SOCIAL FORSKNINGS INSTITUTTET

James McIntosh
Martin D. Munk

11:2002 WORKING PAPER

MOBILITY: A CRITICAL APPRAISAL

RESEARCH DEPARTMENT OF CHILDREN, INTEGRATION AND EQUAL OPPORTUNITY

Mobility: A Critical Appraisal

James McIntosh & Martin D. Munk

Program Area 5
Working Paper 11:2002

Mobility: A Critical Appraisal

James McIntosh[1]

Economics Department
Concordia University
1455 De Maisonneuve Blvd. W.
Montreal Quebec, H3G 1M8, Canada.
and
Social Forsknings Instituttet
Herluf Trolles Gade 11
DK-1052 København K, Denmark.

Martin D. Munk[2]

Social Forsknings Instituttet
Herluf Trolles Gade 11
DK-1052 København K, Denmark

February 26, 2002

[1]Email: jamesm@vax2.concordia.ca
[2]Email: mdm@sfi.dk

Mobility: A Critical Appraisal

ABSTRACT

This paper deals with the methodological and statistical problems that have arisen in the literature which analyzes social and economic mobility. These problems are considered in the context of both simulated data and Danish mobility data on social classes and earnings. We first show that traditional methods used in the analysis of mobility tables will produce biased and, hence, unreliable estimates of the model's parameters if there are individual attributes that can be observed by the researcher like ability, for example. We also show that the schemata that are used to define social classes based on occupational groupings can be tested using classical statistical methods. Using Danish mobility data we found that there were plausible situations where these schemata are rejected by the data. A model of income was developed whose structural parameters could be estimated consistently. This was then estimated on a Danish longitudinal data base in which respondents were surveyed in 1976 and again in 2000. The main conclusions are that household income depends significantly on parental background variables and in spite of the fact that Denmark has many universal social programmes devoted to improving the welfare of its citizens the children of disadvantaged households are much less likely to succeed than the children of parents which are more affluent and have better educational backgrounds.

Mobility: A Critical Appraisal

1 Introduction

This paper deals with the methodological and statistical problems that have arisen in the literature which analyzes social and economic mobility. These problems are considered in the context of both simulated data and Danish mobility data on social classes and earnings. Much of what we have to say about the structure of mobility models has been noted by others. Likewise, our statistical concerns are based on basic widely accepted and well known propositions in econometrics. The points that we make have often been made by other social scientists in areas of economics and sociology that are similar to the analysis of mobility. However, for reasons that are not apparent to us, mobility analysis, by and large, appears to have been left behind and has not benefited from the application of the procedures that would be routinely applied to problems of this sort in other areas of social enquiry. We, therefore, believe that a critical review of the current state of mobility analysis is in order. In our examination of this literature we found many examples of research where the statistical procedures employed are likely to produce biased parameter estimates and where crucial theoretical assumptions were imposed on the data without proper tests of the parameter restrictions implied by the theory. These are serious problems, indeed, and it is our hope that by focusing on them some progress can be made in improving the quality of research in this area.

The paper has the following format. The next section contains a brief literature review. There are a very large number of papers that are relevant one way or another. The issues involve class, inequality, income and wage determination, cognitive skills, and labour markets. Providing an adequate well digested summary of the relevant literature here is a substantial undertaking. Even the narrower area of mobility is complicated by the fact that both economists and sociologists have been prominent contributors. It is interesting to note that the sociologists Featherman and Hauser (1978) were pioneers in the estimation of earnings functions that have come to be so prominent in modern labour economics.

Section 3 deals with the econometric and statistical issues by examining an econometric model of earnings by simulation methods. The data is, of course, artificial but this procedure allows us to demonstrate what can go wrong when the methods that mobility analysts usually use are applied to data with properties that are likely to be observed. It also allows us to show what methods can be used and how well they perform in the estimation of mobility probability models on one hand and earnings functions on the other.

In section 4 we estimate mobility probability models and earnings functions for Denmark using a longitudinal survey in which respondents were first interviewed in 1976 and reinterviewed again in 2000. It contains information about education and occupational position, and parents' education, social group and work position as well as income and wealth variables in 2000. Section 5 ends the paper with a brief discussion of the results.

2 Mobility Studies

Mobility research falls naturally into a number of categories. The most noticeable division is between economic and social mobility but the bulk of the literature concentrates on social mobility so we will discuss this first.

At one level mobility research was motivated by the idea that social mobility told us something about the degree of equality of opportunity or openness characterizing a society. Representatives from various time periods here include Rogoff (1953), Glass (1954), Carlsson (1958), Lipset and Bendix (1959), Svalastoga (1959), Blau and Duncan (1967), Featherman and Hauser (1978), Bourdieu (1986), Erikson and Goldthorpe (1992a), Hansen (1995), Savage and Egerton (1997), and Breen and Goldthorpe (2001). A study by the French sociologist Merllié (1994) gives an overview of the main studies since Benini and Sorokin (1964).

Of the above, Goldthorpe and his associated co-authors deserve special mention as the most prominent modern supporters of the Glass tradition and thus found themselves in conflict with the American school of social mobility, especially Lipset and Bendix and later Hauser and Hout. The essential difference is due the status attainment approach taken by the Americans in contrast to the European class mobility approach. Goldthorpe an colleagues focus on class mobility whereas Blau and Duncan (1967 p. 19) are concerned with "...how the status individuals achieve in their careers is affected by the statuses ascribed to them earlier in life, such as their social origin, ethnic status, region of birth, community, and parental family".

This fundamental difference in terms of philosophical outlook led to different statistical techniques being used. Mobility tables are usually estimated by log-linear models in which cell frequencies are estimated or by conditional logit probability models sometimes involving covariates. Whereas status attainment models have usually been estimated by regression methods.

There are serious statistical problems in both areas of this literature some of which have been mentioned by Kelley (1990) with respect to the procedures used by Goldthorpe. These include omitted variables such as education and family background variables. There can be no doubt that there can be substantial errors of interpretation arising from omitted variables as Korenman and Winship (1999) show in their re-analysis of *The Bell Curve*. But the regression model will also suffer when there are omitted variables or when one improperly conditions on an outcome or what econometricians refer to as an endogenous variable.

