Testing the Quasi-Perfect Mobility Model for Intergenerational Data: International Comparisons

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THE study of social stratification and social mobility seems to be experiencing a revival of interest in recent years. The first studies on a national level were carried out in the decade following World War II, with the pioneering work of David Glass and associates [9]. A series of national surveys soon followed, under the encouragement of the International Sociological Association. This early phase of mobility studies has been aptly summarised by Miller in his *Comparative Social Mobility* [20]. After this initial period, the variable occupational status, social class, or the like, became an intrinsic part of most sociological investigations, but the interest in social mobility subsided.

Blau and Duncan [1] may be credited with a revival of interest in mobility with the publication of their *American Occupational Structure*. Presently, there are several national surveys being carried out in various parts of the world. (See Table 2.) Inevitably, the second generation of studies has brought about critical discussion of the many problems related to the conceptualisation, measurement, and analysis of social mobility.

A number of different approaches to the study of mobility have been utilised.

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It seems legitimate, though arbitrary, to divide these approaches into two general categories: those which claim to study "social mobility" in the tradition of Glass [9] and Rogoff [25], and those which deal with "occupational achievement" as proposed by Duncan [7] and others. In this paper we follow the first tradition. The basic starting point for this type of study is the "transition matrix" or mobility table, a contingency table based on a cross-classification of individuals according to their fathers' and their own statuses. Although there are many criticisms of this type of analysis (see Duncan [7]), it seems that, given careful interpretation, mobility tables can provide much useful information about intergenerational mobility within a society. (Boudon [3, pp. 9–11]). This is not the place for extensive evaluation of the merits of the various approaches to the study of mobility. Suffice it to say that the approach adopted here has been developed consistently since Glass first proposed his "Index of Association".

Models using the traditional matrix have received progressive attention in the past few years. The solutions suggested have centred on such problems as a precise analytical definition of "perfect" or free mobility, definition of structural and individual or "exchange" mobility and how to measure them, and the definition of immobile individuals and/or categories of persons within a given cell. Illustrations of the different alternatives can be found in White [30], [31], Yasuda [32], Goodman [10], [11], [12], Matras [19], McFarland [21], and Boudon [2], [3].

The different models have introduced new insights into the analysis of intergenerational mobility, and it seems now that two tasks should be carried out: first, a critical analysis of the various models with empirical tests; and second, an integration or attempt at synthesis wherever possible of the different solutions. The purpose of this paper is to begin this task by testing one model in detail.

Goodman has presented various methods for detailed analyses of cross-classification tables and for the testing of the "quasi-perfect mobility" model. The present paper is an attempt to test these methods and to evaluate the model. A number of different societies for which data were available are used for this purpose.

The QPM Model

Goodman first introduced the concept of quasi-perfect-mobility (herein denoted as QPM) in 1965 and has since published a number of articles developing various methods for analysing social mobility tables according to the QPM model. The reason for the development of the QPM concept was the inadequacy of the more usual "perfect mobility" assumption underlying most indices of social mobility or immobility. Perfect mobility assumes independence between father's status and son's status, and expected frequencies under that assumption are compared with observed frequencies in order to obtain summary measures of the degree of departure from perfect mobility (as, e.g., the Glass Index of Association, which is a measure of immobility). The problem with this model, as Goodman [12] points out, is that excessive status inheritance in one category

affects the relative column and row totals for the other categories (relative to the first category) in such a way that mobility ratios under the perfect mobility assumption may be misleading. A method is needed by which status inheritance or mobility within each category of origin (or father's status category) can be determined independently of the inheritance or mobility within other categories. As Goodman demonstrates [12, pp. 832–835], the perfect mobility assumption does not allow this kind of analysis, and "can lead to an incorrect or misleading interpretation of the data".

Another, and similar, demonstration of the inadequacy of the perfect mobility model is given by Boudon [3, pp. 15–16], who shows that under some conditions a table with maximum immobility in one category, may have an index of immobility for that category, which is less than that for another table with a substantial proportion of persons moving out of that category. The problem is that the Glass Index, based on the model of perfect mobility, is not independent of variations in the marginal distributions which represent structural changes in the distribution of occupations from fathers' generation to sons' generation. The Glass Index "measures, at the same time, that part of the total mobility independent of structural changes in the composition of the labour force, and that part of total mobility due to these changes" [3, p. 16]. The mobility ratios developed by this procedure, then, may be unrealistic and misleading.

Goodman's QPM model is an attempt to develop a more "realistic" standard with which to compare observed mobility than was possible with the perfect mobility assumption. The assumption of quasi-perfect rather than perfect mobility, as he argues, gives rise to more realistic measures of mobility phenomena than does the assumption of independence between status of origin and status of destination.

Sociologically, QPM means that, given "status inheritance" from some strata (or greater immobility than would be expected under conditions of free mobility of all individuals), the mobility of those who have moved (with respect to their father's status) is "free". In other words, if only those who have been mobile are considered, "an individual's own status is, to a certain extent, independent of his father's status" [Goodman, 10, p. 565].

