Industries, Firms, and Jobs

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Careers, Industries, and Occupations

Industrial Segmentation Reconsidered

Jerry A. Jacobs and Ronald L. Breiger

I. INTRODUCTION

Two strands of structuralism have become prominent in stratification research in recent years. The first is the focus on labor market structures as mediating contexts for the determination of socioeconomic rewards. Baron and Bielby have introduced the phrase "the new structuralism" in urging the centrality of organizations in the analysis of social stratification (Baron and Bielby, 1980; see also Kalleberg and Berg, 1987). They delineated a series of levels for structuralist analysis, ranging from the job to the firm to the industrial sector. At the most aggregated level of this continuum, researchers have identified economic sectors that influence the distribution of social rewards (Beck, Horan, and Tolbert, 1978; Berg, 1981; Bibb and Form, 1977; Tolbert, Horan, and Beck, 1980). Other important structural research has focused on the effects of local labor markets on the income determination process (Parcel and Mueller, 1983), the sex segregation of occupations (Jacobs, 1983a; Reskin, 1984; Rosenfeld, 1983), and demographic constraints on careers within corporate settings (Rosenbaum, 1984; Stewman and Konda, 1983). Two reviews summarize much of this structural research (Baron, 1984; Kalleberg and Sorenson, 1979).

Another important line of structuralist inquiry has been the renewed focus on the structure of the mobility table. The emergence of log-linear analysis has facilitated the examination of the configuration of relationships in mobility tables. A recent spate of developments in the analysis of mobility tables (Breiger, 1981; Clogg, 1981; Duncan, 1979; Goodman, 1981; Hauser,

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1978; Hout, 1983; Logan, 1983; Yamaguchi, 1983) has made this one of the most lively foci of sociological advance in recent years. Mobility tables have reclaimed their place alongside regression models of status attainment in the study of social mobility.

Surprisingly, no efforts have been made to date to combine these two strands of structuralist analysis. There have been no attempts to apply the formidable range of mobility table techniques to the problems introduced by the new structuralism in stratification. Perhaps the most surprising hiatus is the absence of applications of log-linear mobility table techniques to the analysis of industrial sector models. Tolbert (1982) may be considered an exception to this generalization, but flaws in Tolbert's approached discussed below preclude drawing conclusions regarding mobility patterns from his research (see also Jacobs, 1983b).

This chapter will begin to bridge this gap by applying mobility table analysis to hypotheses regarding industrial segmentation. We use the terms *segments* and *segmentation* to refer to all models that divide labor markets according to industry position in a discrete fashion. We view the two-sector model as a special case of a multiple segments approach.

II. MOBILITY AND LABOR MARKET SEGMENTATION THEORY

The industrial sectors employed by Tolbert *et al.* (1980) and Bibb and Form (1977) are derived from a factor-analytic examination of many dimensions of industrial organization, such as size, market concentration, and profitability. These models divide the economy into a core and a periphery. The core consists of industries dominated by large firms with substantial market power that organize jobs along elaborate career ladders, also referred to as internal labor markets. The periphery, on the other hand, is the competitive sector, with relatively small, unstable firms without elaborate career ladders. The advocates of the core-periphery model have argued that income, income growth with experience, returns to education, and career mobility are influenced by sectoral location.

Mobility is an important assumption underlying any hypothesis regarding labor market segmentation. Sectors have not been defined on the basis of mobility patterns, yet particular mobility patterns are nonetheless implied by these theories. The dual economy thesis has been employed to provide at least a partial explanation of the inequality among workers. The argument has been proposed that workers of equal background and ability receive different amounts of rewards because of their location in different economic sectors (Tolbert *et al.*, 1980). It is clear that if there is frequent mobility between sectors, then the inequality between sectors that proponents identify can be reduced by movement out of the secondary sector. The maintenance of structural inequality of this nature requires some barriers to mobility. This assumption has been emphasized by economists critical of the segmentation perspective (Cain, 1976). Economists, assuming competitive markets, have argued

that even if independent sectors were to arise, they could not maintain themselves because the workings of competitive labor markets would undermine the distinction between the sectors through either eroding the wage and other reward differences between sectors or through sorting the best workers into the preferred sector. But the economist's assumption is the sociologist's empirical issue. We propose to examine the degree of career mobility that actually occurs between economic sectors.

The immobility required by a sectoral model must be located at sector boundaries. The mere inertia of remaining in a job in a particular firm or industry should not be taken as evidence of immobilty between sectors. (See a related discussion by Farkas, England, and Barton, Chapter 5 in this volume.) If this inertia were the only constraint on career mobility, then all effects would be located at the firm or industry level, not at the sector level. This is why it is important to distinguish sector effects on mobility from detailed industry (and occupation) effects, as we detail below.

A degree of immobility is clearly an essential component of any theory of industrial sectors. It is equally central to theories that delineate multiple segments, rather than two principal sectors. The question we raise, then, is: What are the segments in an industrial mobility table? Where are sector or segment boundaries located, and how many such boundaries are there? To what extent does labor market segmentation overlap or coincide with the sectoral division of the economy?

Evidence on the degree of immobility between sectors or segments has been equivocal (Jacobs, 1983b; Kalleberg and Griffin, 1980; Rosenfeld, 1983). Criticisms have also been directed to tests of industrial sector immobility (Jacobs, 1983b). Jacobs shows that Tolbert's (1982) analysis takes detailed industry immobility as evidence of sectoral immobility. When this effect is removed, the degree of immobility between sectors is far less than the degree of immobility between white-collar and blue-collar occupations. As attractive as many find the industrial dualism perspective, one must conclude that to date the evidence on intersectoral immobility is inconclusive.

