# **Swedish Institute for Social Research (SOFI)**

## **Stockholm University**

WORKING PAPER 6/2012

## NO WAY BACK UP FROM RATCHETING DOWN? A CRITIQUE OF THE 'MICROCLASS' APPROACH TO THE ANALYSIS OF SOCIAL MOBILITY

by

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### Abstract

'Microclasses', detailed occupational groups, have recently been suggested as the basis of research in social stratification; occupations represent 'real' social groups in contrast to the purely 'nominal' categories of either 'big class' schemata or socioeconomic status scales. In a recent paper, Jonsson et al. apply the microclass approach in social mobility research. They claim to show that a strong propensity exists for intergenerational occupational inheritance, and that such inheritance is the dominant factor in social reproduction and limits equality of opportunity. We model the same large-scale Swedish dataset as is used by these authors. We show (i) that while with many occupational groups a marked degree of intergenerational inheritance occurs among men, such inheritance is far less apparent among women, and, for both men and women, accounts for less than half of the total association in the occupational mobility table; (ii) that the microclass approach does not deal in a theoretically consistent way with the remaining association underlying patterns of occupational mobility since appeal is made to the theoretically alien idea of 'socioeconomic closeness'; and (iii) that a standard class approach, modified to account for occupational inheritance, can provide a more integrated understanding of patterns of immobility and mobility alike. We also give reasons for doubting if it will prove possible to establish a theoretically consistent microclass approach to explaining intergenerational mobility propensities. Finally, on the basis of our empirical results and of the relevant philosophical literature, we argue that the microclass approach is unlikely to be helpful in addressing normative questions of equality of opportunity.

### Keywords

Microclass, social class, intergenerational mobility, Sweden, equality of opportunity

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#### Introduction

Over the last decade, David Grusky, together with a number of associates, has argued that if claims of the 'death of class' (e.g. Pakulski and Waters, 1996; Kingston, 2000) are to be effectively resisted, a radical reorientation of class analysis is required (Grusky and Sørensen, 1998; Grusky, Weeden and Sorensen, 2000; Grusky and Weeden, 2001, 2002; Grusky and Galescu, 2005a,b). The 'big class' concepts that are typically applied, whether from a neo-Marxist or a neo-Weberian standpoint, have to be recognized as having, at least in modern societies, no more than 'nominal' significance. They relate simply to aggregates of individuals allocated to one or other class category according to criteria that are imposed by the analyst rather than mapping out actual socio-cultural entities recognized by and meaningful to their members. 'Big classes' therefore provide an inadequate basis for understanding and demonstrating the extent of class-based attitudes and behaviour and forms of collective action. In order for class analysts to overcome this problem and to move towards more 'realist' concepts of class, the level of analysis needs to be 'ratcheted down' to that of detailed occupational groups, occupying specific niches within the division of labour and understood, from a neo-Durkheimian standpoint, as 'microclasses'. For it is only at this level that individuals are brought together at 'the site of production', through processes of selection (including selfselection) and socialization, into collectivities with which they can identify and which create among them a sense of a shared way of life and shared interests.

The microclass initiative has already attracted some amount of sceptical commentary relating to theoretical and empirical issues that arise at a rather general level (Birkelund, 2002; Goldthorpe, 2002, 2007, vol. 2, ch.6; Brooks and Svallfors, 2010). In the present paper we investigate the suitability of the microclass approach for the analysis of intergenerational social mobility. We do this in relation to, and as a critique of, a recent paper (2009) by Jonsson, Grusky, Di Carlo, Pollak and Brinton (henceforth JGDPB). As this attempt of theirs does follow on from the

previous work of Grusky and his associates in a highly consistent way, the analysis we present here necessarily carries wider implications for the microclass approach.

Two rival approaches have for long been established in the field of social mobility research: the 'gradational' approach that sees mobility as occurring within a continuous social hierarchy, typically, one of socioeconomic status; and the 'class' approach that sees mobility as occurring within a discontinuous class structure, with class positions being defined in terms of relations within labour markets and production units. JGDPB question whether these two approaches, even if taken together, can provide an adequate basis for capturing the full extent of the 'rigidities' that exist within the mobility regimes of modern societies, or thus for revealing the full extent of inequalities of opportunity. What is overlooked, they maintain, is that it is only at the occupational, or microclass, level that certain mechanisms operate that are crucial to processes of 'social reproduction': in particular, the intergenerational transmission of 'occupation-specific' human, cultural and social capital and various more institutionalized forms of 'social closure'. In the gradational approach these mechanisms are left out of account because of the assumption that children have 'generic access' to all occupations of similar ranking in the socioeconomic hierarchy; and in the class approach, because of the assumption that it is class-linked, rather than occupation-linked, resources and opportunities that predominantly determine mobility chances.

JGDPB then propose, and aim to implement, a new programme for social mobility research based on microclass analysis. We recognize that in this way they are able to add to our knowledge of how occupation-specific processes contribute to intergenerational class immobility. However, while sharing their reservations about the gradational approach, we doubt that their new programme is capable of actually competing with, and perhaps substituting for, the standard class approach. We use a compilation of census data for Sweden in order to scrutinise empirically the application of the microclass approach to the analysis of social mobility in this country - one of the few, we argue, for which datasets can be formed of sufficient size to allow for individuals to be coded to detailed occupational groups as well as to 'big classes'. The results of our analyses bring out a number of different problems. While a tendency for occupational immobility does show up as between sons and their fathers, this is far less the case as between daughters and their fathers - or as between daughters and their mothers - and even in the case of sons and fathers the tendency for immobility is guite variable across occupations. Further, this variation is clearly related to father's class, and as regards individuals' occupational attainment overall, whether entailing immobility or mobility, this proves to be structured far more by father's social class than by father's occupation within a given class. A further focus of our critique is in fact on the failure of exponents of the microclass approach to treat immobility and mobility in a theoretically consistent way. We show how, with our Swedish occupational mobility tables at least, JGDPB would have done better by modelling occupational immobility in conjunction with a model of both immobility and mobility deriving from the class approach than through the hybrid microclass and gradational model that they actually apply, although in neither case are the data of these 'ratcheted-down' tables adequately reproduced a goal which, we argue, microclass analysts are, in principle, unlikely to achieve. Finally, we question certain aspects of the position, deriving from the microclass approach, that JGDPB take up on normative questions of inequality of opportunity (cf. also Jonsson et al. 2011).

### Data

The dataset we use for our analyses of mobility is based on the Swedish censuses of 1960, 1970 and 1990. Our data for children come from the 1990 census and are restricted to men and women born between 1943 and 1960: i.e. aged 30 to 47 in 1990. Our data for the fathers of these individuals, by reference to whom their social origins are determined, come from the 1960

and 1970 censuses, with priority being given to the latest information available. Children and fathers are linked through a multigenerational register based on birth records.<sup>1</sup>

We code children and their fathers to an eight-category version of the EGP class schema, as shown in Table 1, on the basis of the Nordic classification of occupations, NYK80, a variant of the ISCO 1958 classification. We also use this classification in essentially the same way as JGDPB in order to allocate children and their fathers to occupational groups. However, in quite a number of cases, the occupational groups cut across EGP classes, which creates a problem for us in that we wish these groups to be perfectly nested within our eight classes. In cases where there were sufficient numbers, we have simply divided the problematic groups so that different sets of their component occupations are included in different classes. In cases where numbers were too small to make this procedure practicable, we have maintained the occupational groups intact and have allocated them to the EGP class appropriate to the majority of their component occupations. In addition, we have modified - that is, slightly extended - the JGDPB occupational groups so as to give greater differentiation in the case of the self-employed. We have created three new groups in order to distinguish, as well as proprietors, self-employed workers in skilled, semi-skilled and unskilled occupations, respectively.

## [Table 1 here]

In all, then, we have 108 occupational groups. Our basic data arrays thus take the form of 108 x 108 occupational mobility tables for men and for women, each of which is overlaid by an 8 x 8 class mobility table (for full details on the occcupational classification, see Table A1). As regards the former tables, we have, respectively, average counts of 70 and 66, which suggests that low cell frequencies will not raise problems in our case (cf note 1).