Concepts like 'class' or 'status' in mobility analysis have been criticized and discussed within sociology by Blackburn and Prandy (1997), Savage and Egerton (1997), Prandy (1998), Munk (1999), Grusky and Sørensen (1998), and Grusky and Weeden (2001). While these criticisms are clearly valid they go only part of the way in dealing with the methodological and theoretical deficiencies of this type of approach. Prandy suggests that the interesting object is not mobility but immobility which he means the reproduction of advantage. Another important issue is that in much of the literature on class based social mobility there is no clear ordering of social classes, a point emphasized by Kelley (1990 p. 325-327), for example. We will argue in the next two sections that classes must be ordered by the welfare of their members if the concept of class is to be a useful concept.

The importance of class as an organizing principle is in part an empirical issue. However it is not seen in this way in the literature and classification schemes are not seen as testable hypotheses. As we will show using the Danish data class schemata, as represented by parameter restrictions, can be rejected by the data when the constituent occupation variables are used in models which include parents' income, educational level, and gender.

Finally, Sørensen (1986 and 1999) in his critiques of mobility analysis laments the absence of sound theoretical foundations of mobility tables. What he has in mind are models in which occupational choice and labour market characteristics contribute to the explanation of mobility.

Turning now to the literature on economic mobility earnings functions have been analyzed by both economists and sociologists. Early contributions by Featherman and Hauser (1978), as we mentioned in the introduction, and more recently, Korenman and Winship (1999) among many others attempt to see how sensitive an individual's earnings are to family background variables like parent's education, parental earnings and other inherited characteristics. A slightly different approach is followed by Atkinson *et al* (1983), Dearden *et al* (1997), and the work of Solon (1999) and the papers cited there in which the relation between father's and son's income is examined. While this yields a simple index of mobility, namely the regression coefficient attached to the logarithm of the father's 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 this literature 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. Consequently, our focus is on primary or fundamental inheritance mechanisms. Much of our statistical analysis will concentrate on testing this hypothesis. In particular, we will endeavour to determine whether the variation in those family background variables that so much American research has found important in determining individual life time chances is greater within social classes than between social classes.

3 Econometric Issues In Mobility Analysis

There are a number of econometric and statistical issues that are often ignored in the analysis of intergenerational mobility data. Many of these surfaced in the aftermath of the publication of *The Bell Curve* by Herrnstein and Murray (1994). Much of the criticism of this work focused on the statistical methodology that the authors employed. Unfortunately, the lessons learned from this high profile controversy have not been fully absorbed by researchers in the area so we think it is appropriate that a very careful evaluation of the procedures that are commonly used in the analysis of intergenerational mobility be undertaken.

To fix ideas we start with a definition of mobility. A perfectly mobile society is one in which none of the characteristics upon which an individual's success depends is inherited from that individual's parents. This is similar to what Bowles and Gintis (1976) had in mind[3] but this is not the same as the concept of a meritocratic society first advanced by Young (1958) who defined individual merit as 'intelligence and effort together'. In a meritocratic society economic and social rewards are determined by the characteristics that an individual brings to the labour market independently of the way in which they were acquired. But once it is admitted that there are aspects of intelligence (sometimes the term, ability, is used instead of intelligence[4]) or other attributes that are passed from one generation to the next the two concepts become quite distinct.

[3] On page 8 they write "..economic mobility-i.e., the degree to which economic success (income or occupational status) is independent of family background of individuals..

[4] For example, Cawley, Heckman and Vytlacil (2001 p. 420) write: "In a fully meritocratic society, there would be a single wage payment for ability, irrespective of the race and gender of the person in whom the ability is embodied".

While the definition of ability is a subject that generates much dispute among social scientists involved in its determination we believe that there are reasonable measures of ability available and that they can be used in a profitable way in the study of economic and social success (Jencks *et al* (1972), Arrow *et al* (2000), and Savage (2000)). The concept of habitus may be used as a description of the total ability a person has: a proxy for all kinds of ability (see Bourdieu and Passeron (1977) and Bourdieu (1986)). In practice, these definitional problems have not prevented social scientists from using the concept and, as is the case in many modern studies involving earnings functions, innate ability could be partly inherited and plays an important role in determining the amount of education obtained.[5]

As we have stated earlier, inheritance mechanisms determine mobility. To implement this idea we construct the simplest possible model of intergenerational income dynamics. It is a model of individual earnings and educational attainment and it specifies how members of generation t depend on generation $t-1$. Hence, it is a microeconomic model but it serves as the foundation for macroeconomic aggregates like the distribution of earnings. Consequently, intergenerational mobility between income groups is determined by and can only be understood in the context of the dynamics of the model which generates the income distribution in each generation. It is worth noting at this point that models of intergenerational occupational mobility that are so common in the literature lack the micro-foundations that could be provided by models which explain occupational choice, such as that provided by Cawley *et al* (1999). In our view this is a serious deficiency since these models could at least serve as a guide as to what should be included as covariates. As we will see later consistent estimation of the parameters in mobility models is only possible when omitted variable and simultaneous equation biases are removed. For this proper model specification is crucial.

We start by specifying a model which describes the income generation process. We then derive the income distributions that arise from this process. Using artificial data we estimate the parameters of the process from the model itself and from the mobility table that is generated by the model. Naturally, when all the relevant variables can be observed both approaches yield consistent parameter estimates and aside from (statistical) efficiency considerations there is nothing to distinguish them. On the other hand, when there are some important variables that can not be observed by the researcher and incomplete data sets have to be used then serious estimation problems arise. For the income generation model, which is a system of equations, these are easily remedied by conventional econometric techniques. But this is not the case for the estimation of the probability models that describe the mobility data. Parameter biases are significant and we know of no way of dealing with them.

[5]See, for example, Card (1999), Angrist and Krueger (1999), and Crawley *et al* (1999).

To be specific consider the following model. For generation t let the natural logarithms of individual $i's$ income, ability and completed level of education be (y_{it}, a_{it}, e_{it}) and let the same vector for $i's$ parents be $(y_{i,t-1}, a_{i,t-1}, e_{i,t-1})$. The subscripts t and $t-1$ refer to the two generations being considered. Sometimes we will refer to the first generation as the parent's generation and the second as the child's generation. We assume that the following equations generate these variables.

$$y_{it} = \alpha_0 + \alpha_1 e_{it} + \alpha_2 a_{it} + u_{it} \quad (1)$$

$$e_{it} = \beta_0 + \beta_1 y_{i,t-1} + \beta_2 a_{it} + v_{it} \quad (2)$$

Equation (1) says that the natural logarithm of individual $i's$ income depends on the logarithms of ability and education together with a random disturbance term. The second equation specifies the level of education as a stochastic linear function of parental income and ability. These equations are assumed to hold for all generations so that $y_{i,t-2}$ is the income of $i's$ grandparents's. In what follows this system of equations will be referred to as a structural model and the individual equations as structural equations.