Statistically, the model may be defined as follows:

Denoting the frequencies in a mobility table as,

		Son's Status			
		1	2	3	
Father's Status	1	f_{11}	f_{12}	f_{13}	$f_{1\cdot}$
	2	f_{21}	f_{22}	f_{23}	$f_{2\cdot}$
	3	f_{31}	f_{32}	f_{33}	$f_{3\cdot}$
		$f_{\cdot 1}$	$f_{\cdot 2}$	$f_{\cdot 3}$	n

where f_{ij} are the observed frequencies of sons in status j with fathers in status i; $f_{1.}$ is the number of sons with fathers of status i; $f_{.j}$ is the number of sons in status j; and n is the sample size; then the condition of perfect mobility is satisfied when

$$f_{ij} = f_{i.}f_{.j}/n \tag{1}$$

If we define

$$P_{ij} = f_{ij}/n; \quad P_{i} = f_{i.}/n; \quad \text{and } R_{j} = f_{.j}/n \tag{2}$$

then P_i can be interpreted as the probability that an individual belongs to origin status i; and R_j, the probability that an individual belongs to destination status j. With this notation, the condition of perfect mobility can be written as

$$P_{ij} = P_{i}R_{j} \tag{3}$$

The QPM model compensates for "over-representation" or "under-representation" in certain diagonal cells which, in turn, would inflate or deflate the expected frequencies in other diagonal cells by (i) "blanking out" the diagonal cells by subtracting them from the column and row totals, or (ii) by "adjusting" their frequencies so that a condition of "perfect" mobility is reached in the modified table. In the present analysis, we have used the method of "blanking out" the diagonal cells and estimating the expected frequencies in the non-diagonal cells under the assumption of QPM.

To illustrate the procedure, suppose we blank out certain specified diagonal cells in a given 3×3 mobility table. Assigning a zero probability to the blanked out cells, and letting P^{o}_{ij} denote the probability that an individual will fall in origin status i and destination status j of this new table (without the blanked out cells), then the condition of QPM is satisfied when, for each cell (i, j) that is not blanked out:

$$P^{o}_{ij} = P_{i}R_{j}/[\overset{*}{\Sigma} P_{i}R_{j}] \tag{4}$$

where the symbol $\overset{*}{\Sigma}$ denotes the summation of P_iR_j over all cells (i, j) that have not been blanked out.

In the case where all diagonal cells have been blanked out, as will be our procedure, the equivalent of (4) is

$$P^{o}_{ij} = P_{i}R_{j}/[1 - \overset{3}{\underset{k=1}{\Sigma}} P_{k}R_{k}] \tag{5}$$

for all cells (i, j) where $i \neq j$.

Having thus excluded from consideration all individuals whose origin and destination statuses are the same, R_j is the "theoretical tendency" for a mobile individual to fall into destination status j, and P_i is the similar theoretical tendency for an individual to have status i.

In order to test the fit of the model, the diagonal cells are blanked out and estimates $\hat{R}_j$ and $\hat{P}_i$ of the parameters R_j and P_j under the assumption of QPM in the non-diagonal cells are calculated. Then estimates $\hat{F}^{\circ}_{ij}$ of the "expected" frequencies in the non-diagonal cells are calculated, using the formula:

$$\hat{F}^{\circ}_{ij} = n^{\circ}\hat{P}^{\circ}_{ij} \tag{6}$$

where n° is the number of individuals in the non-diagonal cells and $\hat{P}^{\circ}_{ij}$ is the estimate of P°_{ij} calculated by replacing R_j and P_i in equation (5) by their corresponding estimates $\hat{R}_j$ and $\hat{P}_i$. The observed frequencies f_{ij} (where $i \neq j$) are compared with the corresponding $\hat{F}^{\circ}_{ij}$ using the chi-square goodness-of-fit statistics:

$$\chi^2 = \overset{*}{\Sigma}(f_{ij} - \hat{F}^{\circ}_{ij})^2/\hat{F}^{\circ}_{ij} \tag{7}$$

where the summation is over all non-diagonal cells. The complete procedure is given in summary form in Goodman [12, p. 848].

When the model of quasi-independence "fits" the data with the diagonal cells blanked out, this model can be used to calculate the "expected" frequencies in the non-diagonal cells, as we have seen. From these new "expected" frequencies, frequencies can be calculated for the blanked out cells which would make the entire table conform to a pattern of independence between origin status and destination status [12, p. 31]. Then, comparing the observed with the corresponding "expected" frequencies, a new mobility ratio can be calculated. The new "index of immobility" is defined exactly as Glass's Index of Association (ratio of observed to expected frequencies in the diagonal cells). A value greater than one indicates status inheritance for that category; a value less than one indicates status disinheritance. This new index of immobility gives rise to different interpretations of immobility than did that of Glass, but these new interpretations seem to be more realistic in that they are free of the marginal bias mentioned earlier. One purpose of this paper is to see how extensively the model can be successfully applied to various kinds of mobility data.

Another index developed by Goodman [12] which uses as a standard the QPM assumption and with which we will be concerned is the "index of status persistence". As we have already stated, $\hat{R}_j$ estimates the theoretical tendency for an individual to fall in destination category j (calculated from the entries in the non-diagonal cells). Defining $\hat{A}_j$ as the observed proportion of individuals who fall in destination category j whose origin status was also j it makes sense to

compare this observed proportion $\hat{A}_j$ with the estimated theoretical tendency $\hat{R}_j$. In the case of complete persistence, $\hat{A}_j$ reaches its maximum possible value of 1. Goodman therefore suggests comparing $\hat{A}_j - \hat{R}_j$ with $1 - \hat{R}_j$ in order to measure the degree to which an individual's status of origin "persists" from his origin to his destination, for those of each origin status. The computation of this index $\hat{G}_j$ is:

$$\hat{G}_j = (\hat{A}_j - \hat{R}_j)/(1 - \hat{R}_j), \quad \text{for } j = 1, 2, 3. \tag{8}$$

In other words, $\hat{G}_j$ can be interpreted as the estimates proportion of "stayers" among those of origin status j.