### Modelling

The basic loglinear model with which JGDPB work in their comparative analyses is one intended to represent, simultaneously, gradational (i.e. socioeconomic), class and specifically occupational effects in producing association within the detailed 82 x 82 occupational mobility tables that they construct. The model is written as

$$m_{ij} = a \beta_i \gamma_j \varphi^{u_i u_j} \delta^A_{ij} \delta^B_{ij} \delta^C_{ij} \delta^M_{ij}$$

where *i* indexes origins, *j* indexes destinations,  $m_{ij}$  refers to the expected value in the *ij*th cell,  $\alpha$  refers to the main effect, the  $\beta_i$  and  $\gamma_j$  terms refer to row and column marginal effects, the  $\varphi_{ij}^{uu}$  term refers to the effect of some socioeconomic scale, and the four  $\delta$  terms refer to the immobility effects of the four levels of 'class' that JGDPB distinguish: i.e. nonmanual/manual, macro-class, meso-class and microclass - *sc.* occupational group.

In analyzing our 108 x 108 occupational mobility tables for Sweden in order to provide the empirical basis of our critique of JGDPB, we likewise apply loglinear models which in all cases include the same main and marginal effects as in JGDPB's model. Our models can indeed be regarded as essentially variants of theirs in that we are also concerned, in differing ways, with gradational, class and occupational effects.

#### Results - I

The main results of our analyses are presented in Table 2. In this section of the paper, we discuss the results reported for Models 1 to 4. In the next section, we turn to the results for Models 5 to 7, which treat class effects on both immobility and mobility via a version of the 'core model' of social fluidity based on the EGP schema.

## [Table 2 here]

Model 1 in Table 2 is the independence model that postulates no association between child's and father's occupational group. We can therefore take the likelihood ratio ( $G^2$ ) returned under this model as representing the total association existing between child's and father's occupational group, and we are then interested in how far subsequent models can account for this association. We are also interested in how far these models reduce the dissimilarity index (DI) for the independence model - i.e. the percentage of all cases misclassified - and in changes in the *bic* statistic.<sup>2</sup>

Model 2 in Table 2 is the quasi-independence model that postulates no association between child's and father's occupational group except in the 108 cells on the main diagonal of the mobility table: i.e. cells implying intergenerational immobility. These cells are fitted exactly, and thus via this model we give the fullest possible expression to JGDPB's  $\delta^{M}_{ij}$  term. In the case of men, it can be seen that, for the loss of 108 degrees of freedom, a substantial reduction in G<sup>2</sup> is achieved: immobility, or occupational inheritance, can be taken as accounting for about 44% of the total association in the 108 x 108 table. At the same time, the DI falls from 19.4 for the independence model to 15.2. However, in the case of women, the outcome is very different. The reduction in G<sup>2</sup> is only around 14% and the fall in the DI is almost negligible.

These findings do then have clearly divergent implications for JGDPB's arguments. One of their central claims is that a strong propensity for occupational inheritance means that much of what shows up as immobility in intergenerational class mobility tables will in fact be driven by occupation-specific rather than by class-wide factors. This claim finds some support in our results for men but very little in our results for women. JGDPB do indeed recognize that their approach is likely to appear less successful in regard to women's mobility than to men's, and they advance two quite different reasons for this (1012-4). The first is that the extent of

occupational sex segregation limits the possibilities for father-to-daughter occupational inheritance. The second is that the datasets so far available that are suitable for microclass analysis rarely contain information on mother's occupations, which, if available, might reveal occupational inheritance between mothers and daughters at a level similar to that between fathers and sons.

In response, we would make two observations. First, occupational sex segregation is simply a feature of modern societies that any effective approach to the analysis of social mobility must be able to accommodate, and in any event the parameters of a loglinear model do in fact relate to the association in a mobility table net of the differences between the marginal distributions - as between those of the occupations of fathers and daughters. Second, whether considering mother-to-daughter mobility tables would be helpful to JGDPB's position is an empirical issue that we can in fact address. In the Swedish case, we do have data on mother's occupation, and in the case of women we can therefore construct a 108 x 108 mobility table in which the origin variable is mother's occupation in all cases where an occupation is recorded, and father's occupation otherwise. Fitting Model 2, the quasi-independence model, to this table produces results that are in all respects very similar to those reported for the father-daughter table. The reduction achieved in the total  $G^2$  is 14.9%.<sup>3</sup> It thus remains the case, for Swedish women at least, that the argument that seeming class immobility will to a substantial degree be driven by occupation-specific effects has little force.

Moreover, following from the foregoing analyses, another claim made by JGDPB (991) can also be called into question: that is, the claim that 'the vast majority of association in a mobility table is generated by simple reproduction' - i.e. by immobility. Even with men, where the quasi-independence model accounts for 44% of the total association in the 108 x 108 table, this still means that more than half has to be accounted for in terms of patterns of *mobility*; and with women this proportion increases to over 85%. The further important point that then arises - and

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that will be pursued at length below - is that the success of a new research programme based on microclass analysis must depend on this association deriving from patterns of mobility being also open to explanation *in a way consistent with the theoretical thinking on occupation-specific processes that underlies the programme,* as set out in Grusky's previous work (see esp. Grusky and Weeden, 2001, Grusky and Galescu, 2005b)

Finally, it may also be observed here that even if there is what JGDPB call a 'palisade' along the main diagonal of occupational mobility tables, 'protecting occupational positions from intruders' - or in the case of women more 'a dilapidated picket fence' (1013-4) - much variation still occurs in the height of the individual 'pales': i.e. in the propensity for immobility that exists from one occupational group to another. Indeed, JGDBP do at various points acknowledge, following Grusky and Galescu (2005b), that occupations will in fact differ significantly in the extent to which they are 'real' social groups with an institutional capacity for 'closure'. But they do not then offer any systematic treatment of this differentiation, nor consider its relation to class. In order to take these matters further, we have fitted independence and quasi-independence models to separate occupational mobility tables for men and women *in each class of origin.* This allows us, first, to scrutinize heterogeneity in occupational inheritance across classes, and, second, to separate out the effects on child's occupational attainment of fathers' occupation and social class, respectively.

From the results reported in Table 3, it can be seen that our previous findings regarding the total association in our 108 x 108 tables that is accounted for by occupational immobility do indeed conceal the fact that much variation is present within classes of origin. Thus, in the 3 x 108 occupational mobility table for men originating in Class IVc, that of farmers, as much as 70% of the association lies in the cells indicating occupational immobility<sup>4</sup>; and in the 23 x 108 table for men originating in Class V+VI, that of technicians, supervisors and skilled manual workers, 63% of the association lies in such cells. However, in the 12 x 108 table for men originating in Class

III, that of routine nonmanual employees, the corresponding figure is as low as 16%. With women, as would be expected, the importance of immobility is generally much less, and a particularly striking and significant contrast with men arises with those of Class V+VI origin in that now only 14% of the total association lies in cells indicating immobility. This will of course in important part reflect occupational sex segregation but it has also to be noted that it is among skilled manual workers *in almost exclusively male occupations* that cases of highly developed 'occupational communities' have most often been documented (cf. Salaman, 1974). The apparent infrequency of such communities in female dominated occupations could therefore be an important part of the explanation of why bringing mother's occupation into the analysis may do little to make the microclass approach more applicable in the case of women.

## [Table 3 here]

Turning to the contributions of father's occupation and father's social class to child's occupational attainment, our analyses allow us to determine what part of the total association in our 108 x 108 tables derives from the association between father's occupation and child's occupation *holding father's class constant*, and what part from the overall association between father's *class* and child's occupation. That is to say, we can partition the  $G^2s$  for the independence model as fitted to our 108 x 108 tables into two components: (i) that which is the sum of the  $G^2s$  for the independence model as fitted to a single 8 x 108, father's class by child's occupation table.<sup>5</sup> As is reported at the bottom of Table 3, for fathers and sons the association between their occupations within classes of origin accounts for 35% of the total association in the 108 x 108 table, while the association between father's class and son's occupation accounts for 65%; and for fathers and daughters the corresponding proportions are 30% and 70%.