In this model a_{it} is referred to as ability. In the model it is determined randomly for each generation. A more realistic representation of intergenerational dependence would have at least part of a child's ability is inherited from its parents.[6] Here the inheritance process is limited to the effects on the individual's life time opportunities of the economic well-being of the household in which it resided as a child. That may be too simplistic as an accurate description of the processes which determine intergenerational earnings mobility but it is sufficiently general to capture the essential issues.

In the model outlined above there is no independent concept of social or economic class. It is, however, possible to generate these from the model. Suppose that there are N individuals in the society that this model describes. Given equations (1) for generations t and $t-1$ and (2) together with data that satisfies these equations it is possible to generate an income distribution or a social class distribution using an index based on individual characteristics, or even other characteristics.

Incidently, it should be pointed out that there is a serious logical problem that arises when sociologists or economists construct a mobility matrix which relates the income distributions of two generations and attempts to explain the associated cell probabilities as conditional probabilities of destination classes when the origin classes are also outcomes of the inheritance process.

[6] Adding the equation $a_{it} = \rho a_{i,t-1} + w_{it}$ does not change any of the conclusions.

To see what the statistical implications of this model are we examine its properties using an artificial data set which we construct to mimic the features of a real data set. This is done in the following way. All of the stochastic error terms are generated from the normal random number generator and by construction u_{it} and v_{it} are independently normally distributed random variables with zero means and unit variances. The rest of the variables are then generated by the model starting from equation (2) for generation $t-1$with a random drawing of $y_{i,t-2}$ from the stationary distribution of income that the system generates. Parameter values are chosen somewhat arbitrarily but they lead to reasonable values of correlations between variables.

Once incomes have been generated they can be ranked to produce an income distribution for each generation. We then summarize the income distributions by three equal income classes where the lower third of the income distribution is referred to as the low income group. When N is equal to 6000 there are 2000 members of each class in each generation.

Income distributions are not the only types of class structures that could be generated by this model. Some of the early work on social mobility focussed on the 'prestige of occupations'. Reiss and Duncan (1961) regressed the sum of the shares of the top two categories of the North-Hatt prestige scale on occupational income and education to get an occupational socio-economic index.

Following this tradition it is possible to generate a socio-economic index which depends on income and education and then instead of generating a set of income classes we could generate a set of occupations which are ranked by their prestige as determined by the index. The important point here is not whether one is concerned with social rank or income inequality but that the model generates both types of class distributions.

The model described above is a model of intergenerational mobility and estimating its parameters tells us everything we need to know about mobility. Social scientists have approached the problem of statistical inference in mobility models either by estimating some of the parameters in equations (1) and (2)[7] or by constructing mobility tables and then estimating the parameters which characterize their cell frequencies or cell probabilities. Table 1 displays the frequencies that arise from the model just described using the parameter values listed at the top of the table. The numbers in square brackets are the frequencies predicted by the probability model underlying the mobility table.

We restrict our analysis to the case where it is impossible to observe ability. This is certainly a realistic case to examine even when there is an agreed definition of the

[7] Clearly, the set parameters which can be estimated depends on what data is available. Due to data limitations many studies confine their analysis to the examination the relationship between y_{it} and $y_{i,t-1}$ See Solon (1999).

TABLE 1

Social Mobility Table
$\alpha_0 = 1$ $\alpha_1 = 0.5$ $\alpha_2 = 0.5$
$\beta_0 = 1$ $\beta_1 = 0.5$ $\beta_2 = 0.5$

Destination Origin	**Low Income**	**Medium Income**	**High Income**
Low Income	861[862.6]	672[663.5]	467[437.9]
Medium Income	682[669.1]	663[686.1]	655[644.7]
High Income	457[462.7]	665[686.1]	878[883.5]

term but it means that no estimates of α_2 or β_2 can be obtained. It also illustrates the statistical problems that arise when researchers are not able to observe all the attributes of individuals in the sample. Constructing this artificial data set from a model whose structure and parameters are known allows us to compare the estimation procedures for each type of model and then decide which approach yields the better research strategy. Is it better to estimate the parameters of the structural model or the probability models underlying the mobility table?

Estimating the parameters of the observable variables, $(\alpha_0, \alpha_1, \beta_0, \beta_1)$ in equations (1) and (2) is straightforward either by system maximum likelihood (both equations simultaneously) or by any instrumental variable procedure. These estimates are shown in the second column of Table 2 together with their standard errors in brackets below the estimate. A star indicates that the parameter is significant at the 5 % level. All of the estimates are within two standard errors of the true value of the parameter so they are consistent in spite of the fact that the ability variable is missing from both equations. It is also possible to estimate the larger system consisting of equations (1), (2), and (1) for generation $t-1$ by the generalized method of moments (GMM) if $y_{t-2,i}$ is available as an instrument. However, maximum likelihood estimates of this larger system are not consistent. For coverage of the econometric terms used here see Greene (2000).

Estimation of ordered probability models, on the other hand, is problematic. When a_{it} is not observable it has to be treated as part of the error term. This means that y_{it} is normally distributed with mean $\mu_{it} = \alpha_0 + \alpha_2 e_{it}$ and variance $\sigma_t^2 = \alpha_1^2 var(a_t) + \sigma_u^2$ and conditional on e_{it} it is independent of $y_{i,t-1}$. Likewise, $y_{i,t-1}$ is normally distributed with mean $\mu_{i,t-1} = \alpha_0 + \alpha_2 e_{i,t-1}$ and variance $\sigma_{t-1}^2 = \alpha_1^2 var(a_{t-1}) + \sigma_u^2$. It is well known that the marginal cell probabilities are given by the equations

$$p_{ki}^1 = \Pr\{y_{ki} \leq \theta_1\} = \Phi(\frac{\theta_1 - \mu_{ki}}{\sigma_k}) \quad (3)$$

$$p_{ki}^2 = \Pr\{\theta_1 < y_{ki} \leq \theta_2\} = \Phi(\frac{\theta_2 - \mu_{ki}}{\sigma_k}) - \Phi(\frac{\theta_1 - \mu_{ki}}{\sigma_k}) \quad (4)$$

$$p_{ki}^3 = \Pr\{y_{ki} > \theta_1\} = 1 - \Phi(\frac{\theta_2 - \mu_{ki}}{\sigma_k}) \quad (5)$$

where $k = t$ or $t-1$, Φ is the cumulative unit normal distribution function, $\theta_1 < \theta_2$ are threshold points to be estimated, and σ_u^2 is the variance of $u_{i,t-1}$ and u_{it} which is assumed to be equal to one. Readers not familiar with ordered probability models will find Maddala (1983) a useful reference.