There is no general agreement on the appropriate division of the economy into sectors. Various industrial sector and segmentation schemes have been proposed (Bibb and Form, 1977; Hodson, 1978; Tolbert *et al.*, 1980). This discussion will focus primarily on the Tolbert-Horan-Beck model; results obtained with the Bibb-Form industrial sector model will be presented for comparison.

Critics of the dual economy model have argued that it oversimplifies reality by incorporating many conflicting dimensions of inequality in a single dichotomy (Kaufman, Hodson, and Fligstein, 1981; see also Wallace and Kalleberg, 1981). Kaufman *et al.* (1981) have proposed a multisector model that they argue avoids this difficulty. A multisector model can be tested in the same way that a dualistic model can be tested. We consider one such partition, derived from an attempt to fit an industrial mobility table rather than from a theory of industrial segmentation.

In addition to industrial segmentation models, another approach to labor market segmentation has focused on occupational distinctions (Fox and Hesse-Biber, 1984; Piore, 1975). Segmentation models that delineate an upper and lower primary market and an upper and lower secondary market are, in essence, models of occupational stratification, rather than models of industrial segmentation (with which they are sometimes confused). These models of occupational labor market segmentation may also be tested as partitions of an occupational mobility table, as proposed below.

III. INDUSTRIAL SEGMENTS AS PARTITIONS OF A MOBILITY TABLE

We propose a specific test with respect to career mobility for an industrial segmentation model. We suggest that a labor market segmentation model presupposes easy movement within segments and immobility between segments. The two aspects to the notion of segmentation are important to distinguish: (1) internal homogeneity and (2) identifiable boundaries.

Easy movement within segments is an essential element in a segmentation model. If it were difficult to move within segments, then there would be segments within segments. There may be inertia at the level of the individual job, or industry-specific skills that make interindustry mobility difficult. But, removing these factors from the picture, sectors or segments should be internally homogeneous. If one cannot find relatively homogeneous areas of movement in an industrial mobility table, one is left with a stratified system, not a segmented system. In this case, effects such as inertia and job-, firm-, industry-, and occupation-specific skills may be responsible for posing mobility barriers and for maintaining wage differences. This is distinct from the implications of a sectoral model. Internally homogeneous sectors, net of these detailed effects, are required for sectors to produce a common effect on all incumbents.

Immobility between segments is equally crucial to a segmentation model. As suggested above, without immobility at segment boundaries, the competitive market would erase inequality between segments. The boundaries of segments must constitute hurdles that inhibit mobility. For segments or sectors to have an independent effect, net of the detailed industry and occupation effects described above, mobility barriers must be located at sector or segment boundaries. The task for mobility research is identifying these boundaries.

The requirements of labor market segmentation theory correspond closely with statistical for models for collapsing categories in mobility tables. Breiger (1981) has argued that the question of the number of categories employed in the analysis ought to be a central issue for mobility table analysis, rather than taken as an unexamined starting point, as is so often the case. He argued that one should test theoretical propositions regarding the number and nature of classes against specific empirical criteria. He proposed a model of intracategory homogeneity and intercategory ordering as a method for

collapsing large tables into a relatively small number of segments (or classes). Goodman (1981) has proposed an alternative model of partitioning mobility tables. Breiger's model is less restrictive than the model Goodman proposes, as Hout has demonstrated (1983). The advantage of the Breiger approach is that, where Goodman's criterion is too strong to fit any large mobility table, Brieger's model has been shown to fit large tables effectively.

What is suggested above is that industrial sectors (or segments) constitute a partition of an industrial mobility table. The segments must be internally homogeneous, with statistical independence or quasi-independence characterizing the structure of the segments. Quasi-independence is an approach to mobility tables that tests for statistical independence on all off-diagonal rows of a mobility table. Quasi-independence is particularly appropriate when there are theoretical reasons for controlling for industry persistence, i.e., the tendency of persons not to change major industry categories, as is the case here (see below). We can test whether an observed table of career mobility between industries can be characterized by a model that assumes easy mobility within segments and barriers to mobility between segments—that is, whether such a model constitutes a good approximation of the data. A similar test can be applied to an occupational mobility table to test occupation-based segmentation models.

IV. PARCELING OUT INDUSTRIAL PERSISTENCE

Jacobs (1983b) presented evidence suggesting that the manual versus nonmanual distinction constitutes more of a barrier to career mobility than the core-periphery industrial sector dichotomy. This analysis rested on the distinction between stayers and movers. Jacobs showed that Tolbert's (1982) finding of immobility between sectors was in part the result of stayers, those individuals remaining in the same detailed industries. When industry stayers are removed, there is a relatively weak pattern of immobility between sectors, while a sizable collar-color barrier remains even after occupation stayers are removed. These results suggest that the sector effect Tolbert reported is more appropriately viewed as an inertial effect, the tendency of many people to stay where they are. One would find such inertia in any partition of industries or occupations, including a random division of detailed industries.

Immobility between segments, then, must rest on more than persistence in the same industries. While focusing on movers constitutes a hurdle for tests of immobility between segments, it facilitates the test of internal homogeneity. Since persistence in the same industry is a well-known feature of careers, it would be unlikely to find a broad classification that met the criterion of internal homogeneity without distinguishing between stayers and movers.