These results do then serve to confirm our view than an emphasis on the importance of specifically occupational, as distinct from class, effects in intergenerational immobility can easily be exaggerated. Overall, occupational attainment among both men and women alike is structured more by the class positions of their fathers than it is by the occupations of their fathers within a given class.

Returning now to the main line of our results in Table 2, we may note that JGDPB do accept (e.g. 1008) that some class immobility effects occur *over and above* occupational immobility effects, and we seek then to capture these effects by means of Model 3. In this model, as well as the main diagonal cells of the 108 x 108 occupational mobility table being fitted exactly, so also are the main diagonal cells of the overlaid 8 x 8 class mobility table. (The non-diagonal cells of the 108 x 108 table falling within each of the diagonal cells of the class mobility table are not themselves fitted exactly but are rather given a common density parameter.) Now, as can be seen, about 53% of the total association in the men's 108 x 108 table and 29% of that in the women's table is accounted for. This is something of an improvement. However, the question still obviously arises of how the substantial degree of association that remains is to be dealt with and - crucially - of how it is to be dealt with from the theoretical position underlying microclass analysis.

In this regard, we would note what is, for us, a very strange feature of JGDPB's general model, as set out above. Although this is explicitly described as a 'mobility model' (1001, our emphasis) that aims to incorporate simultaneously gradational, class and occupational effects, the only term in the model that relates to mobility as well as immobility is the gradational  $\varphi^{u}{}^{i}{}^{j}{}_{j}$  term: i.e. no terms are included that aim to capture either class *or* occupational - i.e. for JGDPB, microclass - effects on mobility *per se*. In the spirit of JGDPB's model, we thus fit to our Swedish data Model 4 in the series of Table 2 which is Model 3 plus the  $\varphi^{u}{}^{i}{}^{j}{}_{j}$  gradational term, as

implemented, following JGDPB, through the International Socio-Economic Index of Occupational Status (Ganzeboom, De Graaf and Treiman, 1992).<sup>6</sup>

A further improvement in fit is in this way produced - and especially for women. The proportion of the total association accounted for in the 108 x 108 table for women now approaches a half, while in that for men it is close to two-thirds. Also, the negative *bic* statistic is increased substantially in both cases. But what has at the same time to be recognized is that, apart from the model still being far from reproducing the data, the improvement in fit is only achieved through an abandonment of the idea of the occupational specificity of mobility processes and by an appeal instead to the 'generic' processes implicit in the gradational approach - one of the two established approaches that JGDPB wish set their own position *against*. In commenting on the general pattern of their comparative results, which are on similar lines to those we obtain for Sweden, JGDPB do indeed state (1011) that as regards the mobility chances of children who exit from their parental microclass, these are primarily shaped by 'the simple tendency to move to occupations that are socioeconomically close'.

The rather perplexing situation that thus arises - given JGDPB's apparent ambition to develop a whole new approach to mobility research based on occupation-specific effects - is that they do not even *attempt* to implement this approach in the case of mobility as opposed to immobility. In some seeming awareness of this, they offer various remarks on the possibility that there may be other kinds of affinity existing between occupations apart from that of socioeconomic closeness. But the important point remains that these affinities do not figure in their mobility model, nor are they in any way treated in their empirical analyses. Rather, in seeking to account for mobility propensities *per se* - i.e. for association in the off-diagonal cells of the occupational, or, supposedly, microclass, mobility table - JGDPB simply fall back on the gradational approach.

### Results- II

As well as having no term that aims to capture occupation-specific effects on mobility, as opposed to immobility, JGDPB's mobility model, as noted above, also has no term or terms that aim to capture corresponding class effects. However, JGDPB at various points acknowledge (e.g. 985) that some class analysts do aim to model both immobility and mobility processes *together* (as indeed do gradational analysts) and we would in fact regard this as the approach that has been most commonly followed. It is therefore of some interest to take such an approach to our Swedish data. We should stress that we would not expect a model specifically designed to account for *class* mobility to be able to satisfactorily reproduce the data of detailed occupational mobility tables, such as the 108 x 108 tables with which we are here concerned. Indeed, on grounds that we will later set out, we would doubt if such tables can be successfully modelled in *any* systematic way. The point of the exercise we undertake is to see how well a theoretically coherent class approach performs in comparison with the theoretically problematic Model 4 on which we have commented above.

The model with which we work is a version of the 'core model' of social fluidity, proposed on the basis of the EGP class schema, and with a corresponding theoretical rationale, by Erikson and Goldthorpe (1992a, ch. 4). The model aims to capture the generic pattern of social fluidity found within the class structures of advanced societies in terms of four kinds of effect.<sup>7</sup> How far these four effects can be differentiated is dependent on the degree of detail in the data to be used. In the case of our Swedish data, we can apply a version of the core model intermediate between that developed in the CASMIN project (Erikson and Goldthorpe, 1992a) and an extended version that was developed later (Erikson and Goldthorpe, 1992b). The design matrices used in fitting the model are given in Table A3.

(i) *Hierarchy effects*. These are effects on fluidity deriving from differences in the general desirability of positions within classes; and further from the relative advantages offered by different classes (e.g. in terms of economic, cultural and social resources) when considered as classes of origin, and from the relative barriers to access to them (e.g. in terms of formal qualifications, skills or capital) when considered as classes of destination. We include four hierarchy effects, HI1-HI4, based on the ordering of our eight classes as indicated in Table 1: i.e. by the lines separating Classes I, II, III+IVab, V+VI+IVc and VIIa+VIIb. HI1 represents a base level and HI2, HI3 and HI4 represent successive shifts from this base level, implying *additional* reductions in fluidity as more hierarchical divisions are crossed.<sup>8</sup>

(ii) *Inheritance effects*. These are effects deriving from the special attractiveness to individuals of positions falling within their own class of origin, and further from distinctive opportunities for the inheritance of class positions (e.g. via the transmission of capital or 'going concerns' or special skills) or from distinctive constraints on mobility away from classes of origin (e.g. limited opportunities in local labour markets). Three inheritance effects, IN1-IN3, are included to operate in cells on the main diagonal of the class mobility table. IN1 represents a base level for all eight classes, and IN2 and IN3 imply successively increasing propensities for class immobility, with IN2 applying additionally to Classes I and IVc, those of higher grade professionals and managers and of farmers, and IN3, additionally again, to IVc.<sup>9</sup>

(iii) *Sector effects*. These are effects deriving from economic divisions that create vertical rather than horizontal, or hierarchical, barriers to mobility (e.g. in that mobility across sectors is likely to require geographical and/or sociocultural relocation). Two sector effects, SE1 and SE2, are included. SE1 operates as between the two classes in the agricultural sector, Classes IVc and VIIb, and all other classes, and SE2 as between the two classes of 'independents', Classes IVab and IVc, and all others.

(iv) Affinity and disaffinity effects. These are effects deriving from specific linkages or discontinuities between classes that influence patterns of social fluidity over and above the more generalized hierarchy, inheritance and sector effects. Three such effects, AF1, AF2 and AF4 are included. AF1 is a disaffinity effect representing the exceptional barriers to mobility, in either direction, between Class I and Class VIIb on account of the interaction of hierarchy and sector effects. AF2 represents the affinities existing in the cases of Classes I,II and III on account of their the common 'white-collar' social status and in the cases of Classes V+VI and VIIa on account of their common 'blue-collar' status, which are taken to facilitate fluidity among these classes. AF4 is a further affinity, but of a 'one-way' kind, representing the high propensity for mobility from the two agricultural classes, IVc and VIIb, to Class VIIa, that of nonskilled manual workers.<sup>10</sup>

We may report, first of all, that if the core model, as described above, is fitted to the 8 x 8 class mobility tables that overlie our 108 x 108 occupational mobility tables reasonably satisfactory results are achieved, despite the return of positive *bic* statistics. In the case of men, 93.1% of the total association in the table is accounted for and in the case of women 87.6%, while the DIs are quite low at 4.5 and 4.0 respectively. Moreover, the parameter estimates, as reported in the (a) columns of Table 4, are all significant and take their expected signs.