The Data

The principal source of data for our analysis was Miller [20]. In his monograph, detailed tables are presented from various studies of mobility, representing 20 samples from 17 different countries. Because of problems in comparability of sampling or occupational categorisation, four of Miller's tables could not be used in the present study.[1] In addition to those data from Miller, four more mobility tables were included in our analysis, representing Italy [Lopreato and Hazelrigg, 18], Ireland [Hutchinson, 14], Sweden [Carlsson, 5] and Yugoslavia [Milić, 22]. In all, a total of 20 mobility tables were included in the present study, representing 17 countries.[2]

The samples were drawn primarily in the mid-fifties, although they range in date from 1940 to 1968. Almost all of the samples used included only male adults, but there were some viariations in the defined populations of the different studies. For example, some samples consisted of males above a certain age (usually around 21 years), while others included only male heads of households. One might expect here a slight bias in the direction of greater upward mobility for the heads of households group, since they would, on the average, be older and further into their careers than would a group which also included young men just beginning their careers.

Perhaps an even more important problem for consideration is the difference in the geographic sampling units for some of the data. Thirteen of the samples used were national in representation, five were samples drawn from specific cities or communities, and one was representative of Russian *èmigrés*. The problem with the sample of *èmigrés* is obvious, since they are a rather "unrepresentative" group to begin with. However, since no other data for the Soviet Union were available, it was decided to include them, keeping in mind the limitations of the sample.

1. The samples eliminated were those of Finland, France II (Desabie), Hungary and Norway.
2. The countries represented are: Australia, Belgium (2 samples), Brazil, Denmark, France, Great Britain, India, Ireland, Italy (2 samples), Japan, The Netherlands, Puerto Rico, Sweden, United States (2 samples), USSR, West Germany and Yugoslavia.

The comparability of the national cross-sections and the specific urban areas is more problematic. While mobility patterns may not always vary substantially between a nation and a city within that nation [Miller, 20, p. 8] it is likely that. in developing and underdeveloped nations especially, urban populations show a higher degree of upward mobility than do national populations. If we were primarily interested in comparing cross-national rates of mobility, then national samples should not be compared with area or city samples. However, our purpose in the present study is not comparison of rates of mobility as such; instead, we are mainly interested in testing the utility of the QPM model, given the kinds of data that are available. Therefore, caution should be exercised in comparing specific results of our analyses. Table 1 gives a summary of the general characteristics of the samples tested in later sections of this paper.

As the acceptance or rejection of the QPM model is affected by the number of occupational categories used for the model, we decided to follow Goodman's usual presentation of three categories, which can loosely be called "upper," "middle" and "lower" status groups. Given that the mobility tables used presented a varied number of occupational categories, ranging from 4 to 11, a rather difficult problem involved developing a rationale for collapsing the given

TABLE 1: *Characteristics of the sample used*

Country	*Date*	*Unit*	*Representation*	*N*
Australia	1949–50	Fathers and grandfathers of students	Melbourne	121
Belgium I	1959*	Adult males	St. Martens/Latem	873
Belgium II	1953	Male heads of households	Mont-Saint Guibert	296
Brazil	1958*	Males	Sâo Paulo	1,056
Denmark	1954–55	Males	National	2,391
France	1948	Males	National	3,023
Great Britain	1949	Males age 18 and older	National	3,498
India	n.a.	Males (?)	Poona	4,505
Ireland	1968	Males, age 21 and older	Dublin	2,540
Italy I	1963–64	Male family heads	National	1,569
Italy II	1950*	Males	National	636
Japan	1955	Males	National	1,866
The Netherlands	1954	Males	National	2,355
Puerto Rico	1961*	Male heads of households	National	857
Sweden	1950	Male cohorts born 1899, 1902, 1903, . . . 1923	National	15,487
USA (I)	1946	White males	National	6,377
USA (II)	1956	Males, white and negro	National	784
USSR	1940	Male *èmigrés*, age 21–40	n.a.	765
W. Germany	1955	Heads of households	National	3,385
Yugoslavia	1960	Employed males and females, age 20 and over	National	8,707

*Sampling date unknown; first publication date is given.

occupational categories into three. As any division of the occupational groupings into three categories would be somewhat arbitrary, we decided to test the model for a number of different collapsings within the same sample, all of which could be justified theoretically in terms of our knowledge of prestige rankings within societies.• One of the basic assumptions of the model is that the occupational rankings used should each be relatively homogeneous in terms of the social prestige rankings of the populations sampled. In some instances we accepted the ranking presented by the original researcher as correct, while in others we reordered some categories before proceeding with the collapsings, taking the names of the different categories at face value and trying to obtain through the collapsing what we subjectively and theoretically understood as "upper," "middle" and "lower" social status.

The nature of the society in terms of development and the particular sampling frame used, for example, affect the kinds of prestige ratings given to various occupational groups. If the sample was primarily urban, then farmers and farm labourers were usually placed in the lowest category; while in countries with strong emphasis on agriculture, farmers were sometimes considered to be in the middle category. Not only the agricultural basis of a country but also the industrialisation and professionalisation bases became important frameworks for the collapsing of occupations.

Due to the partially arbitrary and subjective nature of the occupational categorisations, we are conscious of the limitations of this procedure. Unfortunately, it is impossible to obtain the pertinent information about many of the samples used which might make a more objective definition of categories possible. The problems associated with this kind of procedure are more extensively dealt with by Miller [20, p. 10–23]. A detailed description of the collapsings finally used is provided in the Appendix .

Results and Conclusions

Several analyses were carried out in this study. First, we wanted to test the adequacy of the QPM model for different sets of data. Secondly, we were interested in a comparison of the classical indices of immobility and status persistence with the indices based on the QPM model. And thirdly, we were interested in testing the influence of the various categorisations of occupational statuses on the measures.