Removing stayers from the analysis may be viewed as a nested process that may or may not correspond to removing the diagonal from the mobility table. One may remove detailed industry stayers, which will leave some entries on the diagonal when the row and columns of the table are major industry categories. Removing major industry stayers is equivalent to removing the diagonal entries from the analysis, as is done in quasi-independence models. One may also remove industry segment stayers or industry sector stayers. The thrust of this approach is to consider the stayer–mover distinction as a substantive one that may or may not correspond to constraining diagonal cell entries.

V. PARCELING OUT OCCUPATIONAL PERSISTENCE

We further propose that industry mobility tests must factor out occupational persistence. Existence evidence suggests the importance of occupational persistence in influencing career mobility (Blau and Duncan, 1967; Featherman and Hauser, 1978). To some extent, persistence in occupations may account for the appearance of immobility between industries. For example, one reason it is difficult to move from construction to finance may be that few occupations are common to both industries. Since one may not be able to change industries without changing occupations, the social distance between industries may simply reflect the relative difficulty of changing occupations. In occupations that overlap between these industries, mobility may not be especially difficult. A thorough test of industry immobility models must factor out occupational persistence: It should be clear that immobility between industries does not simply reflect occupational effects. Occupational stayers can be thought of in a nested way to include detailed occupation stayers, major occupation stayers, occupational class stayers, and manual versus nonmanual occupation stayers. In our analysis we begin with the stayers included, and remove them layer by layer in order to isolate the effects of persistence at each level of analysis.

Here again we treat the removal of stayers in a way that does not correspond to constraining diagonal cells to zero. In this case, removing occupational stayers involves removing from the analysis those who are stayers on a variable not explicitly treated in the industry mobility table. The number of cells in the industrial mobility table remains the same, but the sample size is reduced.

VI. PARCELING OUT OCCUPATIONAL MOBILITY EFFECTS

A final step in factoring out extraneous effects involves screening out occupational mobility effects. As is well known to students of mobility, occupational effects go beyond excessive persistence on the diagonal. Movement between occupational categories becomes more difficult the more distance between them in the occupational hierarchy. Thus, beyond the direct matter of persistence in the same detailed occupation, one suspects that immobility between industries may be the result of the occupational distance between those industries.

In order to control for occupational mobility, we examine the structure of an industrial mobility table within cells of an occupational mobility table. Thus, if 14 major industry categories are the units of analysis for industry, and 4 broad occupational classes are the units of analysis for occupation, we would propose to examine 14 by 14 industry tables within the cells of a 4 by 4 occupational mobility table. In doing so, we can examine the pattern of industry mobility among specific groups of occupation movers as well as among occupation stayers.

Once the relationship between industrial and occupational mobility table is conceived of in this way, interesting hypotheses can be put forward. For example, we hypothesize that industrial barriers to mobility are weakest for occupationally downwardly mobile individuals. In contrast, we expect the strongest industry effects to be found among those who are occupationally immobile—that is, those who are "stayers" in the occupational mobility table.

In sum, the analysis will examine whether an industrial mobility can be partitioned into discrete labor market segments. We first examine whether industrial sector models proposed in the literature can serve as partitions of an industrial mobility table. Subsequently, we consider a five-category industrial segmentation model. We test whether this partition of a major industry mobility table into segments based on patterns of homogeneity and immobility characterizes the data. The partitioning analysis is performed on a series of industry mobility tables sequentially removing effects of industrial persistence, occupational persistence, and occupational mobility. We compare these results to those obtained by removing industry effects from an occupational mobility table. This comparison is useful in showing that our results are not artifacts of the procedures employed, and for assessing the relative importance of occupation and industry in constraining career mobility.

VII. DATA AND METHODS

Data from the second Occupational Change in a Generation (OCG2) survey are employed in this analysis. These data have been frequently analyzed in studies of occupational mobility (Featherman and Hauser, 1978; Hout, 1983). The two Occupational Change in a Generation data sets have become benchmarks against which models of the American occupational structure are to be measured.

We focus on the career mobility of employed white men in 1973. With OCG2 data, career mobility refers to movement from first industry to current industry, or first occupation to current occupation. Following the procedures indicated by Featherman and Hauser, the sample was weighted to estimate the white experienced civilian labor force. For purposes of estimates of statistical significance, the sample was divided by the average sample weight. In addition, since the sample was not a pure random sample, the actual sample size was reduced by a factor of 0.75 to reflect the efficiency of the sample design. The rationale for this handling of the sample is detailed in Featherman and Hauser (1978).

Hauser and Featherman treat similar issues regarding industrial mobility in an earlier study (1977). Our sample differs from that employed in Hauser and Featherman's examination of industrial mobility in several ways: (1) We are analyzing the OCG2 (1973) data, not the original OCG data (1962); (2) while Hauser and Featherman restrict their sample to men over 24 to minimize the extent of correspondence between origin and destination industry, we include men under 24 and address the issue of persistence directly; (3) while Hauser and Featherman exclude men with foreign-born fathers to facilitate intergenerational analysis, we include them, since we are concerned only with intragenerational mobility. Agriculture is excluded in the analyses because of the unique patterns of farm occupational mobility and also because industrial and occupational definitions overlap so greatly in this area.

Including only whites, we obtain a weighted sample of 21,445. Missing or incomplete information on industry or occupation reduced the weighted sample to 16,848. Excluding farming reduces the sample to 14,670. (Fractional weighted cell entries are rounded to the nearest decimal for the purpose of the statistical analysis.) The decision to restrict the analysis to white males reflects the need for very large numbers of cases in our analysis. This restriction is unfortunate, since the interactions of race and gender with segmentation are important.