## [Table 4 here]

Our main concern here is, however, with the further results that we report in Table 2. Model 5 in this table is simply the core model fitted now to the 108 x 108 mobility tables for men and women. Not surprisingly, while the parameter estimates are the same as when the model is applied to the 8 x 8 class mobility tables, the fit is much worse, even though close to 50% of the total association is accounted for. But Model 5 serves primarily as a basis for introducing Model 6. In this case, we supplement the core model to take account of what we see as JGDPB's most

significant finding: that in the case of men, if not of women, there is a propensity for occupational inheritance that, though variable, is often quite strong. That is to say, we add the quasi-independence model for the  $108 \times 108$  table - Model 2 in Table 2 - to the core model, to which we have then to make some slight modifications.<sup>11</sup>

As can be seen from Table 2, Model 6 makes a large improvement on Model 5 and, more importantly for present purposes, gives a fit to the data of our 108 x 108 tables that proves, and particularly for women, to be better than that of Model 4 while remaining theoretically more coherent. Model 4, as earlier observed, treats mobility - as distinct from immobility - as being determined by the generic effects of socioeconomic 'closeness' and thus leads JGDPB to diverge from the emphasis on occupation-specific effects that is, theoretically, at the heart of the microclass approach. In contrast, Model 6 treats mobility, and in part also immobility, through the core model and thus consistently with the standard class approach<sup>12</sup> - although with due recognition also being given, in the case of a detailed occupational mobility table, to immobility as created by occupation-specific in addition to class-wide effects.

In view of the fact that Model 6 does better than Model 4 without the need for a gradational socioeconomic effect, it is of some further interest to see how far Model 6 can itself be improved on by, in Model 7, introducing such an effect - i.e. by means of the ISEI association term as included in Model 4. As is shown in Table 2, some further improvement is achieved but, for men and women alike. In other words, the core model would appear to capture within a coherent class perspective a large amount of what within a gradational perspective would be seen as socioeconomic 'closeness'. The indication then is that in their comparative analyses JGDPB might have done better by combining their microclass approach with a standard class approach rather than, anomalously, with the gradational approach.

Finally, though, what has once again to be recognized is that none of the models represented in Table 2 comes at all close to giving a good fit to the data of our 108 x 108 occupational mobility tables. Even when, as in Model 7, terms are included to capture occupational inheritance effects plus class and socioeconomic status effects on both immobility and mobility, still over 30% of the total association in the tables is unaccounted for and DIs of more than 11 for men and more than 9 for women are returned.<sup>13</sup> For adherents of the standard class approach to social mobility research, this need be of no great concern. Their focus is on mobility among what JGDPB would call 'big classes' rather than among microclasses or, that is, detailed occupational groups. The one qualification to their position that is suggested is that they should accept JGDPB's observation that, with men, some non-negligible part of class immobility is likely to be the product of occupation-specific rather than class-wide effects. However, for JGDPB themselves the situation is far more serious for reasons on which we elaborate in the following section.

## The problem of mobility in microclass analyses

If the case is to be made out for 'ratcheting down' the analysis of social mobility to the level of occupational groups in order to give due recognition to social processes determining mobility chances that operate only at this level, then it is clearly not enough for analyses to focus on occupational immobility, or inheritance, alone. The microclass approach must also be able to account for mobility. And simply to revert in this case to the gradational approach and invoke generic socioeconomic status effects, as JGDPB do, can scarcely be regarded as satisfactory. The major challenge that microclass analysts must face up to is to show how occupational specific effects determine propensities for occupational inheritance *and* for intergenerational mobility among occupations alike

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As earlier noted, JGDPB do from time to time show an awareness of this issue and raise the possibility that occupational affinities might be identified that structure mobility, apart from that of socioeconomic closeness. Thus, at one point, following Hout (1988), they suggest (991) that occupations might in some way be scaled by the kinds of skills or of cultural capital or social networks that are distinctively associated with them, with the expectation that mobility between occupations would then be greater, the closer they were according to such scaling. However, this idea is not taken further.

Instead, at a later point, JGDPB (1012) proceed more empirically by examining residuals under their basic mobility model for clues as to occupational affinities that might serve their theoretical purposes. They do in fact note a number instances of 'excess exchange' that, they appear to be believe, could be of wider significance. For example, excess intergenerational mobility shows up between the categories of ships officers and fishermen - suggesting a sea-faring affinity; between those of health professionals and semi-professionals - suggesting a health sector affinity; between those of authors and librarians - suggesting a literary affinity; and between those of accountants and bookkeepers - suggesting a financial sector affinity. Again, though, JGDPB do not pursue the possibilities they raise - and perhaps wisely so. What it would seem they are in effect envisaging here is a return to the long-forgotten concept of 'situs' (Morris and Murphy, 1959), relating to a form of 'horizontal' occupational differentiation, orthogonal to that of socioeconomic status. However, this is a concept that appears never to have paid off empirically, whether in the study of social mobility or otherwise.<sup>14</sup>

In sum, JGDPB do very little to show how in microclass analyses it is possible to bring out occupation-specific effects in regard to mobility as well as to immobility. And this does then raise another possibility that, we believe, has to be seriously considered: namely, that a detailed occupational mobility table, unlike a class mobility table, is not in fact open to successful modelling in *any* systematic way. This is because, as the degree of detail - of ratcheting down -

increases, the content of such a table is increasingly likely to express mere happenstance rather than the effects of any regularly operating factors: that is, instances of mobility that are *highly specific to time and place* as, say, in resulting from the shifting conditions of local labour markets - the very particular constraints and opportunities that come and go as these markets adjust to wider cyclical or structural economic change.<sup>15</sup>

#### Normative issues

JGDPB regard the microclass approach to social mobility research as marking an advance on the gradational or standard class approaches not just in revealing hitherto unappreciated sources of the structuring of mobility propensities but further in throwing new light on normative issues of equality of opportunity. In this respect also we find their arguments in various respects unconvincing.

Social reproduction, JGDPB write, 'can in large part be equated with inequality of opportunity' (979), and this, they claim, is just as true of reproduction in the form of occupational inheritance as in the form of status or class inheritance. In the end, 'all ascriptive constraints on choice, even those pertaining to purely horizontal inequalities, are inconsistent with a commitment to an open society' (1023).

We find this argument difficult to understand and, even as best we can interpret it, still inadequate. Difficulties of understanding arise on account of the concept of 'horizontal inequalities' which seems oxymoronic. However, even if we suppose that what JGDPB wish to refer to here is simply occupational *differentiation*, their argument, as it stands, is incomplete. In philosophical discussion of the principle of equality of opportunity, the possibility is indeed recognized that this principle may be contravened even where the positions that individuals

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should have equal opportunity to achieve are not themselves unequal (Marshall, Swift and Roberts, 1997: Appendix E). But what has then to be made out is a rather special case: namely, that inequality arises *in individuals' chances for self-fulfilment* - that is, for present purposes, in their chances of entering an occupation which they wish to enter and in which, they believe, their particular human potentialities could be most fully realized. However, JGDPB do not present any case of this kind. They simply demonstrate a statistical disparity in the form of the high propensity for occupational inheritance and then *assume* that this is essentially a matter of lack of opportunity or, in other words, of constraint. Chance in the sense of 'statistical probability' is confounded with chance in the sense of 'opportunity set' (Swift, 2004).