We now turn to the results of these analyses. The overall tests of the fit of the models are shown in Table 2, and the different definitions of the occupational groups, in the Appendix. Table 2 also gives the summary measures of mobility for all those models for which the QPM hypothesis was tested. And Table 3 is a summary of some aspects of Table 2, showing the stability of the QPM model for those cases where a "fit" is obtained.

Starting with our first objective of comparing the model's adequacy over a wide variety of occupational structures, we defined a total of 83 models of occupational structure, using data from 19 surveys from 16 countries. The

TABLE 2: *Test of the quasi-perfect mobility model for different countries and collapsings: index of immobility and index of persistence*

Country	Model	χ^2	Index of Immobility						Index of Persistence					
			Classical			Goodman			Classical			Goodman		
			U	M	L	U	M	L	U	M	L	U	M	L
Australia	1	1·89	1·84	1·15	1·81	5·58	·54	5·02	·11	—·18	·12	·29	—·51	·42
	2	·98	1·38	1·95	1·83	3·34	1·91	2·37	·24	·03	·09	·44	·24	·31
	3	3·45	1·87	1·72	1·39	2·87	1·40	3·62	·09	·02	·25	·23	·13	·55
Belgium I	1	·23	6·72	1·66	1·65	175·60	·46	21·76	·10	—·34	·33	·82	—·94	·63
Belgium II	1	·00	1·90	1·54	1·39	1·99	1·14	4·50	·04	·01	·28	·19	·06	·54
	2	2·92	2·19	1·65	1·39	2·09	1·87	3·64	·03	·08	·26	·16	·28	·50
	3	3·54	1·71	2·04	1·39	1·70	2·33	3·87	·05	·05	·26	·15	·33	·51
Brazil	1	·66	1·55	1·59	2·45	9·14	·76	6·30	·32	—·04	·09	·72	—·16	·29
	2	·75	2·35	1·31	2·45	23·00	·52	12·67	·19	—·27	·10	·78	—·62	·32
	3	·46	2·35	1·93	1·49	8·57	·92	5·71	·17	—·01	·32	·72	—·03	·58
	4	4·50	4·18	1·62	1·49	16·21	·54	13·12	·07	—·16	·36	·67	—·48	·65
	5	·01	4·16	1·17	2·44	52·97	·26	31·55	·08	—1·29	·11	·70	—·27	·33
	6	1·28	8·28	1·55	1·49	48·11	·25	34·20	·03	—·85	·38	·55	—2·17	·69
Denmark	1	1·00	45·28	7·04	1·06	16·04	·44	112·42	·00	—·07	·87	·30	—·73	·96
	2	·87	3·06	1·48	1·30	5·04	·20	5·36	·05	—·05	·34	·35	—·17	·62
	3	·97	9·56	1·09	1·97	28·31	·46	8·81	·01	—·71	·09	·30	—·96	·41
	4	·83	1·51	1·29	1·97	5·39	·68	3·15	·23	—·07	·07	·52	—·21	·32
France	1	18·47	5·71	1·56	1·54	7·48	3·98	2·60	·03	·25	·20	·42	·48	·48
	2	4·96	1·40	2·48	1·90	4·68	2·05	2·50	·32	·03	·11	·55	·22	·38
	3	6·55	3·18	1·01	·96	8·24	·83	·96	·05	—·06	·00	·43	—·12	—·01
Great Britain	1	·61	1·71	1·16	1·67	4·48	·68	3·01	·13	—·10	·08	·40	—·22	·32
	2	·02	2·82	1·13	1·67	10·30	·53	4·46	·08	—·31	·09	·43	—·53	·38
	3	·31	2·82	1·61	1·15	4·30	·93	2·72	·07	—·00	·34	·37	—·01	·07
	4	·32	5·98	1·54	1·15	10·71	·52	5·54	·03	—·08	·44	·41	—·32	·66
	5	·74	5·98	1·10	1·67	34·48	·35	7·85	·03	—·80	·10	·44	—1·31	·42
	6	·14	13·16	1·62	1·15	27·75	·39	9·09	·01	—·20	·48	·37	—·68	·72
India	1	2·05	42·21	1·50	1·47	149·31	·82	12·19	·00	—·08	·34	·73	—·19	·57
	2	3·24	10·76	1·51	1·28	17·69	·80	6·16	·01	—·06	·35	·42	—·17	·55
	3	1·89	2·02	2·01	1·47	2·08	2·12	6·61	·06	·06	·31	·27	·34	·52
	4	2·29	2·28	1·85	1·46	2·07	2·28	6·29	·04	·09	·31	·23	·40	·52
Ireland	1	0·00	2·01	1·46	1·98	11·87	·63	5·53	·23	—·10	·15	·61	—·30	·50
	2	1·73	3·20	1·24	1·98	22·39	·31	15·40	·09	—·77	·17	·50	—1·48	·57
	3	·10	3·20	2·03	1·30	4·74	·70	10·45	·08	—·03	·49	·41	—·15	·78
	4	4·00	4·67	1·85	1·30	8·02	·35	24·14	·03	—·24	·52	·31	—·90	·83
	5	8·13	4·67	1·19	1·98	36·40	·18	30·87	·04	—1·96	·18	·35	—3·31	·59
	6	·52	9·51	1·96	1·30	18·76	·35	31·47	·01	—·37	·52	·25	—1·13	·84
Italy I	1	·01	3·93	2·73	1·28	3·19	1·77	13·50	·03	·05	·55	·18	·26	·85
	2	7·53	3·93	1·18	2·30	16·31	·52	14·26	·04	—·42	·14	·24	—·71	·60
	3	·29	35·33	3·67	1·09	40·91	·98	16·40	·01	—·00	·72	·33	—·01	·89
	4	·00	32·64	2·32	1·28	51·10	1·08	18·35	·01	·02	·56	·33	·05	·86
Italy II	1	·91	4·09	1·51	1·81	16·17	·70	22·39	·08	—·13	·28	·65	—·33	·57
	2	2·96	2·40	1·28	3·24	18·31	·55	13·35	·16	—·33	·08	·69	—·55	·48
	3	·51	4·09	1·16	3·24	122·45	·12	69·17	·08	—4·14	·08	·69	—6·70	·52