The analysis will focus on a 15 by 15 industry mobility table. Each of the 14 major industry categories, except agriculture, is included. Two of the 14 are divided into 2: manufacturing, durable goods and manufacturing, nondurable goods both are divided into a core-sector component and a periphery-sector component, following the Tolbert-Horan-Beck scheme. Separating these categories allows us to test the mobility patterns of the Tolbert-Horan-Beck model. We compare these results to those obtained dividing industries as suggested by the Bibb-Form core-periphery model.

A series of other models were considered. Results are presented for a five-category industrial segmentation model, which consists of (1) finance, (2) administration, (3) services, (4) secondary goods, and (5) primary goods. Table 1 lists the industrial categories that form the rows and columns of the industrial mobility table, and indicates which categories are grouped together for the different models.

Industrial persistence is defined as individuals staying in the same industry between first job and current job. Industrial persistence may be measured at the detailed industry level, at the major industry level, or at the segment or sector level. Occupational persistence is similarly defined as persistence in the same (detailed or major) occupation between first and current job. Persistence here plays the same role that inheritance plays in intergenerational mobility analysis.

Table 1. Modified Major Industry Categories

Category	Tolbert-Horan-Beck placement[a]	5-category model placement[b]
1. Mining	Core	5
2. Construction	Core	5
3. Manufacturing, durable goods (lumber, furniture, misc.)	Periphery	4
4. Manufacturing, durable goods (stone, metal, machinery, transport equipment, ordnance)	Core	4
5. Manufacturing, nondurable goods (food, tobacco, textiles, leather, nonspecified)	Periphery	4
6. Manufacturing, nondurable goods (paper, printing, chemicals, petroleum, coal, rubber)	Core	4
7. Transportation, communications, utilities	Core	5
8. Wholesale trade	Core	4
9. Retail trade	Periphery	3
10. Finance, insurance, and real estate	Core	1
11. Business and repair services	Periphery	2
12. Personal services	Periphery	3
13. Entertainment and recreation services	Periphery	3
14. Professional and related services	Core	2
15. Public administration	Core	2

[a]Tolbert-Horan-Beck models include agriculture in the periphery, but the present analysis excludes agriculture.
[b]The substantive titles for the 5 categories are (1) finance, (2) administration, (3) services, (4) secondary goods, (5) primary goods.

In order to control for occupational mobility, industry mobility is examined within a 4 by 4 occupational mobility table. The four categories are (1) upper white-collar, including professionals and managers; (2) lower white-collar, including clerical and sales workers; (3) upper blue-collar, including craft and operative positions; and (4) lower blue-collar, including laborers and service workers.

We will perform a parallel set of analyses removing industrial persistence effects from occupational mobility tables. First, 15 by 15 occupational mobility tables will be examined. These categories correspond with Blau and Duncan's (1967) 17 occupational strata, with the two farm categories removed. Then we examine the effect of sequentially removing industrial effects on two additional models of the occupational mobility table: Breiger's (1981) eight-class model (here seven classes, owing to the removal of farming) and Fox and Hesse-Biber's (1984) four-category model of occupational strata (which corresponds to the four occupational class model outlined above).

VIII. RESULTS

The search for industry sectors begins with the analysis of the 15-category industry mobility table. Table 2 presents analyses of models of the 15 by 15 table that partition this table into discrete industry segments. Independence and quasi-independence models are presented for comparison. The columns refer to the models examined; the rows reflect the successive elimination of various groups of "stayers." Both the likelihood ratio chi-squared (L2) and the index of dissimilarity (D), which indicates the proportion of misclassified cases, are presented. The categories included in the Tolbert-Horan-Beck core-periphery model and the 5-category segmentation model are indicated in Table 1.

We will begin with a discussion of independence and quasi-independence, proceeding down the columns of results in Table 1. We will thus consider in turn the effect of removing each group of stayers from the model under consideration. The first row of Table 2 indicates that there is a strong relationship between the major industry of first job and the major industry of current job (L2 = 11,025.7, *df* = 196). This relationship is not surprising, and it is well documented in the literature (Featherman and Hauser, 1978). Much, but not all, of the relationship between major industries over time is a matter of persistence in the same detailed (Census 3-digit) industry. When detailed industry stayers are removed from the table, (row 2 of Table 2), the relationship between major industry categories over time is substantially reduced but not completely eliminated (L2 = 1,127.5, *df* = 196), a nearly 90% reduction in the L2 statistic.

Rows 3, 4, and 5 of Table 2 remove detailed, major, and occupational-class stayers in turn (but leave in detailed industry stayers in the first column). The successive removal of occupational stayers diminishes but does not eliminate the relationship between origin and destination industry.

Nor does persistence in major industry categories account for the remainder of the career–industry relationship. The quasi-independence models, which represent the removal of the major industry stayers, are depicted in the second column of Table 2. This model does not fit the data for the entire sample (L2 = 546.7, *df* = 181), indicating that there is a significant relationship between industries off the main diagonal. Row 2 of Table 2 removes detailed industry stayers. Removing detailed industry stayers is redundant for the quasi-independence models, and so the last three tests of the first and second rows are identical.