In some particular circumstances, we would accept that JGDPB's assumption might be reasonable: for example, where a high level of occupational inheritance results from local labour markets being dominated by one industry and the occupations associated with it - as in the 'isolated mass' situations of coal miners, loggers or in some cases textile workers, as discussed by Kerr and Siegel (1954). But, more generally, the guestion of whether children follow in their parents' occupational footsteps on account of constraint rather than of their own preferences is a far more complex one. At certain points (e.g. 988-9), JGDPB do indeed emphasize that children 'cathect' with their parents and thus tend to view their occupations in a favourable light, even if they are relatively disadvantaged ones. But, rather than accepting that where children then enter these same occupations, this may be because they actually want to do so - and as perhaps their best way of pursuing self-fulfilment - JGDPB always come back to their underlying position: 'Even though some reproduction may partly be due to differences in taste ... we nonetheless refer to it as "inequality" under the assumption that tastes are themselves largely endogenous' (979, our emphasis). In other words, tastes, as they result, say, from parental socialization, are constraints on the individual of just another kind, and all choice must be regarded as essentially 'adaptive'. Thus, for JGDPB, a mobility table would indicate a genuine

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equality of opportunity only if the independence model fitted: *any* departure from 'perfect mobility' has, by fiat, to be seen as incompatible with 'a commitment to an open society'. However, the serious philosophical difficulties that arise in taking perfect mobility as a benchmark for the assessment of equality of opportunity, even where mobility is understood as 'vertical', have been well set out by Swift (2004; cf. Roemer, 2004), and are only compounded where 'horizontal' mobility is involved.

JGDPB do in fact seem to have some awareness that their stance here is a precarious one and seek to strengthen it with a further argument. They note (1023) that it may be 'tempting' to suggest that 'the extreme microclass inequalities uncovered ...are not all that objectionable' and that it may be asked whether one should care all that much if the child of a truck driver has a special propensity to become a truck driver while the child of a gardener has a special propensity to become a gardener. Their answer is that one should care, because, even if one is not impressed by their position on 'horizontal inequalities', one should recognize that such inequalities 'contribute directly to the perpetuation of vertical ones'. The propensity for occupational immobility within occupational groups such as truck drivers and gardeners matters if not because they are 'crucially different in their relative attractiveness' but because 'microclass immobility of this sort is the principal mechanism ensuring that the working class reproduces itself' (1023-4).

Again, though, we do not find JGDPB's argument at all compelling. It relies on the very questionable supposition that if fewer children of truck drivers became truck drivers and fewer children of gardeners, gardeners, then those who escaped from occupational 'closure' would move up out of the working class rather than entering other working-class occupations. However, Table 3 above shows that in accounting for the total association in our Swedish occupational mobility tables, the association between father's class and child's occupation is in fact around twice as important as the association between father's and child's occupations given

father's class. Indeed, JGDPB's argument would make more sense if stood on its head: i.e. if it were held that it is the inequalities of opportunity for attaining more advantaged class positions that working-class children face that promote occupational immobility within the working class. Where it is apparent to working-class children that their chances of upward mobility are slight - on account, say, of their relatively poor academic attainments - then it may well make sense for them to exploit any occupation-specific forms of human, cultural and social 'capital' that they can acquire from their family and to follow in their family's occupational tradition - if it has one - rather than seeking to move into some other occupation within the working class (cf. Goldthorpe, 2007, vol.2: 173-4). That is to say, occupation-specific effects would be better understood as subordinate to, and conditional on, class effects.

## Conclusions

Grusky's proposal for the 'ratcheting down' of class analysis to the level of microclasses, or, in other words, to that of detailed occupational groups, finds an important expression in JGDPB's paper. The authors' aim would appear to be that of presenting the microclass analysis of social mobility not as in some way supplementary to the established gradational and class approaches but rather as a fully-fledged competitor with them. They focus on 'social reproduction' - i.e. on *im*mobility - and in this regard, as we recognize, they have one good point to make, even if they exaggerate its quantitative importance and especially in regard to women: namely, that at the level of occupations quite strong propensities for inheritance may exist, so that some part of what in the standard class approach would be treated as class immobility in fact results from occupation-specific rather than from class-wide effects. However, the main aim of our critique has been to bring out the seriousness of the problems for the microclass analysis of social robility.

that JGDPB's paper leaves unresolved, and indeed largely unaddressed, and that thus stand in the way of the realization of their larger ambitions.

The nub of the matter is this. The class approach to mobility research that we would ourselves favour - and likewise the gradational approach - aim to model propensities for both immobility and mobility simultaneously and on the same theoretical basis. However, while within their proposed new approach JGDPB have developed a theoretical basis for understanding immobility at least to some extent - i.e. in terms of occupationally specific resources, occupational closure etc. - they have not shown how their approach might be extended to the treatment of mobility as distinct from immobility. In the 'mobility model' they present in their paper, the only term relating to mobility *per se* is in fact the gradational  $\varphi_{i}^{uu}$  term which would seem theoretically anomalous given their emphasis on occupation-specific as opposed to generic socioeconomic status effects in shaping mobility propensities. And in turn in their empirical analyses, JGDPB can only treat these propensities as a matter of socioeconomic closeness - a difficulty on which they opt not to comment. Moreover, our own analyses of Swedish mobility tables reveal that this difficulty is likely to be a major one. In the first set of results we report, we show that adding the ISEI association term to a model incorporating maximum occupational and class immobility effects does give a improvement in fit, but that still with this theoretically incongruous model, a third of the total association in the table for men and a half in that for women remains unaccounted for. The crucial question facing JGDPB is then that of how this remaining association, in the off-diagonal cells of the tables, is to be dealt with.

In our second set of results, we further show that a class approach via the core model of social fluidity, supplemented by the occupational immobility effect, gives a better fit than the model with the ISEI association term while retaining greater theoretical consistency. But even so, as would be expected with a model designed to account for class rather than for detailed occupational mobility, the fit remains far from good. And again the point that is underlined is that

if JGDPB are to justify their ratcheting down of mobility analysis to the occupational level, they need to find factors patterning mobility propensities at this level - i.e. below that of classes - and ones that are distinct from, and more powerful than, that simply of socioeconomic closeness.

In this regard, JGDPB put forward some ideas, derived from inspection of residuals under their mobility model, that would in effect appear to hark back to the concept of situs. However, they do not then set these ideas to work, and we have indicated grounds for supposing that they would not in fact prove to be very productive. The major challenge for JGDPB thus remains. Having proposed the ratcheting down of mobility analyses to the occupational level, they have usefully drawn attention to processes creating immobility, chiefly in the case of men, that other approaches overlook; but they then need to identify analogous occupation-specific processes generating and structuring mobility. This they have so far failed to do, and there are reasons for believing that it may not in fact be possible: in this sense, there may well be no way back up from ratcheting down.

The deficiencies we have revealed in JGDPB's attempt to apply the microclass approach to the analysis of intergenerational social mobility do then lead on to larger questions concerning not only the viability of, but also the need for, the entire project of salvaging class analysis through in effect ignoring what occupations within a class have in common, as regards the relations in which their members are involved in labour markets and production units, and concentrating instead on their particularities. Occupation, we would agree, can provide a useful basis for the understanding of many social processes and outcomes in modern societies. But as regards issues of social stratification, social mobility and inequality of opportunity, it is class that, at both a conceptual and empirical level, has to be regarded as dominant. This becomes most apparent once 'social reproduction' is understood not in the limited sense of intergenerational immobility, as favoured by JGDPB, but rather as referring to persisting patterns of intergenerational immobility. Class analysis, as exemplified by our application of the core model,

may not capture many of the highly specific processes that are involved in occupational mobility - processes that often reflect simply social differentiation rather than social stratification - but neither, as we have shown, does the microclass approach, despite its theoretical focus on these processes; and in class analysis, in contrast to microclass analysis as represented by JGDPB, immobility and mobility are at all events treated together in a coherent way. Moreover, we have also shown that insofar as individuals' detailed occupational attainment is open to systematic analysis, it proves to be structured far more by father's class position than by father's occupation within a given class, and in turn that tendencies for occupational immobility within less advantaged classes are far more plausibly understood as following from, rather than as creating, class immobility can, at best, supplement that of class mobility, not replace it - and even if occupations are collectivities with which individuals more readily identify than with classes. Grusky's distinction between 'nominalist' and 'realist' conceptions would seem in this connection to be rather beside the point: nominal classes are real enough in their consequences.