continued

TABLE 2—*continued*

Country	Model	χ^2	Index of Immobility						Index of Persistence					
			Classical			Goodman			Classical			Goodman		
			U	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*	*U*	*M*	*L*
Japan	1	·15	3·28	2·18	1·20	2·79	1·39	5·58	·03	·02	·45	·25	·15	·63
	2	1·31	2·34	2·00	1·32	2·45	1·60	5·34	·05	·04	·36	·32	·19	·55
	3	·10	1·94	3·76	1·32	2·94	3·98	3·48	·12	·03	·31	·46	·34	·49
	4	1·12	6·16	2·03	1·20	6·23	1·24	5·94	·02	·03	·46	·37	·11	·63
	5	1·02	2·34	3·03	1·20	1·81	2·37	5·07	·04	·03	·45	·24	·23	·61
	6	·53	3·28	1·75	1·32	3·47	1·26	6·04	·03	·03	·37	·27	·13	·57
The Netherlands	1	2·30	17·57	1·79	1·16	26·79	·51	9·56	·01	—·14	·50	·48	—·49	·72
	2	·69	17·27	1·20	1·65	89·55	·26	18·22	·01	—1·33	·20	·49	—2·33	·54
	3	0·00	4·81	1·21	1·65	17·12	·46	8·90	·04	—·43	·19	·50	—·77	·51
	4	5·60	4·81	1·99	1·16	6·70	1·35	3·59	·03	·02	·41	·45	·10	·58
	5	·52	1·84	1·34	1·65	4·01	·85	3·94	·13	—·03	·16	·43	—·08	·43
	6	1·11	1·84	1·15	2·68	8·14	·57	4·76	·15	—·31	·02	·50	—·53	·16
Puerto Rico	1	2·10	2·64	1·18	1·20	3·78	·71	2·78	·03	—·06	·20	·26	—·13	·46
	2	2·22	2·64	1·15	1·26	4·15	·71	2·79	·03	—·08	·16	·27	—·18	·40
	3	5·97	5·15	1·34	1·16	6·62	·75	3·51	·01	—·05	·29	·29	—·10	·58
	4	1·94	5·15	1·19	1·20	8·46	·54	4·01	·01	—·17	·24	·30	—·34	·54
	5	·52	·51	1·18	1·20	3·67	·75	2·61	·03	—·04	·19	·29	—·10	·44
	6	·70	2·51	1·14	1·26	4·06	·71	2·70	·04	—·08	·16	·30	—·16	·39
Sweden	1	25·54	8·12	1·32	1·20	12·41	·64	4·05	·02	—·11	·29	·51	—·27	·51
	2	14·38	3·09	1·43	1·20	4·00	1·25	2·30	·03	·03	·22	·30	·09	·38
	3	1·22	3·09	1·16	1·33	5·13	·86	2·68	·03	—·05	·14	·32	—·09	·32
	4	6·28	8·12	1·13	1·33	33·76	·33	6·76	·02	—·68	·18	·53	—1·25	·44
USA I	1	·30	3·30	1·65	1·46	4·50	1·13	7·77	·04	·02	·34	·43	·07	·61
	2	·99	6·25	1·53	1·46	9·60	·73	11·81	·01	—·11	·36	·43	—·25	·64
	3	·01	1·90	2·30	1·46	2·50	1·80	5·71	·11	·03	·32	·36	·22	·57
	4	·00	1·90	1·30	2·02	6·30	·70	5·46	·16	—·10	·12	·50	—·22	·46
	5	·12	3·30	1·16	2·02	13·62	·39	12·14	·05	—·64	·14	·51	—·99	·52
USA II	1	1·20	2·24	1·18	1·52	6·04	1·00	2·04	·10	·00	·05	·50	—·00	·24
	2	·74	2·02	1·32	1·52	6·23	1·63	1·46	·14	·09	·03	·61	·17	·15
	3	·37	2·24	1·12	1·57	7·20	·04	1·94	·10	—·08	·02	·52	—·12	·12
USSR	1	11·11	3·19	2·05	1·24	3·77	·83	11·92	·05	—·01	·50	·48	—·09	·66
	2	8·00	3·19	1·39	1·36	7·57	·43	12·41	·06	—·16	·36	·57	—·65	·55
	3	2·72	2·46	2·44	1·24	2·57	1·17	9·32	·07	·00	·48	·45	·04	·64
	4	6·65	2·46	1·33	1·36	5·69	·48	8·58	·09	—·07	·35	·61	—·38	·53
W. Germany	1	1·70	11·12	1·97	1·20	16·44	·70	10·02	·01	—·06	·51	·50	—·24	·71
	2	·09	1·98	1·21	7·11	13·36	·56	16·74	·18	—·40	·01	·62	—·59	·26
	3	·32	11·06	1·02	7·08	69·41	·42	30·26	·01	—1·18	·01	·53	—1·73	·26
Yugoslavia	1	·76	4·57	2·03	1·20	4·60	·82	9·21	·02	—·02	·51	·38	—·11	·68
	2	1·61	2·99	2·36	1·20	2·66	1·31	6·70	·04	·01	·49	·34	·10	·65
	3	3·46	1·56	1·99	1·20	·86	·63	13·83	—·00	—·09	·53	—·01	—·38	·71

methods described in earlier sections of this paper were used in testing the fit of the QPM model over the 83 mobility tables. As can be seen by the chi-square values in Table 2, almost all of the values are very low, both for most countries and for most models within countries. A chi-square value of greater than 3·08 is necessary for rejection of the QPM hypothesis [Goodman, 11]; thus, in 78 per cent (or 65) of the cases tested, the model "fit". In other words, if the groups of inheritors of their fathers' statuses are ignored, then there is independence between fathers' and sons' statuses (given the three-category status models defined) for most countries and for a wide variety of reasonable definitions of occupational structure.