From the conditional independence of y_{it} and $y_{i,t-1}$ it logically follows that the joint distribution y_{it} and $y_{i,t-1}$ is the product of the marginal distributions so that the cell probabilities can be written as $p(i,j,\ell) = p_{i,t-1}^j p_{it}^\ell$ whose parameters can be estimated by maximizing the sample likelihood function. It is also possible to estimate α_0 and α_1 from the marginal distribution of y_t alone.[8] These estimates are shown in the third column of table 2 together with two additional gamma parameters which arise when the term $\gamma_1 o_{i1} + \gamma_2 o_{i2}$ is added to μ_{it}. o_{i1} and o_{i2} are dummy variables which take the value 1 if $i's$ parents were in the low or medium income group, respectively.

These estimates are not consistent. There is no estimate of α_0 since the procedure estimates $(\theta_1 - \alpha_0)/\sigma_t$, $(\theta_2 - \alpha_0)/\sigma_t$ and α_1/σ_t, but the estimate of the last coefficient overestimates its true value by more than forty percent and what is more disturbing it falsely attributes significant effects to parents' incomes as evidenced by the significant values of the parental income group parameters, (γ_1, γ_2), which are not related to the process of acquiring educational skills. It is clear that when education in equation (1) is replaced by its defined value in equation (2) y_{it} and $y_{i,t-1}$ are correlated. When ability is omitted from equation (1) and parent's income is included it becomes significant indicating that there is some sort of intergenerational income effect. But this is spurious and it appears because ability is missing from equation (1).

Two further points are worth noting. First the parameter biases lead to biases in the odds of approximately the same size as the parameter biases, although odds ratios are less affected. Secondly, even when ability is not included in the model this does not prevent it from fitting the data reasonably well. The numbers in square brackets in Table

[8] Both procedures yield very similar estimates and they both yield consistent estimates of $(\alpha_0, \alpha_1, \alpha_2, \beta_0, \beta_1, \beta_2)$ in the case when ability can be observed.

TABLE 2

Parameter Estimates For Structural And Probability Models

Variables And Associated Parameter	True Value	Regression Model	Variables And Associated Parameter	True Value	Probability Model
Constant: α_o	1.0	1.012*			
		(0.044)			
Education: α_1	0.5	0.496*	Education: α_1/σ_t	0.446	0.628*
		(0.021)			(0.015)
Constant: β_0	1.0	0.992*	Origin: γ_1/σ_t	0	-0.230*
					(0.026)
Income: β_1	0.5	0.499*	Origin : γ_2/σ_t	0	-0.068*
		(0.010)			

1 are the frequencies predicted by the model whose parameter estimates appear in the right hand panel of Table 2. While having good predictions is desirable, the downside is that the Pearson χ^2 goodness of fit statistic does not reject the model although it is obviously not correct.

It is possible to get consistent estimates of $\alpha_1\beta_1/\sigma_t$ from the reduced form of the model which is obtained by substituting equation (2) for e_{it} in equation (1). But this coefficient combines information on the effects of education on income together with the effects parental income on the child's educational attainment. Since the whole purpose of mobility studies is to separate these effects this information is of little value.

This exercise may seem somewhat arbitrary and to a certain extent it is in the sense that the size of the biases depend on the particulars of the parameter values chosen. However, it should be clearly understood that there is nothing unusual about this particular set of simulations. In all of the examples that we considered the estimated coefficients were always many standard errors away from their true values. Whether the biases are twenty-five or fifty percent or something else depends on the parameter values chosen. Since the simulation model is extremely simple we leave it to sceptical readers to examine its properties themselves.

TABLE 3

Danish Social Mobility Table: 1976-2000 (N=2006)

Destination Origin	**Class I 2000**	**Class II 2000**	**Class III 2000**	**Class IV 2000**
Class I 1976	215[230.1]	175[147.9]	237[245.9]	145[148.5]
Class II 1976	86[73.5]	67[75.5]	135[143.6]	109[100.4]
Class III 1976	67[65.6]	61[70.7]	148[134.3]	86[91.4]
Class IV 1976	44[46.0]	63[67.6]	187[173.8]	181[185.2]

4 An Analysis of Danish Mobility Data

The purpose of the previous section was to highlight some of the problems concerning statistical inference which arise in the analysis of mobility data when some of the important variables can not be observed by the researcher. The implications of those results are that it is preferable wherever possible to estimate the structural equations that generate the data underlying the mobility tables or possibly to choose the data in such a way which is amenable to consistent estimation. In this section we will turn our attention to the estimation of both mobility based probability models and linear structural equation models using sample survey data from a Danish longitudinal study which identified a set of respondents in 1976 and then resurveyed them in 2000.

Table 3 contains the mobility data. For the year 2000 all individuals were assigned a class based on the set of occupational groupings listed in Table 4A. Occupational groupings differ for the year 1976 because of changes in definitions of occupations and reassignment of occupations to different classes. These occupations are listed in Table 4B together with the class to which they were assigned in 1976 and the average household income of the respondent's income in the year 2000. The largest changes occur in the treatment of the self-employed partly because of the decline in the importance of agriculture in Danish society.

The occupational classifications and mean incomes for each class are displayed in Table 4 for the year 2000.[9] The 'economic' features of this table raise serious method-

[9]Here income means household income. Unfortunately the survey contains no information on indi-

ological problems for us. For reasons outlined below we think that the notion of class should involve some aspect of welfare as characterized by the material well-being of the individuals under consideration. Suitable definitions should be based on profiles of individual variables like income, wealth, and labour force participation over a sufficiently long period to reflect the individual's long term characteristics together with education and contact with state organizations like the criminal justice system or local welfare agencies. A simple consequence of this observation is that for a class schema to have any meaning the categories must be ordered. That is, all of the members of Class I should be better off in some sense than those in Class II etc.