We would like to thank for Jan Jonsson and Carina Mood for helping us with coding algorithms, Reinhard Pollack for helping us to analyse the German data set, John McDonald for statistical advice, and, two reviewers for very constructive comments.

<sup>1</sup> JGDPB use the same database, while they also analyse data from the United States, Germany and Japan. However, we restrict our analyses to Sweden since we would in fact believe that it is only in this case that JGDPB's analyses are likely to be free from potentially serious problems of sparsity in the mobility tables they use, although these problems are concealed in that their analyses are based on the pooled data for all four of the countries they consider. For the US, the German and the Japanese mobility tables that they construct, the average cell counts are, respectively, 6.9, 1.9 and 1.3 for men and 1.8, 0.9 and 0.6 for women (as compared with the averages for Sweden of 27.0 and 26.0) and it may therefore be supposed that many zero cells exist. As an experiment, we undertook (with generous help from Reinhard Pollak) similar analyses to those we report below for Sweden using the German micro-class mobility table for men. The results, available on request, are highly anomalous and indicate that sparsity, in the off-diagonal cells, is indeed a problem. For example, with a 97 x 97 table and an N of 12,178, the quasi-independence model returns as likelihood ratio of 7994 which is much smaller than the degrees of freedom of 9119 while the DI is as large as 26.0. We are grateful to John Mcdonald for his advice on this issue.

<sup>2</sup> The Bayesian information criterion (BIC) provides a possibility to compare the fit of non-nested models (Raftery 1995). The smaller Bic is, the relatively better is the fit.

<sup>3</sup> We have also produced a table including only those cases where a daughter had a mother who reported an occupation. This table has several zeroes in the marginals. However, with this qualification, we may note that the quasi-independence model still reduces the total association in the table by only 17.1%. Full details of all our mother-to-daughter analyses are provided in Table A2.

<sup>4</sup> A high propensity for occupational immobility in this instance is scarcely surprising. In addition to any sociocultural influences of the kind that JGDPB would wish to highlight, the

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intergenerational transmission of land as a form of fixed capital - more a class effect than an occupationally specific one - and geographical constraints are also likely to be involved.

<sup>5</sup> The results of fitting this model are available from the authors on request. The partitioning can be understood in the following way. We model the association in a table of  $108 \times 108 = 11,664$ cells. The 108 origin occupations are nested within eight class origins. Thus, we have in effect a three-way table of class origin by occupational origin by occupational destination. Three models of independence can be set up.

$$\log F_{ij.} = \mu + \lambda_{j.}^{O} + \lambda_{j.}^{D}$$
(1)

$$\log F_{i\,j\,k} = \mu + \lambda_{i,k}^{O} + \lambda_{,jk}^{D}$$
 for k=1 ... 8 (2)

$$\log F_{jk} = \mu + \lambda_{k}^{O} + \lambda_{j}^{D}$$
(3)

where i refers occupational origin, j to occupational destination and k to class origin.

Model (1) is the independence model for the full table, model (2) refers to the eight independence models for each class origin, and model (3) is the independence model for class origins by occupational destinations. Models (2) and (3) can be regarded as nested within model (1), with the consequence that the  $G^2$  for model (1) can be partitioned into the  $G^2$ s for models (2) and (3), if model (3) is fitted to a table of class origin by occupational destination with 8 by 108 cells. Thus,

$$G^{2}(tot) = \sum G^{2}(o.d|c) + G^{2}(c.d)$$

where

o=occupational origin

d = occupational destination

c = class origin

<sup>6</sup> We thank Jan Jonsson for providing us with the algorithm for implementing the ISEI.

<sup>7</sup> As well as being used in Erikson and Goldthorpe's own work, as cited, the model has been applied in much other comparative mobility research as, for example, by contributors to the collections edited by Breen (2004) and Ishida (2008).

<sup>8</sup> In other words, all '1s' in the design matrices of Table A3 imply an additive contribution to the expected log frequencies under the model. For example, in the case of a move from Class I to Class VIIb, all four hierarchy effects have to be included - together with, as explained further below, a sector and a disaffinity effect.

<sup>9</sup> In the version of the core model in Erikson and Goldthorpe (1992b), the IN2 term was also included in the diagonal cell for Class IVa, that of small employers. However, since in the present dataset we cannot distinguish between Class IVa and Class IVb, that of self-employed workers, we do not include the IN2 term in the diagonal cell for these combined classes.

<sup>10</sup> The AF3 term in the version of the core model in Erikson and Goldthorpe (1992b) involves Class IVa and has here to be omitted in view of the fact that, as referred to in the preceding note, we cannot separate Class IVa from Class IVb.

<sup>11</sup> Fitting exactly the cell in the 108 x 108 table that indicates immobility among farmers means fitting almost exactly (almost, because Class IVc includes in addition to farmers small numbers of other self-employed workers in primary production) the cell indicating immobility among farmers in the class mobility table - i.e. the IVc-IVc cell. We need therefore to drop from the core

model the IN3 term which applies solely to this cell and in turn to include zeroes rather than ones for this cell in the design matrices for the IN1 and IN2 terms.

<sup>12</sup> It may be observed from Table 4 that the parameter estimates of the core model under Model 6 - the (b) column estimates - are little different, except of course in the case of the modified IN parameters, from those under Model 5 or when the core model is fitted to the 8 x 8 class mobility table.

<sup>13</sup> It should be noted that in their comparative analyses JGDPB likewise fail to produce wellfitting models of the detailed occupational mobility tables with which they work - see e.g. their Table 4.

<sup>14</sup> We have in fact checked whether the fit of the models of Table 2 could be improved by including a measure of occupational situs, based on the categories proposed by Morris and Murphy (1959). The improvement achieved is minimal. Details of our analysis are available on request.

<sup>15</sup> For example, although the evidence comes from journalistic accounts rather than academic social research, it seems that after the collapse of the British coal mining industry in the later 1980s, the occupations that the sons of former miners most often took up, when they could no longer follow in their fathers' footsteps, were those of lorry or van driver, food factory operative or security guard - clearly not because of any affinity with coalmining but simply because these were the occupations most readily available.

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Class	Brief description	Hierarchical division
I	Professionals and managers, higher grade	1
II	Professionals and managers, lower grade	2
	Routine nonmanual employees	3
IVab	Small proprietors and self-employed workers	
IVc	Farmers	4
V+VI	Technicians and supervisors, skilled manual workers	
VIIa	Semi- and unskilled manual workers	5
VIIb	Agricultural workers	

## Table 1: The EGP class schema, eight-category version

		Males <sup>b</sup>					Females <sup>c</sup>				
					reduction					reduction	
Mo	odel	G <sup>2</sup>	df	DI	in G <sup>2</sup> (%)	bic	G <sup>2</sup>	df	DI	in G <sup>2</sup> (%)	bic
	I										
1.	Independence	293,553	11,449	19.4	-	137,623	120,288	11,449	13.2	-	-34,957
2.	Quasi-independence, occupational immobility	164,559	11,341	15.2	43.9	10,099	103,334	11,341	12.4	14.1	-50,447
3.	2 + class immobility	138,947	11,333	13.9	52.7	-15,404	85,950	11,333	11.2	28.5	-67,723
4.	3 + ISEI association	102.773	11,332	11.7	65.0	-51,564	63,577	11,332	10.0	47.1	-90,082
5.	1 + core model of social fluidity	147,058	11,437	14.1	49.9	-8,709	64,543	11,437	9.7	46.3	-90,540
6.	2 + core model of social fluidity <sup>a</sup>	98,188	11,330	11.6	66.7	-56,121	57,361	11,330	9.4	52.3	-96,271
7.	6 + ISEI association effect	91,417	11,329	11.2	68.9	-63,407	54,065	11,329	9.1	55.1	-99,554

Table 2: Models of association in the 108 x 108 occupational mobility table, Swedish men