Most of the other models (those for which the QPM model was rejected) had relatively low chi-square values, indicating a tendency toward the fit of the model even where it cannot be said to be adequate at our ·05 critical level. We feel, however, that the large range of acceptance of the model is adequate proof of its usefulness as a basic standard by which mobility can be measured. The question why the model did not fit in over 20 per cent of the cases tested is not of concern here, since we can simply say that the model did not adequately describe the phenomenon of mobility in those particular occupational structures; hence, another standard would be a more adequate basis with which to compare observed mobility in those cases.

As for the effect of the different collapsings on the probability of rejecting the QPM model, this may not be as crucial as might be expected. The greater effect of different definitions of occupational structure seemed to be on the indices of mobility, rather than on the simple test of acceptance/rejection of the QPM hypothesis. For example, Britain or Denmark were found to show quasi-perfect mobility regardless of which occupational collapsing was used; but the indices of immobility and status persistence vary (as would be expected) with the definition of strata chosen.

The second objective of the paper was to look at the difference between the "classical" indices of mobility based on the assumption of perfect or free mobility and the Goodman indices based on the quasi-perfect mobility model. The Goodman index of immobility and the index of status persistence were calculated for each of the models tested, along with the classical measures for the same cases. These results are shown in Table 2. It should be noted that, where the model of QPM was not rejected, the Goodman measures provide a more adequate summary measure of mobility phenomena than do the classical measures, since they use a more realistic standard with which to compare observed frequencies in the diagonal. To recapitulate, the index of immobility is the ratio of those who "inherited" their fathers' statuses, to those who would be expected to be in those strata given free mobility. The difference is that the Goodman method calculates the expected frequencies in the diagonal in such a way that the marginal totals do not inflate the estimates, as we discussed earlier in this paper. Thus, the Goodman indices are usually larger for those cells which show inheritance (the upper and the lower categories), and smaller in the middle categories. The inter-

pretation would be that there is more immobility in the upper and lower classes of the countries tested than had been assumed by the classical index, and more outward mobility from the middle classes.

The Index of Status Persistence is similarly interpreted, being an estimate of the proportion of sons of any specific origin status who remain in that status at the time of the measurement. Again, the classical measures tend to be closer to zero than the Goodman index, indicating less status persistence, in general, than was indicated by the Goodman measure.

In comparing the two Goodman indices of mobility, comparing across countries within single strata, we found that all values for the upper stratum in the Immobility Column (see Table 2) are greater than 1·00, which represents status inheritance in that category for all groups tested, Similarly, all the values for this same stratum for the index of persistence are positive. Such results indicate status inheritance within the upper strata in all countries tested. Identical findings are observed in the lower stratum for both measures. Status inheritance is much less common for the middle strata defined in this study. The two measures (index of immobility and index of persistence) show consistent results in all cases, a value of less than 1·00 for the immobility index always associated with a negative value for the index of persistence.

TABLE 3: *Stability of the indices of immobility and persistence when the models or categorisations are compared within each country*

Country	*Number of Models*	*Immobility*				*Persistence*			
		*Test A**			*Test B***	*Test A**			*Test B***
		U	*M*	*L*		*U*	*M*	*L*	
Australia	2	1·00	·50	1·00	1·00	1·00	·50	1·00	·50
Belgium I	1	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00
Belgium II	2	1·00	1·00	1·00	0·00	1·00	1·00	1·00	0·00
Brazil	5	1·00	0·00	1·00	1·00	1·00	0·00	1·00	·80
Denmark	4	1·00	0·00	1·00	·50	1·00	0·00	0·00	·25
Great Britain	6	1·00	0·00	1·00	1·00	1·00	0·00	1·00	·50
India	3	1·00	·67	1·00	·33	1·00	·67	1·00	·33
Ireland	4	1·00	0·00	1·00	·50	1·00	0·00	1·00	·25
Italy I	3	1·00	·67	1·00	·67	1·00	·67	1·00	0·00
Italy II	3	1·00	0·00	1·00	·67	1·00	0·00	1·00	1·00
Japan	6	1·00	1·00	1·00	·83	1·00	1·00	1·00	0·00
The Netherlands	6	1·00	0·00	1·00	1·00	1·00	0·00	1·00	·20
Puerto Rico	5	1·00	0·00	1·00	1·00	1·00	0·00	1·00	0·00
Sweden	1	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00
USA I	5	1·00	·60	1·00	·40	1·00	·40	1·00	·20
USA II	3	1·00	·33	1·00	1·00	1·00	·33	1·00	1·00
USSR	1	1·00	1·00	1·00	1·00	1·00	1·00	1·00	1·00
West Germany	3	1·00	0·00	1·00	·67	1·00	0·00	1·00	·67
Yugoslavia	2	1·00	·50	1·00	0·00	1·00	·50	1·00	0·00

*The proportions presented in each column (*U*, *M*, *L*) indicate the proportion of models that express inheritance for each strata.