This may not be the case for the scheme used to construct the Danish classification system. We illustrate the point by using income as an example but what happen with income may very well be true for other measures of welfare. Although the social classes are ordered by mean monthly household incomes there is more income variation within classes than between classes as measured by the differences in class means. Furthermore, each class has many families whose incomes are higher than the mean income of the class above it. The proportion of each class in this category is given by Π_+. Similarly, Π_- is the proportion of the class whose income is below the mean income of the class below it. For Class II these numbers are 27.4 and 48.2. There is also considerable variation in the occupational income means within each class as shown by the data in the third column of Table 4B. With respect to this type of classification the variation in education in both generations mimics that of income. It is, therefore, hard to see how the analysis of the social mobility data in summarized in Table 3 can provide any real insight into the economic mobility of individuals whatever the measure of welfare is being used.

Economic mobility or welfare mobility[10] to use a broader term is the key issue here because this is what matters in terms of inheritance mechanisms. The vast majority of the research that we have looked at provides overwhelming support for the proposition that the economic and social environment of the family in which an individual was raised is crucial in determining that person's life time chances. A representative sample of this literature which spans both economics and sociology includes Featherman and Hauser (1978 p. 235), Bowles and Gintis (1976 p. 113), Korenman and Winship (2000 p. 147-156), Mayer (1997 p. 173-174), Dearden *et al* (1997 p. 60) and Fischer *et al* (1996 p. 232-239). Even the authors of *The Bell Curve*, Herrnstein and Murray (1994), acknowledge that there is a role for the parent's socio-economic status as a determinant the child's success.

vidual incomes for the year 2000 nor is there any information on the income of the househould in which the respondent was born.

[10]See Munk 2000 for the concept of welfare capital.

TABLE 4

Occupations Class Compositions And Average Incomes

Class Number	Constituent Occupation Numbers	Average Income (Standard Deviation)	Π_+	Π_-
I	1,2,3,4	54.45 (17.41)	-	18.2
II	5,6,7	37.47 (20.48)	27.4	48.2
III	8,9,10	35.97 (18.76)	50.1	48.2
IV	11	24.74 (18.80)	23.7	-

TABLE 4A

2000 Occupation Numbers And Names

Occupation Number	Name
1	Non-farm Large Entrepreneurs
2	High Grade Professionals
3	Non-Farm Medium Entrepreneurs
4	Medium Grade Professionals
5	Self-Employed Small Farmers
6	Self-Employed Craftsmen
7	Low Grade Professionals
8	Agricultural Small Holders
9	Routine Non-Manual Workers
10	Skilled Workers
11	Unskilled Workers

TABLE 4B

1976 Class Numbers, Occupation Names And Average Incomes

1976 Class Number	Name	Income
I	Non-farm Large Entrepreneurs	54.29
I	Non-Farm Medium Entrepreneurs	39.69
II	Non-Farm Small Entrepreneurs	38.57
II	Self-Employed Craft Workers	36.09
I	Self-Employed Professionals	58.13
I	Higher Grade Professionals	47.85
I	Lower Grade Professionals	42.89
I	Administrative Civil Servant	42.72
I	Ordinary State Employees	40.64
III	Routine Non-Manual Workers	37.11
III	Skilled Labour	35.25
IV	Unskilled Labour	32.88
I	Large Agricultural Land Holders	29.17
II	Small Agricultural Land Holders	28.82
III	Self-Employed Agricultural Workers	30.35
IV	Paid Agricultural Workers	27.83

4.1 Occupational Mobility

In spite of our reservations about Mobility Table estimation for the sake of completeness and comparability we will estimate a model which utilizes the mobility data. Researchers in this area usually employ conditional multinomial logit probability models for the analysis of this type of data, although log-linear models have been used. That was our initial strategy[11] but we experienced convergence difficulties so we used an ordered normal probability model with mean

$$\mu_i = \delta_1 \ln(Age_i) + \delta_2 Sex_i + \sum_{j=1}^{3} \omega_j o_{ji} + \sum_{j=1}^{6} \eta_j r_{ij} + \sum_{j=1}^{6} \varphi_j f_{ij} \tag{6}$$

where r_{ij} and f_{ij} are dummy variables representing the respondent's and the respondent's father's education levels, respectively. There is no constant term in the mean function since that is estimated as part of the normalized threshold points. Age is included to control for life-cycle effects. Instead of using a gender dummy we could have estimated the model separately for men and women but the sample sizes were too small for that. Parameter estimates are shown in Table 5 for the model which includes all variables except a set of dummy variables for father's education which as a group are not significant. The terms in square brackets in Table 3 are the estimated cell frequencies based on these parameter estimates.

By looking at the increase in the likelihood function as more variables are included it is apparent that while age, sex, and the origin dummies are significant it is the set of educational dummies that provide the bulk of the explanation. Including these education dummies is desirable on the grounds that their absence increases the omitted variable bias problem. On the other hand, their inclusion creates a bias of another sort. As we will argue later, education is an 'outcome' or endogenous variable and depends on parental background variables as well as ability. Consequently, all of the parameter estimates will be biased for the same reasons that they were in the example based on the artificial data. While the experimental results of the previous section suggested that biases might be present it provided no information as to how big they would be. However, Savage and Egerton (1997 p. 663) estimated conditional logit models using data from the British National Child Development Study and found very large differences in estimated coefficients across ability categories. Thus, the problem is real and potentially serious.

The estimates in Table 5 arise from the model which includes the child's education

[11] We did estimate an unordered logit model based on a three catagory representation of the two education variables. When this is compared with the ordered probit model with the same reduced educational variables the results are similar.