Note: <sup>a</sup> As modified, see text, <sup>b</sup>N = 822,048, <sup>c</sup>N=774,336

		Males						Females	;				
Class		Indepen	dence	Qua indeper	isi- ndence	%		Indeper	ndence	Qua indeper	isi- ndence	%	
origin	No. occ. <sup>a</sup>	G²	df	G²	df	imm. <sup>ь</sup>	N	G²	df	G²	df	lmm.⁵	Ν
I	17	12,636	1,712	7,655	1,695	39	57, 176	7,450	1,712	5,757	1,695	23	53, 500
П	18	11,332	1,819	7,405	1,801	35	105,604	5,115	1,819	4,229	1,801	17	99,972
Ш	12	9,382	1,177	7,882	1,165	16	91,688	2,918	1,177	2,689	1,165	8	86,804
IVab	4	11,197	321	6,386	317	43	73,384	1,186	321	1,608	317	15	69,370
IVc	3	5250	214	1,587	211	70	75,148	592.4	214	500	211	16	68,788
V+VI	23	23,703	2,354	8,845	2,331	63	214,547	6,388	2,354	5,504	2,331	14	203,767
VIIa	27	25,305	2,782	14,614	2,755	42	174,803	10,418	2,782	8,840	2,755	15	164,809
VIIb	4	3,381	321	1,882	317	44	29,698	741.6	321	686	317	7	27,326
Sum	108	102,109		56,590		45		35,509		29,813		16	774,336
				In	dep. G <sup>2</sup>	% as	sociation	Indep. G <sup>2</sup>			dep. G <sup>2</sup>	% association	
Sum of G <sup>2</sup> s for independence model fitted to eight tables as above					102,109	acco	ounted for 35				35,509	acco	ounted for 30
G <sup>2</sup> for inc father's c	G <sup>2</sup> for independence model, 8 x108 father's class by son's occupation table				191,444		65				84,779		70
G <sup>2</sup> from independence model, full 108 x 108 occupational mobility table				:	293,553		100				120,288	1	00

Table 3: Results of fitting independence and quasi-independence models to occupational mobility tables by class of origin

Notes: <sup>a</sup> number of occupational groups within origin class, <sup>b</sup> % association accounted for by occupational immobility

	Males		Females	
Parameter	(a)	(b)	(a)	(b)
HI1	-0.11	-0.09	-0.06	-0.06
HI2	-0.20	-0.23	-0.21	-0.22
HI3	-0.35	-0.37	-0.34	-0.35
HI4	-0.24	-0.26	-0.33	-0.34
IN1	0.20	0.02	0.04	-0.01
IN2	0.60	0.59	0.56	0.49
IN3	1.01	-	0.56	-
SE1	-0.71	-0.64	-0.33	-0.31
SE2	-0.22	-0.10	-0.10	-0.06
AF1	-0.43	-0.40	-0.09	-0.08
AF2	0.16	0.11	0.08	0.07
AF3	0.09	0.04	0.10	0.08

Table 4: Parameter estimates for different fits of the core model

Notes: (a) As fitted to the 8 x 8 class mobility table under Model 5, Table 2 (b) As fitted (modified) under Model 6, Table 2

## Table A1. Coding of Situs and occupational groups

	EGP							
Microclass 4404 Invite	1		Illab	IVab	IVcd	VI	VIIa	VIIb Total
1101 Jurists 1102 Health professionals	5,697	0	0	0	0	0	0	5,697
1103 Professors and instructors	9.407	0	0	0	0	0	0	9.407
1104 Natural scientists	5,008	0	0	0	0	0	0	5,008
1105 Statistical and social scientists	4,581	0	0	0	0	0	0	4,581
1106 Architects	5,515	0	0	582	0	0	0	6,097
1108 Journalists, authors, and related writers	612	8,493	0	642	0	0	0	9,747
1109 Engineers	9,399	0	0	402	0	0	0	9,801
1201 Officials, government and non-profit organizations	17,872	0	0	0	0	0	0	17,872
1202 Managers	21,882	36,912	0	0	0	0	0	58,794
1203 Commercial Managers	3,841	48,105	21 211	763	0	0	0	51,946
1301 Systems analysts and programmers	8.274	0	0	0	0	0	0	8.274
1302 Aircraft pilots and navigators	0	1,098	0	17	0	0	0	1,115
1303 Personnel and labor relations workers	9,526	2,820	0	42	0	0	0	12,388
1304 Elementary and secondary school teachers	36,927	77,763	0	780	0	0	0	115,470
1306 Creative artists	1 672	5 445	672	5 896	0	5 969	0	19 654
1307 Ship officers	0	6,173	0/2	337	0	0,000	0	6,510
1308 Professional, technical, and related workers, n.e.c.	2,778	3,982	3,810	2,171	0	0	0	12,741
1309 Social and welfare workers	0	14,864	0	1	0	0	0	14,865
1310 Workers in religion	5,099	1,779	102 615	6	0	0	0	6,884
1312 Health semiprofessionals	118	39.383	20.610	967	0	0	0	60.978
1313 Hospital attendants	0	0	0	0	0	15,840	102,430	118,270
1314 Nursery school teachers and aides	0	0	9,233	138	0	0	48,019	57,390
2001 Proprietors	0	0	0	47,869	0	0	0	47,869
3102 Other agents	5 714	1 505	21 902	0	0	0	0	29 121
3103 Insurance agents	0	2,642	0	0	0	0	0	2,642
3104 Cashiers	0	0	0	0	0	0	17,956	17,956
3105 Sales workers and shop assistants	0	0	21,677	0	0	0	175,324	197,001
3201 Telephone operators	0	24 282	7,501	645	0	0	0	7,832
3203 Office and clerical workers	0	158.417	133.543	687	0	0	0	292.647
3204 Postal and mail distribution clerks	0	0	14,813	0	0	0	28,985	43,798
4101 Craftsmen and kindred workers, n.e.c.	0	0	0	710	0	2,745	1,862	5,317
4103 Electronics service and repair workers	0	0	0	927	0	45,563	431	46,921
4104 Printers and related workers	0	0	1,202	919	0	6 358	0,723	<u> </u>
4106 Electricians	0	0	0	2,422	0	46,400	86	48,908
4107 Tailors and related workers	0	0	0	6,633	0	13,128	41,976	61,737
4108 Vehicle mechanics	0	0	0	4,787	0	20,808	99	25,694
4109 Blacksmiths and machinists	0	2 062	0	4,313	0	97,950	21,855	124,118
4111 Other mechanics	0	2,002	0	1,946	0	81,022	11,017	93,985
4112 Plumbers and pipe-fitters	0	0	0	2,385	0	21,439	0	23,824
4113 Cabinetmakers	0	0	0	3,653	0	33,237	0	36,890
4114 Bakers 4115 Welders and related metal workers	0	0	0	2,918	0	8,481	4,071	15,470
4116 Painters	0	0	0	6.802	0	30,480	887	37.890
4117 Butchers	0	0	0	276	0	9,437	0	9,713
4118 Stationary engine operators	0	0	0	0	0	6,726	0	6,726
4119 Bricklayers, carpenters, and related construction workers	0	0	0	13,172	0	129,566	2,615	145,353
4120 Heavy machine operators	0	0	0	15 615	0	10,275	29 688	45 303
4202 Chemical processors	0	0	0	616	0	0	59,634	60,250
4203 Miners and related workers	0	0	0	751	0	7,865	3,981	12,597
4204 Longshoremen and freight handlers	0	0	0	2	0	0	69,295	69,297
4205 Food processors	0	0	0	271	0	0	20,692	21,407
4207 Sawvers and lumber inspectors	0	0	0	1.585	0	0	27.231	28.816
4208 Metal processors	0	0	0	124	0	0	27,510	27,634
4209 Operatives and kindred workers, n.e.c.	0	0	0	1,473	0	0	118,371	119,844
4210 Forestry workers	0	12 5 1 9	0	0	2,454	0	39,039	→ <u>41,493</u>
4301 Protective service workers	0	13,518	2,428	0	0	0	4,192	20,140
4303 Guards and watchmen	0	0	0	45	0	0	12,663	12,708
4304 Food service workers	0	10,256	0	3,765	0	20,871	68,001	102,893
4305 Mass transportation operators	0	0	0	7,495	0	0	57,754	65,249
4306 Service workers, n.e.c.	0	640	3,700	10 834	0	13 165	7,393	12,385
4308 Newsboys and deliverymen	0	0	0	62	0	13,105	6.377	6.439
4309 Launderers and dry-cleaners	0	0	0	871	0	0	12,161	13,032
4310 Housekeeping workers	0	0	0	0	0	0	48,763	48,763
4311 Janitors and cleaners	0	0	26,436	1,658	0	1,586	91,692	121,372
4312 Galdeners	0	0	0	0	<u> </u>	0	23,010	$\rightarrow$ 23,010 $\rightarrow$ 5.270
5201 Farmers and farm managers	0	0	0	0	118,854	0	8,195	→ 127,049
5202 Farm laborers	0	0	0	0	9	0	79,939	→ 79,948
9990 Members of armed forces	0	16,708	0	0	0	0	0	16,708
Total	187 101	598 227	0 720 020	171 972	125 734	727 507	0 1 318 599	3 579 153
	107,101	555,201	440,021	111,012	120,101	121,001	.,0.0,000	5,570,155