**Proportion of cases (models) when stratum *U* show greater inheritance than stratum *L*.

In comparing the two Goodman indices of mobility, we find some inconsistencies within specific samples/models. Sixty-four models were tested and 23 of them (36 per cent) give different impressions of immobility depending on which index one looks at. One might expect that whenever a given stratum shows more inheritance than another as measured by one index, the same pattern would emerge in the alternative index. This is not the case. To illustrate, let us look at Great Britain, where status inheritance is greater in the upper category for models 3, 4 and 6 when the index of immobility is used, but the reverse is true when inheritance is measured by the index of status persistence. Although there is similarity in the results, in that 64 per cent of the cases do show consistency, the two indices are not interchangeable. Consequently, the interpretation of mobility, inheritance, and the like in a given country for different occupational strata can be misleading.

Of the 19 surveys tested, the upper strata show greater inheritance than the lower in most cases (Table 3), although there are cases where this is not so. The proportion of all collapsings showing the upper strata with greater inheritance than the lower is smaller when one uses the index of persistence than when the index of immobility is used. The stability of models using the two indices seems to be about the same; that is, both indices are about equally susceptible to changes when different categorisations are used, but both are quite stable in this regard.

The overall conclusion of this study is that both measures show more stability than do the classical measures, as can be seen in Table 2. This model seems to allow better interpretation of mobility since it is based on a more "realistic" comparison model than the perfect mobility model. The indices of immobility and persistence may be used simultaneously in order to give alternative explanations, but both are affected by the definitions of categories, perhaps one of the most important, and difficult, tasks of the mobility researcher.

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APPENDIX

Description of the Data: Sources, Models (Collapsings), and Occupational Categories

1. AUSTRALIA. *Source:* Oeser and Hammond [24, p. 234]

I. Employer and self-employed
II. White collar
III. Skilled
IV. Semi-skilled

Model	*U*	*M*	*L*
1	I	II–III	IV
2	I–II	III	IV
3	I	II	III–IV

2. BELGIUM I. *Source:* Verischelen [29, p. 132]

I. Higher level (high education)
II. Higher-level (lower education)
III. Lower white-collar
IV*a*. Farm workers
IV*b*. Skilled workers
V. Labour and service occupations
VI. Unskilled labour and unspecified

Model	*U*	*M*	*L*
1	I–II	III, IV*b*	IV*a*, V–VI

3. BELGIUM II. *Source:* Engelborghs—Bertels and Verdassen [8, p. 329]

I. Merchants and artisans
II. Officials
III. White-collar employees
IV. Skilled workers
V. Semi-skilled, unskilled workers and farm labour
VI. Independent farmers

Model	*U*	*M*	*L*
1	I, II	III,VI	IV, V
2	I	II–IV	V, VI
3	I, II,IV	III	V, VI

4. BRAZIL. *Source:* Hutchinson]13, p. 116]

I. Professional and high administrative
II. Managerial and executive
III. Inspectional, supervisory and other non-manual high grades
IV. Inspectional, supervisory and routine grades of non-manual lower grades
V. Skilled manual
VI. Semi-skilled and unskilled manual

Model	*U*	*M*	*L*
1	I–IV	V	VI
2	I–III	IV–V	VI
3	I–III	IV	V–VI
4	I–II	III–IV	V–VI
5	I–II	III–V	VI
6	I	II–IV	V–VI

5. DENMARK. *Source:* Svalastoga [27, p. 330]

I–IV. High-level officials, professionals and major entrepreneurs
V. Middle-level businessmen and officials
VI. Small businessmen and lower white-collar
VIII–IX. Unskilled workers, farm labour

Model	*U*	*M*	*L*
1	I–IV	V–VI	VII–IX
2	I–V	VI	VII–IX
3	I–IV	V–VII	VIII–IX
4	I–VI	VII	VIII–IX

6. FRANCE. *Source:* Bresard [4, p. 539]

I. Manufacturers and independent professionals
II. Managers and officials
III. Merchants
IV. Farmers
V. Lower-level officials and white-collar
VI. Workers and labourers
VII. Agricultural workers

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VII
2	I–IV	V	VI–VII
3	I–II	III, V	IV, VI–VII

7. GREAT BRITAIN. *Source:* Glass [9, p. 183]

I. Professional and high administrative
II. Managerial and executive
III. Inspectional, supervisory and other non-manual (higher grade)
IV. Inspectional, supervisory and other non-manual (lower grade)
V. Skilled manual and routine grades of non-manual
VI. Semi-skilled manual
VII. Unskilled manual

Model	*U*	*M*	*L*
1	I–IV	V	VI–VII
2	I–III	IV–V	VI–VII
3	I–III	IV	V–VII
4	I–II	III–IV	V–VII
5	I–II	III–V	VI–VII
6	I	II–IV	V–VII

8. INDIA. *Source:* Sovani and Pradhan [26]

I. Owners of factories
II. Higher professional, business and administration
III. Medium merchants
IV. Intermediate professional, business and administrative
V. Clerks and shops assistants
VI. Highly skilled and supervisory
VII. Small business
VIII. Lower professional, administrative positions
IX. Skilled manual workers
X. Unskilled manual workers

Model	*U*	*M*	*L*
1	I	II–VIII	IX–X
2	I–II	III–IV, VI–VIII	V, IX–X
3	I–IV, VIII	V–VII	IX–X
4	I, II, IV, VIII	III, V–VII	IX–X