One of the most important pattern of findings in Table 2 emerges as one moves down the second column. In the quasi-independence model, the successive removal of detailed occupation, major occupation, and occupational-class stayers in turn nearly eliminates the observed industry relationship. What remains is an L2 of 222.1 with 181 degrees of freedom, a statistically significant relation but with little punch left.

The results of Table 1 strongly indicate that intragenerational industrial

Table 2. Tests of Industrial Segmentation Models for Tolbert-Horan-Beck 15 Industrial Categories

	Independence (*df* = 196) L2 (D)	Quasi-independence (*df* = 181) L2 (D)	Tolbert-Horan-Beck core-periphery[a] (*df* = 154) L2 (D)	5-segment model[a] (*df* = 86) L2 (D)
1. Entire sample (*n* = 14,670)	11,025.7 (29.9)	546.7 (7.5)	436.5 (7.6)	143.5 (3.3)
2. Detailed industry changers (*n* = 10,510)	1,127.5 (11.6)	546.7 (7.5)	436.5 (7.6)	143.5 (3.3)
3. Detailed occupation changers (*n* = 11,428)	4,611.3 (20.7)	394.7 (7.7)	328.6 (6.8)	116.1 (3.1)
4. 10 major occupation changers (*n* = 9,004)	2,678.0 (18.0)	311.4 (5.4)	251.1 (6.5)	101.5 (n.s.) (3.5)
5. 4 occupational class changers (*n* = 6,653)	1,807.7 (17.4)	222.1 (5.4)	178.4 (n.s.) (6.1)	85.3 (n.s.) (3.6)

[a]See Table 1 for list of industry categories included in each model.

mobility must be understood in the context of industrial and occupational persistence. That is, a large proportion of the relationship between first industry and current major industry is accounted for by persistence in detailed industries, with about a 90% reduction in L2. Nonetheless, detailed industry changers are disproportionately likely to end up in the same major industry. When all major industry persistence is accounted for, the remaining industry relationship is reduced by about half.

Much of the balance of the relationship between the industry of a man's first job and later job is accounted for by occupational persistence. Detailed occupational persistence accounts for more than one-quarter of the balance, major occupational persistence another 20%, and broad occupational class amost another 30%. Thus, the great majority of the relationship between industries over time is accounted for by industrial and broad occupational persistence. *The removal of the inertial or barrier effects between more detailed industry units, combined with the removal of occupational effects, leaves little immobility between major industries to be explained.*

Given this weak relationship in need of explanation, let us turn to the two segmentation models we are considering to see how they fare. The first substantive model considered is the Tolbert-Horan-Beck core-periphery model. All of the industries they incorporate in the core are grouped together into one labor market segment; the balance are assigned to the periphery. The Tolbert-Horan-Beck model does not produce an adequate partitioning of the industrial mobility table when the entire sample is included. A Breiger test of quasi-independence for the Tolbert-Horan-Beck model does not fit the data when the entire sample is included (L2 = 436.5, df = 154), indicating that these two economic sectors do not represent two discrete and internally homogeneous labor market segments. However, this model fits better and better the more stayers are removed from the analysis. When we reach row 5, the model finally fits the data (χ^2 = 178.4, with 154 df). This represents a statistical improvement over quasi-independence (43.7 L2 with a use of 27 degrees of freedom). The Tolbert *et al.* dual sector model fits the data when sufficient persistence effects are accounted for. Thus, there is support for the Tolbert model, but the degree of immobility it explains is quite modest.

The five-industry segment model fares better than the Tolbert model on each row of Table 2. (The categories included in each segment are presented in Table 1.) When the entire sample is included, the Breiger quasi-independence test of this industrial segmentation model considerably improves the fit to the data over the Tolbert model, but it is nonetheless rejected for the entire sample (L2 = 143.5, df = 86).

The five-segment model fits the data when major occupational stayers are removed (row 4 of Table 2). This model represents a statistically significant improvement over the dual sectors model (the L2 improvement equals 149.6 using 68 degrees of freedom). The five-segment model represents an improved fit compared to the Tolbert-Beck-Horan model even when occupational class stayers are removed (93.1 L2 with 68 df), although one might argue that this comparison represents a case of overfitting the data.

Thus, in Table 2 there are results that support a variety of viewpoints. *The strongest pattern in these results is that the bulk of the relationship in a career industry mobility table are accounted for by persistence in occupation and industry categories.* The remaining relationships are definitely secondary. Substantively, this indicates that more attention should be paid to immobility at the industry, occupation, and perhaps firm level, rather than the more aggregated level of segment or sector. *Nonetheless, there is limited support for a sectoral model, which does fit the data after successive layers of stayers are removed from the analysis. However, a five-segment model consistently outperforms the dual sector model.*

Table 3 describes the 15 modified major industry classifications employed for the Bibb-Form model. The Bibb-Form model divides nondurable manufacturing differently than does the Tolbert-Horan-Beck model, and thus a test of this model requires us to reclassify the detailed industries. We obtain a 15 by 15 industry mobility table, as before, but with modified categories. The Bibb-Form model groups paper products and printing with apparel, textiles, tobacco, and food processing in the periphery, whereas the Tolbert-Horan-Beck model groups paper and printing with chemicals, petroleum, coal, and rubber manufacturing in the core of the economy. The detailed industries included in categories 6 and 7 of the 15 modified major industry divisions differ between Tables 1 and 3, and the core-periphery placement of several of the other categories also differs.