TABLE 5

Parameter Estimates For The Mobility Model (N=2006)

Variable And Associated Parameter	**Parameter Estimate (Standard Error)**
$ln(Age)$: δ_1	-0.403*
	(0.178)
Sex: δ_2:	-0.247*
	(0.053)
Origin Class I: ω_1	-0.465*
	(0.068)
Origin Class II: ω_2	-0.306*
	(0.078)
Origin Class III: ω_3	-0.287
	(0.079)
Variables Included	**Ln Likelihood Function**
None	-2714.50
+ Age and Sex	-2648.02
+ Origin Class (3 Dummies)	-2588.06
+ Own Education (6 Dummies)	-2138.12
+ Father's Education (6 Dummies)	-2131.10

and the origin dummies but not the father's education dummies. These estimates arouse suspicions for two reasons. First, the coefficient of the Class II origin dummy is not significantly different from that of Class III so that differentiation in the middle of the mobility table is not informative. The problem is that this result may not be correct being just an artifact of the estimation procedure. There is no way of telling, however. Secondly, mobility indexes, like the Shorrocks (1978) index, show that mobility is higher when the child's education variables are not included as regressors in the probability model. Although this may appear surprising at first glance this is exactly what should happen if the father's occupation plays a significant role in the educational attainment levels of the next generation. Without education the Shorrocks index is 0.959; when education is included it falls to the more believable level of 0.792. What is worrisome here is that leaving out other significant origin variables may leave a mobility index which is too high.

4.2 Earnings Mobility

As an alternative to this rather broad occupational classification we examine the determinants of household earnings. Since this variable is somewhat more welfare oriented than these occupational classes we think that it is a more relevant measure on which to base mobility calculations. In addition it is one whose analysis is less fraught with statistical problems. Earnings and education equation parameter estimates are displayed in Table 6. The two equations are similar to equations (1) and (2) above with a vector of father's occupation and educational dummies replacing father's or parents household income since neither of these was available in the survey. The use of dummy variables here is acceptable here if there is no significant within category variation in these variables.[12]

We follow Kohler and Mathieu (1990) in using the mean household income of the educational group to which the child belongs to represent the child's educational variable in equations (1) and (2) instead of a set of dummy variables. This simplifies the analysis considerably although it may introduce some measurement error into the system.

All of the variables are significant with sex and age being the most important. While significant, including own education does not lead to the same large increase in the likelihood function that occurred in the probability model underlying the mobility table. Adding occupation to age and sex leads to a significant increase in the likelihood function and the increase is much larger than adding the origin social class to which the father belonged. Consequently, when it comes to earnings mobility, origin social class provides no useful information that is not already contained in the father's occupation and there

[12]See Breslaw and McIntosh (1998) for a discussion of some of the problems that arise when ordered categorical variables are represenred by a set of dummy variables.

TABLE 6

Parameter Estimates For The Structural Model (N=1871)

Earnings Variables And Associated Parameters	**Estimate (s.e.)**	**Education Variables And Associated Parameters**	**Estimate (s.e.)**
Education: α_1	1.294*		
	(0.033)		
$ln(Age)$: α_2	-0.896*	$ln(Age)$: β_2	-1.183*
	(0.071)		(0.055)
Sex: α_3	0.041	Sex: β_3	0.088*
	(0.024)		(0.017)

Variables Included	**Ln Likelihood Function**
None	-2544.20
+ $ln(Age)$ and Sex	-2076.11
+ Father's Occupation (14 dummies)	-2023.07
+ Father's Education (6 dummies)	-2010.96
+ Own Education	-2000.66

is useful information contained in the detailed occupational specification that researchers would not have access to if they focused only on social class origins.

As we mentioned in the discussion of the artificial data equation maximum likelihood estimation of the system consisting of the earnings and education equations would produce consistent parameter estimates. Simultaneous equation estimation clearly makes a difference here since the ordinary least squares estimate of the logarithm of the education variable is 0.840 which is substantially below the estimate shown in Table 6. Measurement error biases appear not to very important since the GMM estimates for this system are similar to those reported in Table 6.

5 Discussion

There are two quite separate approaches to the study of social and economic mobility. Many researchers have focussed on occupation based class mobility. Representative of this very large literature is Hout and Hauser (1992), Goldthorpe (1987) or Erikson and Goldthorpe (1992) although there is considerable diversity and disagreements and controversy among social mobility analysts. Other researchers have concentrated on earnings mobility. Early studies include Featherman and Hauser (1978), Atkinson *et al* (1983) and more recently Dearden *et al* (1997).

There are a number of issues to be considered here. The first concerns the aggregation of occupations into classes and whether this can be justified on statistical grounds. Secondly, there are very basic questions involving the choice of what is included in the broad groupings of origin and destination occupations and whether these class schemata can be informative about the issue of social or economic mobility and a third is whether the constituent occupations, themselves, have sufficient content to explain a significant proportion of the variation in the an individual's success. Finally, there are some problems with earnings mobility models that need to be mentioned.

A classification scheme is an aggregation rule which imposes the condition that the regression coefficients are the same for all the occupations in each group or class. Seen this way it is straightforward to carry out a likelihood ratio test to see whether the classification scheme is consistent with the data. We found that for the earnings data that the Danish social classification scheme was not supported. The results for the mobility table are not so clear since they depend on which covariates are included as regressors. When own education is included no significant improvement in the likelihood function is obtained by exchanging the class origin dummies for the occupation dummies. But when own education is not included the hypothesis that all of the occupations have the same coefficient as the other occupations in their class is strongly rejected by the data.[13] Since the derivatives of the analysis like odds ratios will share the biases of the parameter estimates that arise because unwarranted restrictions were imposed on the estimated model one should view any conclusions with considerable care unless some statistical justification is given for the rules which determine class membership.

But this is just a symptom of a more fundamental methodological problem. Many social mobility models appear not to be statistically reproducible in the sense that the origin classifications are not significant in the explanation of the destination classifications when other regressors are available. Reproducibility is necessary for the paradigm to be a useful one.

With regard to the second issue the crucial questions are whether the occupational groups can be ordered in some meaningful way. This means that there is some way of ranking the classes in which individuals in different classes attain different levels of welfare in terms of their earnings or consumption expenditure, employment opportunities, housing and school quality, health care accessibility or some index number based on these items. Our reason for taking this position is based on the presumption that these characteristics, which are more properly seen as features of households, are the fundamental

[13] The choice here is a hard one: include own education and be exposed to simultaneous equation bias; leave it out and the statistical justification for the class scheme goes with it!

ingredients of the inheritance process by which children acquire skills and attitudes that shape their opportunities as adults. Social mobility researchers usually assume that the classification scheme which selects occupations is nominal or unordered although some comparisons can be made between some of the classes.