9. IRELAND. *Source:* Hutchinson [14, p. 16]

I. Professionally qualified and high administrative
II. Managerial and executive
III. Inspectional, supervisory and other higher-grade non-manual
IV. Inspectional, supervisory and other lower-grade non-manual
V. Skilled manual and routine grades of non-manual
VI. Semi-skilled manual
VII. Unskilled manual

Model	*U*	*M*	*L*
1	I–IV	V	VI–VII
2	I–III	IV–V	VI–VII
3	I–III	IV	V–VII
4	I–II	III–IV	V–VII
5	I–II	III–V	VI–VII
6	I	II–IV	V–VII

10. ITALY I. *Source:* Livi [17, p. 68]

I. Owners and managers of large enterprises, etc.
II. Owners and managers of smaller enterprises, etc.
III. Lower-level officials, etc.
IV. Lower white-collar employees
V. Service workers, artisans
VI. Unskilled labour and agricultural workers

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VI
2	I–II	III–V	VI
3	I	II–III	IV–VI
4	I	II–IV	V–VI

11. ITALY II. *Source:* Lopreato [18, p. 385]

I. Elite
II. Bourgeoisie
III. Petty Bourgeoisie
IV. Proletariat
V. Peasantry
VI. Subproletariat
VII. Farm Hands

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VII
2	I–III	IV–V	VI–VII
3	I–II	III–V	VI–VII

12. JAPAN. *Source:* Nishira [23, p. 187]

I. Professional
II. Administration
III. Clerical
IV. Commercial
V. Skilled
VI. Semi-skilled
VII. Unskilled

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VII
2	I–III	IV–V	VI–VII
3	I–IV	V	VI–VII
4	I	II–IV	V–VII
5	I–III	IV	V–VII
6	I–II	III–V	VI–VII

13. THE NETHERLANDS. *Source:* Miller [20, p. 75]

I. Professionals, manager and officials
II. Middle-level managers and officials, Farmers
III. Retailers, lower-level white-collar, Farmers
IV. Skilled workers, small retailers, small farmers
V. Semi-skilled workers
VI. Unskilled workers

Model	*U*	*M*	*L*
1	I	II–III	IV–VI
2	I	II–IV	V–VI
3	I–II	III–IV	V–VI
4	I–II	III	IV–VI
5	I–III	IV	V–VI
6	I–III	IV–V	VI

14. PUERTO RICO. *Source:* Tumin and Feldman [28]

I. Professional
II. Semi-professional
III. Owners of business
IV. Managers and white-collar sales
V. Owners and managers of farms
VI. Clerks and office workers
VII. Skilled labour
VIII. Semi-skilled labour
IX. Service workers
X. Unskilled labour
XI. Agricultural day labour

Model	*U*	*M*	*L*
1	I–III	IV–VII	VIII–XI
2	I–III	IV–VIII	IX–XI
3	I–II	III–VI	VII–XI
4	I–II	III–VII	VIII–X
5	I–IV	V–VII	VIII–XI
6	I–IV	V–VIII	IX–XI

15. SWEDEN. *Source:* Carlsson [5, p. 92]

I. Business owners, leaders, higher managerial in private business
II. Professional, civil servants
III. Lower rank non-manual and semi-manual state employees
IV. Lower rank non-manual private employees, mainly clerical, sales and technical
V. Shopkeepers
VI. Artisans and skilled labour
VII. Semi- and unskilled labour
VIII. Farmers
IX. Farm labour

Model	*U*	*M*	*L*
1	I–II	III–V, VIII	VI–VII, IX
2	I–III	IV–V, VIII	VI–VII, IX
3	I–III	IV–VI, VIII	VII, IX
4	I–II	III–VI, VIII	VII, IX

16. USA I. *Source:* Centers [6, p. 138]

I. Large business owners and managers
II. Professionals
III. Small business owners and managers
IV. White-collar
V. Skilled manual
VI. Semi-skilled manual
VII. Unskilled manual

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VII
2	I	II–IV	V–VII
3	I–III	IV	V–VII
4	I–III	IV–V	VI–VII
5	I–II	III–V	VI–VII

17. USA II. *Source:* Miller [20, p. 78]

I. Professional and semi-professional
II. Self-employed businessmen, artisans, managers
III. Clerical and sales
IV. Skilled workers
V. Semi-skilled workers
VI. Service workers
VII. Unskilled, including farm labourers
VIII. Farm operators

Model	*U*	*M*	*L*
1	I–II	III–V	VI–VIII
2	I–III	IV–V	VI–VIII
3	I–II	III–VI	VII–VIII

18. USSR. *Source:* Inkeles and Bauer [15, p. 81]

I. Professional-administrative
II. Semi-professional
III. White-collar
IV. Skilled worker
V. Ordinary worker
VI. Peasant

Model	*U*	*M*	*L*
1	I	II–III	IV–VI
2	I	II–IV	V–VI
3	I–II	III	IV–VI
4	I–II	III–IV	V–VI

19. YUGOSLAVIA. *Source:* Milić [22, p. 126]

I. Semi-professional, professional, managing personnel
II. Salesmen and office employees
III. Craftsmen, shopkeeper, and similar
IV. Industrial and handicraft workers, transport and service personnel
V. Unskilled worker
VI. Peasant

Model	*U*	*M*	*L*
1	I–II	III–IV	V–VI
2	I–III	IV–V	VI
3	I	II–V	VI

20. WEST GERMANY. *Source:* Janowitz [16, p. 10]

I. Upper middle
II. Lower middle
III. Upper lower
IV. Lower lower
V. Farm owner
VI. Farm worker

Model	*U*	*M*	*L*
1	I	II	III–VI
2	I–II	III–V	VI
3	I	II–V	VI