Table 3. Alternative Modified Major Industry Categories

Category	Bibb-Form placement	5-category model placement[a]
1. Mining	Core	5
2. Construction	Core	5
3. Manufacturing, durable goods (lumber, furniture, misc.)	Core	4
4. Manufacturing, durable goods (stone, metal, machinery, transport equipment, ordnance)	Core	4
5. Manufacturing, nondurable goods (food, tobacco, textiles, apparel, paper, printing, leather, misc.)	Periphery	4
6. Manufacturing, nondurable goods (chemicals, petroleum, rubber)	Core	4
7. Transportation, communications, utilities	Core	5
8. Wholesale trade	Periphery	4
9. Retail trade	Periphery	3
10. Finance, insurance, and real estate	Periphery	1
11. Business and repair services	Periphery	2
12. Personal services	Periphery	3
13. Entertainment and recreation services	Periphery	3
14. Professional and related services	Periphery	2
15. Public administration	Core	2

[a]The substantive titles for the 5 categories are (1) finance, (2) administration, (3) services, (4) secondary goods, (5) primary goods.

Table 4. Tests of Industrial Segmentation Models for Bibb-Form 15 Industry Categories

	Independence (df = 196) L2 (D)	Quasi-independence (df = 181) L2 (D)	Bibb-Form core-periphery[a] (df = 154) L2 (D)	5-segment model[a] (df = 86) L2 (D)
1. Entire sample (n = 14,670)	10,878.0 (29.6)	550.2 (8.6)	378.8 (7.0)	153.4 (3.5)
2. Detailed industry changers (n = 10,510)	1,110.7 (11.4)	550.2 (8.6)	378.8 (7.0)	153.4 (3.5)
3. Detailed occupation changers (n = 11,428)	4,520.1 (20.4)	408.8 (7.7)	297.7 (6.3)	122.9 (3.2)
4. 10 major occupation changers (n = 9,004)	2,608.8 (17.7)	336.0 (7.5)	246.6 (6.2)	105.3 (n.s.) (3.4)
5. 4 occupational class changers (n = 6,653)	1,771.8 (17.1)	240.0 (7.4)	198.9 (6.5)	87.5 (n.s.) (3.4)

[a]See Table 3 for list of industry categories included in each model.

Table 4 repeats the analysis presented in Table 2 using the Bibb-Form 15 industry categories as the units of analysis. The results in Table 4 generally follow those in Table 2. The Bibb-Form model does not quite fit, even when occupation class stayers are removed from the analysis. While the Tolbert-Horan-Beck model does succeed, the differences between these schema in terms of statistical fit are quite small. The five-industry segment model again fits once major occupation stayers are removed, and constitutes a significant improvement in fit over the Bibb-Form model.

Table 5 presents tests of a broader examination of occupational influences, returning to the Tolbert-Horan-Beck 15 industry categories. Whereas Table 2 and 4 considered only occupational immobility effects, Table 5 considers whether off-diagonal occupational distance is responsible for the remainder of the industrial immobility. Table 5, then, considers the relationship between occupational mobility and industrial mobility. Occupational mobility is operationalized in a 4 by 4 occupational class mobility table, industrial mobility in a 15 by 15 mobility table. Thus, the tests presented in Table 5 are for a 4 by 4 by 15 by 15 occupation by occupation by industry by industry table.

The first row of Table 5 indicates that the model of independence is an extremely poor approximation of this table. Quasi-independence (with respect to the 15 industry categories) is a substantially improvement but still does not adequately characterize the data. However, a model that incorpo-

Table 5. Tests of Models for Occupation by Occupation by Industry by Industry Table

Categories	Model	Statistics
	A. 4 × 4 × 15 × 15 table (n = 14,760)	
1. Multiway table 4 × 4 × 15 × 15	Independence	L2 = 29,569.5 df = 3,565
2. Multiway table 4 × 4 × 15 × 15	Quasi-independence	L2 = 10,915.3 df = 3,325
3.[a] Multiway table 4 × 4 × 15 × 15	Fit occupations (1–2)(1–3)(1–4)(2–3)(2–4)	L2 = 3,253.4 df = 3,148
4. Multiway table 4 × 4 × 15 × 15	Fit industries (1–3)(1–4)(2–3)(2–4)(3–4)	L2 = 3,920.1 df = 2,976
	B. 15 × 15 tables, grouping occupation by occupation cells	
5. Above the diagonal	Quasi-independence	L2 = 242.4 df = 181 (n = 2,302)
6. Below the diagonal	Quasi-independence	L2 = 225.5 df = 181 (n = 4,459)
7. Cells (1,2)+(1,3)+(1,4)[a]	Quasi-independence	L2 = 196.9 df = 181 (n = 690)
8. Cells (2,3)+(2,4)+(3,4)[a]	Quasi-independence	L2 = 233.4 df = 181 (n = 1,612)
9. Cells (2,1)+(3,1)+(3,2)[a]	Quasi-independence	L2 = 193.7 df = 181 (n = 2,736)
10. Cells (4,1)+(4,2)+(4,3)[a]	Quasi-independence	L2 = 172.9 df = 181 (n = 1,723)

[a]In lines 7–10, models are applied to the specified combination of cells.

rates the occupational relationships and tests quasi-independence for the industry relationships fits the data (L2 = 3,253.4, *df* = 3,148). This model takes as given the relationship between first occupation and current occupation (1, 2), the relationship between first occupation and both origin and destination industry (1, 3) and (1, 4), and the relationship between destination occupation and origin and destination industry (2, 3) and (2, 4). Thus, all two-way relationships are fitted, with the exception of the industry–industry relationship (3, 4). This model indicates that, once one has accounted for the occupational relationships in this table, the career industry mobility table is quasi-independent.