Shading	Action	Note
	Vertical merges	3 new MCs are created: 2002, 2003 2004 MC9999 and EGP4 goes into MC2001
	Horizontal merges	The EGP classes go into the largest EGP cla

All frequencies refer to the 1970 census

						reduction in G <sup>2</sup>	
Mode	91	Ν	G²	df	DI	(%)	bic
	Mother's class/occupation						
	Independence	414,106	68,913	11,449	13.52	-	-79,167
	Quasi-independence, occupational immobility	414,106	57,113	11,341	12.13	-17.1	-89,570
	Mothers class/occupation (father's if missing)						
	Independence	794,617	126,531	11,449	13.51	-	-29,010
	Quasi-independence, occupational immobility	794,617	107,698	11,341	12.43	-14.9	-46,376
	Fulltime working mother's class/occupation						
	Independence	232,666	47,246	11,449	14.87	-	-94,233
	Quasi-independence, occupational immobility	232,666	39,389	11,341	13.37	-16.6	-100,755
	Fulltime working mothers class/occupation (father's if missing)						
	Independence	793,222	126,732	11,449	13.50	-	-28,790
	Quasi-independence, occupational immobility	793,222	108,308	11,341	12.53	-14.5	-45,746

## Table A3. Design Matrices for the Core Model

	HI1									IN1							
	T	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB		I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
I	0	1	1	1	1	1	1	1	I	1	0	0	0	0	0	0	0
II	1	0	1	1	1	1	1	1	Ш	0	1	0	0	0	0	0	0
Ш	1	1	0	0	1	1	1	1	111	0	0	1	0	0	0	0	0
IVAB	1	1	0	0	1	1	1	1	IVAB	0	0	0	1	0	0	0	0
IVC	1	1	1	1	0	0	1	1	IVC	0	0	0	0	1	0	0	0
V/VI	1	1	1	1	0	0	1	1	V/VI	0	0	0	0	0	1	0	0
VIIA	1	1	1	1	1	1	0	0	VIIA	0	0	0	0	0	0	1	0
VIIB	1	1	1	1	1	1	0	0	VIIB	0	0	0	0	0	0	0	1
	HI2									IN2							
	I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB		I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
T	0	0	1	1	1	1	1	1	I	1	0	0	0	0	0	0	0
II	0	0	0	0	1	1	1	1	Ш	0	0	0	0	0	0	0	0
Ш	1	0	0	0	0	0	1	1	111	0	0	0	0	0	0	0	0
IVAB	1	0	0	0	0	0	1	1	IVAB	0	0	0	0	0	0	0	0
IVC	1	1	0	0	0	0	0	0	IVC	0	0	0	0	1	0	0	0
V/VI	1	1	0	0	0	0	0	0	V/VI	0	0	0	0	0	0	0	0
VIIA	1	1	1	1	0	0	0	0	VIIA	0	0	0	0	0	0	0	0
VIIB	1	1	1	1	0	0	0	0	VIIB	0	0	0	0	0	0	0	0
	HI3									IN3							
	I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB		I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
I	0	0	0	0	1	1	1	1	I	0	0	0	0	0	0	0	0
II	0	0	0	0	0	0	1	1	Ш	0	0	0	0	0	0	0	0
Ш	0	0	0	0	0	0	0	0	111	0	0	0	0	0	0	0	0
IVAB	0	0	0	0	0	0	0	0	IVAB	0	0	0	0	0	0	0	0
IVC	1	0	0	0	0	0	0	0	IVC	0	0	0	0	1	0	0	0
V/VI	1	0	0	0	0	0	0	0	V/VI	0	0	0	0	0	0	0	0
VIIA	1	1	0	0	0	0	0	0	VIIA	0	0	0	0	0	0	0	0
VIIB	1	1	0	0	0	0	0	0	VIIB	0	0	0	0	0	0	0	0
	HI4									SE1							
	I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB		I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
I	0	0	0	0	0	0	1	1	I	0	0	0	0	1	0	0	1
Ш	0	0	0	0	0	0	0	0	Ш	0	0	0	0	1	0	0	1
Ш	0	0	0	0	0	0	0	0	111	0	0	0	0	1	0	0	1
IVAB	0	0	0	0	0	0	0	0	IVAB	0	0	0	0	1	0	0	1
IVC	0	0	0	0	0	0	0	0	IVC	1	1	1	1	0	1	1	0
V/VI	0	0	0	0	0	0	0	0	V/VI	0	0	0	0	1	0	0	1
VIIA	1	0	0	0	0	0	0	0	VIIA	0	0	0	0	1	0	0	1
VIIB	1	0	0	0	0	0	0	0	VIIB	1	1	1	1	0	1	1	0

	SE2							
	Т	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
I	0	0	0	1	1	0	0	0
П	0	0	0	1	1	0	0	0
Ш	0	0	0	1	1	0	0	0
IVAB	1	1	1	0	0	1	1	1
IVC	1	1	1	0	0	1	1	1
V/VI	0	0	0	1	1	0	0	0
VIIA	0	0	0	1	1	0	0	0
VIIB	0	0	0	1	1	0	0	0

	AF1							
	I	П	Ш	IVAB	IVC	V/VI	VIIA	VIIB
I	0	0	0	0	0	0	0	1
II	0	0	0	0	0	0	0	0
III	0	0	0	0	0	0	0	0
IVAB	0	0	0	0	0	0	0	0
IVC	0	0	0	0	0	0	0	0
V/VI	0	0	0	0	0	0	0	0
VIIA	0	0	0	0	0	0	0	0
VIIB	1	0	0	0	0	0	0	0

## AF2

	Ι	II	III	IVAB	IVC	V/VI	VIIA	VIIB	
I	0	1	0	0	0	0	0	0	
II	1	0	1	0	0	0	0	0	
III	0	1	0	0	0	0	0	0	
IVAB	0	0	0	0	0	0	0	0	
IVC	0	0	0	0	0	0	0	0	
V/VI	0	0	0	0	0	0	1	0	
VIIA	0	0	0	0	0	1	0	0	
VIIB	0	0	0	0	0	0	0	0	

	AF4							
	Ι	П	111	IVAB	IVC	V/VI	VIIA	VIIB
Ι	0	0	0	0	0	0	0	0
П	0	0	0	0	0	0	0	0
Ш	0	0	0	0	0	0	0	0
IVAB	0	0	0	0	0	0	0	0
IVC	0	0	0	0	0	0	1	0
V/VI	0	0	0	0	0	0	0	0
VIIA	0	0	0	0	0	0	0	0
VIIB	0	0	0	0	0	0	1	0