The basic criterion underlying the Goldthorpe-Erikson (1992 p. 36) schema, for example, 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.[14] Since this classification tells us almost nothing about the welfare of the individual in question it is, in our view, uninformative.[15]

The occupations which comprise origin social classes certainly contain additional information about an individual's life chances but as we have already seen from the Danish data and from American and British longitudinal surveys that family background variables like parental educational qualifications and household income explain a significant amount of an individual variation in earnings. As result it seems that the attempt by Grusky and Sørensen (1998) to rescue class analysis by replacing broad social classifications of occupations by the occupations themselves will not be successful. While they may provide sociologists with a better model of occupational mobility this approach is less than adequate in revealing the structure of inheritance mechanisms because there is so much variation in welfare within each occupation.

While mobility models based on earnings satisfy the axiom of statistical reproducibility in that child earnings are correlated with parent earnings and in addition child educational attainments are correlated with those of their parents there are some problems associated with use of income as measure of welfare. Although consumption expenditure would be perhaps a better indicator of welfare, for low income families household income is an excellent measure of welfare because most of the problems that they experience can be remedied by increasing their incomes. This simple fact serves as the rationale for income support schemes like unemployment insurance and social assistance programmes that operate almost universally in Western Europe and North America. For higher income families the issue is not so clear. Income is only one dimension of well-being. There

[14]In Erikson-Goldthorpe (page 44) the classes are nominal but Breen and Goldthorpe (2001 p. 82) talk about the 'social desirability' of classes which suggests that they could be represented by an ordered set of classes generated by a latent variable representing 'social desirability' crossing thresholds. On the other hand, all of the empirical work that we have looked at uses either log-linear models or multinomial logit models neither of which imposes any order on the classes.

[15]We are not the first to make this point Kelly (1990 p.325) writes: "*the lack of hierarchy*-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.

are many occupations that have high salaries attached to them but also have disagreeable attributes like stress or excessive time requirements. Some individuals might prefer the lower paid jobs, all things considered. We should, therefore, be alert to the possibility that large changes in income would be required to encourage individuals to change occupations and that the distribution of welfare could be quite different from the distribution of income in terms of ranking individuals. Since earnings are determined in labour markets they are dependent on both the characteristics that individuals bring to the market and the way the market values these characteristics. Since our earnings equations do not include the firm and sector specific variables that are usually used to explain wages or incomes our parameter estimates could be biased if these excluded variables are correlated with any of the included regressors.[16]

Readers should also be warned that as father's social class was revealed to be a poor alternative to father's occupation, father's occupation itself may be equally irrelevant when a complete set of household and family background variables are available. With that caveat in mind we end with some computations that show how mobile Danish society is.

Using the model whose parameter estimates appear in Table 6 we compute the average probabilities of being low or high income using the fact that natural logarithm of household income is assumed to be normally distributed. Here the definition of low income is one standard deviation below mean of the logarithm income. High income is one standard deviation above the mean. Four averages were computed in Table 7, two for low income occupations and two for high income occupations.

In spite of the fact that Denmark has a comprehensive and sophisticated set of welfare programmes and a relatively well financed educational system an individual's success is very much determined by how successful that individual's parents were.

As Table 7 shows the children of self-employed professionals: lawyers, doctors etc. are 4.3 times as likely to earn high incomes and 28 times less likely to be low income as the children of paid agricultural workers. This is, perhaps, not surprising in the light of Table 6 where it was shown that father's occupation and educational qualifications explained more of the variation in earnings than did own education. The ingredients of success: ambition, discipline, and the appreciation of the benefits of education are characteristics that are strongly influenced by the home environment in which one grows up as a child. High income professional households appear to promote these values more than low income families do. They also have more resources to allocate to children and better access to the institutions that are important in the child's development.

[16]Good summaries of the labour economics literature on earnings functions may be found in Angrist and Krueger (1999) and Card (1999).

TABLE 7

Selected Occupational Transition Probabilities

Father's Occupation	**Probability of Low Income**	**Probability of High Income**
#4 Paid Agricultural Workers	0.28	0.10
#6 Unskilled Labour	0.19	0.15
#9 Higher Grade Professionals	0.04	0.26
#12 Self-Employed Professionals	0.01	0.43

More equality in the determination of life time chances is, of course, a desirable policy objective. How this is to be achieved, however, is a question that needs to be addressed. Our results say something about mobility in the sense that they identify some of the processes determining the inheritance of characteristics on which success depends. On the other hand, they tell us very little about how meritocratic Danish society is.

6 Acknowledgment

The authors wish to thank Erik Jørgen Hansen under whose direction the data used in this study was collected for his helpful comments on and interest in our work. We also thank Robert Blackburn for his detailed comments on an earlier version and John Goldthorpe for his lengthy response to our paper.

References

[1] Angrist, J. and A. Krueger Empirical Strategies in Labor Economics. Ch 23 in Ashenfelter and Card 1999

[2] Arrow K., S. Bowles and S. Durlauf. Meritocracy and Economic Inequality. Princeton University Press, Princeton 2000

[3] Ashenfelter, O., and D. Card. Handbook of Labor Economics, V. 3. Elsevier, Amsterdam 1999

[4] Atkinson, A.B, A.K. Maynard and C.G. Trinder Parents and Children, Incomes in two Generations, Heinemann Educational Books, London, 1983

[5] Blackburn, R. M. and K. Prandy. 'The Reproduction of Social Inequality', Sociology 31, 491-509, 1997

[6] Blau, P. and O. D. Duncan. The American Occupational Structure, New York John Wiley 1967

[7] Bowles, S. and H. Gintis. Schooling in Capitalist America, Basic Books, New York, 1976

[8] Bourdieu, P. and J.-C. Passeron. Reproduction in Education, Society and Culture, [1970], London, Sage Publications 1977

[9] Bourdieu, P. Distinction: A Social Critique of the Judgement of Taste, London, Routledge and Kegan Paul [1979] 1986

[10] Breen, R. and J. H. Goldthorpe. Class, Mobility and Merit, the Experience of two British Birth cohorts, European Sociological Review, 17, 81-101, 2001

[11] Breslaw, J. and J. McIntosh. Simulated variable estimation of models with ordered categorical data", Journal of Econometrics, 87, 25-47, 1998

[12] Card, D. 'The Causal Effects of Education on Earnings' Ch 30 in Ashenfelter 1999