Substantively, this indicates that there is no industrial immobility left to explain once one takes occupational mobility and the relationship between occupational mobility and industry mobility into account. Thus, there are no sector effects left to explain.

A potential difficulty with the results in Table 5 is that there are so many cells (3,600) in the table examined here that the results may be artifacts of the small number of cases per cell (3.95). To try to minimize this problem, we collapsed several of the occupation cells into one to obtain a denser table for analysis. We tested the quasi-independence model for a single 15 by 15 industry table for all of the 6 occupation cells above the diagonal in Table 5, and again for the 6 cells below the diagonal. Quasi-independence does not fit these tables. A subsequent test divided the above-diagonal cells into two groups of three, and divided the below-diagonal cells into two groups of three. All four of these groups fit the data. The large number of cases (690, 1,612, 2,736, and 1,723) with only 181 degrees of freedom indicates that the results are not artifacts of the relatively sparse number of cases per cell. We conclude that the industrial quasi-independence is a substantive conclusion rather than a statistical artifact.

The preceding analysis examines the industry effects that remain after occupational effects are removed. Now let us reverse this analysis to see how strong career occupation relationships are once industry effects are removed. Row 4 in Table 5 repeats the analysis of row 5 but tests the strength of occupational effects after controlling for industry effects. In row 4 a model was tested that fit the relationship of first and current industry (3, 4) and all the industry–occupation effects (1, 3) (1, 4) (2, 3) (2, 4) but left the occupation relationship (1, 2) quasi-independent. This model does not fit the data, whereas the model fitting the occupation relationships (row 3) does.

This comparison suggests two conclusions. First, the finding of quasi-independence for industries is not an artifact, since the same procedure does not result in a finding of quasi-independence for occupations. *Second, the strength of the occupation relationship, net of industry effects, is clearly stronger than the industry relationship, net of occupational effects.*

Table 6 examines the same industry–occupation relation in a slightly different fashion. Table 6 reports an examination of the 15 by 15 industry table for each of the 16 occupational cells separately. Table 6 indicates that for 14 of the 16 cells, the model of quasi-independence fits. For only two cells, (1, 1)

Table 6. Quasi-Independence Models for OCG2 Men, for 15 by 15 Industry Mobility Tables, within 4 by 4 Occupational Mobility Table

		Occupational class, 1973			
		Upper white-collar	Lower white-collar	Upper blue-collar	Lower blue-collar
Occupational class, first job	Upper white-collar	*n* = 2,623 L2 = 302.4 *df* = 181	*n* = 328 L2 = 153.7 *df* = 155	*n* = 288 L2 = 154.6 *df* = 168	*n* = 74 L2 = 79.2 *df* = 111
	Lower white-collar	*n* = 1,098 L2 = 152.5 *df* = 181	*n* = 326 L2 = 155.0 *df* = 15	*n* = 748 L2 = 110.2 *df* = 168	*n* = 259 L2 = 240.5 *df* = 168
	Upper blue-collar	*n* = 1,067 L2 = 136.0 *df* = 181	*n* = 571 L2 = 143.6 *df* = 168	*n* = 3,959 L2 = 243.5 *df* = 181	*n* = 605 L2 = 144.3 *df* = 181
	Lower blue-collar	*n* = 345 L2 = 132.3 *df* = 168	*n* = 222 L2 = 150.8 *df* = 168	*n* = 1,156 L2 = 154.4 *df* = 181	*n* = 545 L2 = 179.2 *df* = 155

	Entire sample		3-digit occupation changers	
1. Cell (1,1)	(*n* = 2,623)			(*n* = 1,318)
Independence			L2 = 1,207.5	*df* = 196
Quasi-independence			L2 = 216.3	*df* = 181
Core-periphery model	L2 = 239.6	*df* = 154	L2 = 192.3	*df* = 154
Segmentation model	L2 = 109.9	*df* = 85	L2 = 96.6	*df* = 81
2. Cell (3,3)	(*n* = 3,959)			(*n* = 2,725)
Independence			L2 = 760.3	*df* = 196
Quasi-independence			L2 = 166.9	*df* = 181
Core-periphery model	L2 = 192.3	*df* = 154	L2 = 140.1	*df* = 154
Segmentation model	L2 = 77.8	*df* = 83	L2 = 69.7	*df* = 83

and (3, 3) does quasi-independence fail to fit. Thus, as we saw in Table 5, the more one controls for occupational effects, the less off-diagonal industrial relationship is observed. We also note in Table 6 that, as hypothesized, occupationally downwardly mobile individuals are not constrained by their industry of origin. As it turns out, neither are occupationally upwardly mobile individuals. The concentration of industry effects is evident for individuals who remain in the same broad occupational class.

Table 6 reports tests of partitions of these two recalcitrant cells. The segmentation model fits the upper blue-collar cell and barely misses fitting the upper white-collar cell. The Tolbert-Horan-Beck model dies not fit the industry table adequately when the entire sample (of these two cells) is included. However, when detailed occupation stayers are removed, the industrial segmentation model fits the upper white-collar cell, while quasi-independence fits the upper blue-collar cell. (Removing detailed occupation stayers is not redundant: Quasi-independence blanks out major industry stayers, not occupation stayers.)

The above results suggest that industry effects may consist primarily of persistence in major industry categories, once occupational effects are removed from the analysis. Rather than clustering into two main sectors or five main segments, industry mobility effects are very weak after successive occupational effects are removed.

We finally considered the effects of removing industrial effects on a 15 by 15 occupational mobility table, reversing the control variable as we did in Table 5. The results of this analysis are presented in Table 7. Strong occupation effects persist after successive waves of industrial persistence effects are removed. Independence and quasi-independence fail in all cases, as does the four broad occupational segmentation model.

An interesting pattern of effects is evident for the Breiger seven-class model. Breiger (1981) has noted that his occupational class model does not fit career mobility tables. However, his seven-class model does fit once industrial persistence effects are removed.

A final point should be made regarding the results in Table 7. We have noted that the procedure of removing successive groups of industry stayers can be viewed as a nested process: All three-digit industry stayers are removed once all major industry stayers are removed, and so on. The successive of steps almost invariably improves the fit of the table, indicating that immobility is greater for the group of stayers than for the balance of the sample.

Table 7. Tests of Occupational Class Models

	Independence (df = 196) L2 (D)	Quasi-independence (df = 181) L2 (D)	Breiger 7 nonfarm class model (df = 53) L2 (D)	4-segment model (df = 107) L2 (D)
1. Entire sample (n = 14,669)	10,538.4 (31.9)	2,756.4 (20.9)	106.0 (3.2)	473.8 (7.2)
2. Detailed occupation changers (n = 11,835)	4,095.9 (23.3)	2,756.4 (20.9)	106.0 (3.2)	473.8 (7.2)
3. Detailed industry changers (n = 10,510)	3,695.0 (23.1)	1,769.6 (18.3)	68.8(n.s.) (2.5)	156.8 (4.5)
4. Major industry changers (n = 9,045)	2,757.7 (21.7)	1,525.7 (18.1)	69.8(n.s.) (2.7)	150.3 (4.7)
5. Industry segment changers[a] (n = 7,046)	2,931.0 (25.4)	1,910.7 (21.7)	78.9 (3.3)	729.1 (9.9)
5. Industry sector changers[a] (n = 3,740)	1,430.8 (23.3)	1,014.8 (21.1)	115.3 (5.4)	410.2 (10.5)

[a]See Table 1 for list of industry categories included in each model.

Yet the removal of industrial segment and industrial sector stayers does not improve the fit of the occupational tables. The chi-squared statistics rise for the last two rows of Table 7, contrary to the general pattern of declining figures as one moves down the table. This curious pattern suggests that occupational effects are weaker within these segments than between them, that the relationships within the occupational table are not concentrated within these sectors or segments. This final twist of the occupational data again suggests that the segmentation and dual-sector models are not the most appropriate categories for understanding career mobility patterns.

IX. DISCUSSION

Once occupational mobility is controlled for, few industry effects remain besides persistence on the diagonal. The overwhelming majority of the relationships in a career industry mobility table are accounted for by detailed industry persistence, major industry persistence, and occupational persistence. As indicated in the analysis in Table 5, the balance is accounted for by occupational mobility effects and occupation by industry interactions.

Evidence that economic sectors define barriers to mobility is weak. This correspondence between labor market segments and economic segments is observed only when industry effects verge on disappearing altogether—namely, when all of the extraneous persistence effects are removed from the analysis. (We should add a cautionary note that there might be less mobility for blacks and women. But see Jacobs, 1983b, for contrary evidence.) In all cases, a more variegated segmentation model outperforms a dual sector model. In sharp contrast, occupational effects persist more strongly when industry effects are removed.

However, immobility between major industries may be sufficient to sustain wage inequalities between economic sectors over time. Quasi-independence, of course, is not independence. The evidence of immobility between industries, even after occupational effects are removed, is indisputable. Whether this immobility is the result of different skills acquired, different geographical locations of different industries, or other factors cannot be shown from the present analysis. Quasi-independence may account for the wage effects Tolbert *et al.* (1980) and others have obtained. The degree of immobility required to sustain wage disparities across industries is a matter that we cannot pursue here. However, since immobility appears to be more a matter of industry rather than of sector effects, we would expect wage inequality equations that are operationalized at the industry level to pick up more inequality than those operationalized at the industrial sector level.

Thus, the thrust of our argument is that we should not confuse microlevel structural effects with macrolevel ones. The mobility and wage effects that are attributable to industry and occupation should not be attributed to segments or sectors. Once one has accounted for such effects, we find little or no sectoral barriers to mobility remaining.

The movement of new structuralist analysis has been toward firms and away from aggregated units of analysis such as industrial sectors. Our results would tend to support this trend. While we have not employed data on firms in this analysis, we do find that smaller units of analysis outperform larger ones. We expect that characteristics of firms are particularly important determinants of income and mobility, and that behavior at the firm level is likely to be responsible for much of the more aggregated relationships we have observed.

Another important part of this picture not examined here is the influence of geography on mobility. Some industries are concentrated in particular localities, so the significance of industrial effects may be highlighted in local markets. This question will have to be addressed in a multivariate context, taking into account regional as well as occupation and industry patterns.

Three programmatic notes are in order. This chapter underscores the utility of partitioning models in addressing substantive concerns. Second, this chapter indicates the importance of considering mobility in a multidimensional context, as Logan (1983) has argued. Results that are implied by particular models of a mobility table may disappear when other variables, here simply occupation, are controlled. Third, this chapter highlights the utility of a multilevel view of social structure outlined by Baron and Bielby (1980) and Kalleberg and Berg (1987).

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