[13] Carlsson, Gösta. Social Mobility and Class Structure Lund, CWK Gleerup 1958

[14] Cawley, J,. J. Heckman, and E. Vytlacil. Meritocracy in America: Wages Within and Across Occupations, Industrial Relations, 38, 250-296, 1999

[15] Cawley, J,. J. Heckman, L. Lochner, and E. Vytlacil. 'Understanding the Role of Cognitive Ability in Accounting for the Recent Rise in the Economic Return to Education'. Ch 9 in Arrow 2000

[16] Cawley, J,. J. Heckman and E. Vytlacil. Three observations on wages and measured cognitive ability, Labor Economics, 8, 419-442, 2001

[17] Dearden, L., S. Machin and H. Reed. Intergenerational Mobility In Britain, The Economic Journal, 107, 47-66, 1997

[18] Erikson, R. and J. H. Goldthorpe. The Constant Flux, Oxford, Clarendon Press 1992a

[19] Erikson, R. and J.H. Goldthorpe. 'The CASMIN project and the American dream', European Sociological Review, 8, 283-305, 1992b

[20] Featherman, D. L. and R. M. Hauser. Opportunity and Change, New York, Academic Press 1978

[21] Fischer, C., M. Hout, M.S. Jankowski, S.R. Lucas, A. Swidler, and K. Voss. Inequality by Design: Cracking the Bell Curve Myth, Princeton, NJ: Princeton University Press, 1996

[22] Glass, D. (ed). Social mobility in Britain, London, Routledge 1954

[23] Goldthorpe, J. H. and K. Hope. The Social Grading of Occupations. A New Approach and Scale, Oxford, Clarendon Press 1974

[24] Goldthorpe, J.H. et al. Social Mobility and Class Structure in Modern Britain, Oxford, Clarendon Press [1980] 2. ed. 1987

[25] Greene, W.H. Econometric Analysis, 4^{rd} Edition. Prentice Hall, Upper Saddle River New Jersey USA, 2000

[26] Goldthorpe, J. H. Consensus and Controversy, eds. Clark, Modgil and Modgil, London, The Falmer Press 1990

[27] Goldthorpe, J. H. and G. Marshall. 'The promising Future of Class Analysis: A Response to Recent Critiques', Sociology, 26, 381-400, 1992

[28] Grusky, D. and J. B. Sørensen. Can Class Analysis Be Salvaged, American Journal of Sociology, 103, 1187-1234, 1998

[29] Grusky, D. and K. Weeden. Decomposition Without Death: A Research Agenda for a New Class Analysis, Acta Sociologica, 44, 203-218, 2001

[30] Hansen, E. J. En generation blev voksen, København, Socialforskningsinstituttet, report 95: 8, 1995 (English summary 1996)

[31] Hansen, E. J. The first generation in the welfare state, a cohort analysis, København, Socialforskningsinstituttet, report 96:4, 1996

[32] Hernstein, R. and C. Murray. The Bell Curve Free Press New York 1994

[33] Hout, M. and R. Hauser 'Symmetry and Hierarchy in Social Mobility: A Methodological Analysis of the CASMIN Model of Class Mobility' European Sociological Review, 8, 239-266, 1992

[34] Kelley, J. 'The failure of a paradigm: Log linear models of social mobility', in Clark et al. John H. Goldthorpe: Consensus and Controversy, London, Falmer Press, 319-346, 1990

[35] Kohler, S. S. and J.E. Mathieu. "A Cross-Level Examination of Group Absence Influences on Individual Absence. Journal of Applied Psychology,75, 217-220, 1990

[36] Korenman, S and C. Winship. A Reanalysis of The Bell Curve: Intelligence, Family Background, and Schooling. Ch. 7 in Arrow 2000

[37] Lipset, S. M. and R. Bendix. Social Mobility in Industrial Society, Berkeley, Los Angeles, University of California Press 1959

[38] Maddala, G. Limited Dependent and Qualitative Variables in Econometrics. Cambridge University Press, New York, 1983

[39] Mayer, S. What Money Can't Buy: Family Income and Children's Life Chances. Harvard University Press, Cambridge USA, 1997

[40] Merllié, D. Les enquêtes de mobilité sociales, Paris, PUF 1994

[41] Munk, M. D. Livsbaner gennem et felt, En analyse af eliteidraetsudoeveres sociale mobilitet og rekonversioner af kapital i det sociale rum, Department of Sociology, Lund University, Doctoral Dissertation 28, 1999

[42] Munk, M. D. Reconversions of Educational Capital in the Welfare State, in Education and Work 1999-2000, 2000

[43] Prandy. K. Class and Continuity Social Reproduction: An Empirical Investigation, The Sociological Review, 36, 341-364, 1998

[44] Reiss, Albert J. and O. D. Duncan. Occupations and Social Status, with Otis D. Duncan/Paul Hatt/Cecil North, New York, The Free Press of Glencoe, Inc. 1961

[45] Rogoff, N. 'Social Stratification in France and in the United States', The American Journal of Sociology, LVIII, 347-357, 1953

[46] Savage, M. and M. Egerton. 'Social Mobility, Individual Ability and the Inheritance of Class Inequality', Sociology, 31, 645-672, 1997

[47] Savage, M. Class Analysis and Social Transformation, Sage, London, 2000

[48] Shorrocks, A.F. The Measurement of Mobility, Econometrica, 46, 1013-1024, 1978

[49] Solon, G. 'Intergenerational Mobility in the Labor Market' Ch. 20 in Ashenfelter 1999

[50] Sorokin, P. A. Social Mobility and Cultural Mobility, New York, The Free Press [1927] 1959/1964

[51] Svalastoga, K. Prestige, Class and Mobility, København, Gyldendal 1959

[52] Sørensen, A. B. 'Processes of Allocation to Open and Closed Positions in Social Structure', Zeitschrift für Sociologie, 12, 203-224, 1983

[53] Sørensen, A. B. 'Theory and methodology in social stratification', ed. Ulf Himmelstrand, Sociology: from crisis to science?, The sociology of action, London, Sage Publications, 79-95, 1986

[54] Sørensen, A. B. Statistical Models and Mechanisms of Social Processes, Paper presented at the Annual Meetings of the Swedish Sociological Association, University of Stockholm, January 1999 (www.harvard.edu)

[55] Young, M. The rise of the meritocracy 1870-2033: an essay on education and equality, London, Thames and Hudson 1958