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THE AGE STRUCTURE OF OCCUPATIONS AND JOBS

by

Robert L. Kaufman and Seymour Spilerman

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Robert L. Kaufman
University of Wisconsin

Seymour Spilerman
Brookdale Institute
Russell Sage Foundation

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ABSTRACT

Age segmentation in the labor force can be analyzed in terms of the age distributions of occupations. In this paper we show that the majority of detailed census occupations conform to one of five basic age profiles. Further, these age profiles have meaning as they derive from the operation of well-defined institutional forces. We discuss the relevance of industry for a refined understanding of occupational-age patterns and conclude with some observations about the likely consequence of a change in the age of compulsory retirement for the age distributions of different occupations.

THE AGE STRUCTURE OF OCCUPATIONS AND JOBS

In attempts to comprehend the process of individual achievement, increasing attention has been given to job change behavior (Parnes 1970; Doeringer and Piore 1971; Stinchcombe 1975; Leigh 1976). The importance of this consideration is apparent with respect to status attainment since, by definition, a change in occupational status can ensue only as a result of a job shift. This is not the case with earnings, which can evolve during the course of employment in a single position, yet job switching remains an important mechanism for securing earnings growth over the life cycle. There is evidence, for instance, that a job shift is frequently accompanied by an increase in salary (Ornstein 1976, pp. 109-129; Parnes et. al. 1974, pp. 103-113). There is also reason to suspect that, especially for young workers, job changing is used by many to situate oneself favorably with respect to long-term earnings prospects, if not immediate returns (Spilerman and Miller 1977).

Job changing is hardly a random phenomenon, in regard to rate of movement or choice of destination. Rather, characteristic patterns can be associated with particular origin occupations and industries (Palmer 1954, pp. 62-80; Reynolds 1951, pp. 28-37). This presence of determinable avenues of movement is another way of saying that the labor market is "Balkanized" (Kerr 1954), "segmented" (Piore 1975), or organized into "career lines" (Spilerman 1977), in the sense of there existing sequences of positions with high rates of being traversed. Irrespective of terminology, the implication is that the labor market is structured with respect to movement; in short, for most workers, job changing is not a chaotic process.



If job shifting is an important mechanism in status and earnings attainment, and if this behavior is patterned, it would appear desirable to understand the linkages which exist between jobs. Indeed, the notion of labor market structure is not alien to occupational sociology, though an interest in movement patterns per se has been only an incidental concern. Thus, with respect to the professions and craft occupations, there is the concept of a "life-time commitment" (Caplow 1954, p. 107; Ritzer 1972, p. 203); by implication, a low rate of occupational change. In contrast, descriptions of careers of foremen and managers contain lengthy discussions of typical prior and subsequent occupations (Sofer 1970, pp. 234-251). For our purposes, the pertinent point is that researchers have long recognized the presence of a relation between line of work and job change behavior.

The traditional approach to labor market structure has been to examine organizational entities and institutional rules which impede job changing or, conversely, define conduits along which individuals do move. With respect to craft occupations, for instance, it has been noted (e.g., Stinchcombe 1959) that the number of entrants into a union is limited, membership requires prior training, a union is commonly coterminous with a single craft, employment is obtained through union referrals, and duration with an employer tends to be brief. In this circumstance, a considerable investment is built up by a worker in his craft and in its union, and a low rate of occupational turnover can be expected. In industrial firms, by comparison, jobs are organized into hierarchical sequences (job ladders) and seniority with the firm is a principal consideration in promotion, as well as a determinant of job security and pension rights. Employment therefore tends to be of long duration and is punctuated by periodic occupational shifts.

If the traditional approach to labor market structure emphasizes the institutional arrangements which underlie movement patterns, a second strategy would be to focus directly on the transition probabilities among jobs. There are several virtues to such an approach: It would complement the study of norms and rules in that information would be available on behavior as well as on prescription. Second, movement regularities not suggested by theory could be uncovered. Third, if the analysis were based on a representative population sample, it would be possible to study mobility patterns in a systematic fashion, in which all occupations and industries are examined and observations on job changes have been made at a common point in time.

Yet, the task of delineating movement patterns from empirical data is not simple, even when attention is restricted to transitions between pairs of jobs, rather than historical sequences (careers). Because transferability of work skills often is limited to technologically related occupations and industries, detailed occupation and industry categories are necessary to capture the fine structure of movement. (In aggregate classifications technologically proximate categories tend to be grouped together, which would result in an underestimate of the true amount of movement.) Also, most jobs can lead to multiple destinations, and the transition probabilities to the various destinations alter with a worker's age, further complicating the task of describing job change behavior. Finally, in order to achieve some degree of stability, movement patterns must be based on many individuals in each origin position. For these reasons, the data requirements necessary for an adequate portrayal of mobility patterns are considerable.

As an alternative to examining job transitions directly, we consider one of the implied consequences of a labor market in which movement is structured. If there exist determinable job sequences, such linkages should

find expression in the age distributions of occupations and jobs.¹ Some, being entry-level positions into career lines, should have a concentration of young workers; others, at the apex of career lines, should contain an overrepresentation of middle-aged persons. Conversely, given the presence of a diversity of occupational-age distributions in the labor market, one can infer particular movement patterns; thus, the age characteristics of work positions can be used as an instrument for probing labor market structure. This is not to suggest that age features of occupations are informative only about job linkages. As we shall observe, occupations with similar age profiles have in common other aspects of the organization of work as well. Further, an understanding of age segmentation is pertinent to forecasting the consequences of a change in the age of compulsory retirement, a topic currently of public concern.

In this paper we examine the age distributions of occupations and jobs to ascertain what may be learned from these facts about labor market structure and related matters.² We begin by outlining the mechanisms which generate different occupational-age patterns. Following that discussion we illustrate the sorts of occupations that are found to belong to each age category. This account is then supported by a more formal analysis of the causal forces which contribute to the observed age patterns. In the concluding sections we outline some complications which arise when considerations of industry are introduced, and review policy implications which derive from this study.

MECHANISMS WHICH GENERATE OCCUPATIONAL-AGE DISTRIBUTIONS

The presence of a variety of age distributions among occupations derives from the operation of multiple factors. To cite a few: (1) Jobs differ in task demands and in other work features which make them differentially attractive to the various age groups. (2) In large organizations, work positions are commonly arranged in hierarchies (job ladders) in which progression is unilineal; the age-grading of occupation is one consequence. (3) The replacement of old technologies by more efficient ones can be associated with the

decline of certain occupations (and industries); often this takes place through low rates of hiring into a contracting occupation, with a consequent increase in the average age of incumbents. We now review considerations of these sorts in some detail.

Physical requirements of tasks. Occupations differ in the extent to which the work is physically difficult or exhausting. Some manual jobs (e.g., warehouseman, electrical lineman, fireman) necessitate exertions of the kind that can be performed on a daily basis only by the able-bodied. We expect occupations of these sorts to exhibit an age structure skewed to the young end, as workers in middle age presumably transfer to other lines of endeavor. There also are occupations which, while not physically exhausting, require quick reflexes and a high level of motor coordination (e.g., airline pilot, professional athlete). The need for such abilities should also result in truncation of the age distribution at the upper end.

Retirement rules. Closely related to physical requirements of tasks are formal rules that compel retirement by a certain age. In some instances, retirement rules are intended to insure that workers in occupations where performance declines sharply with age (e.g., airline pilot, policeman) depart from the occupation rather than reduce their quality of work. Yet, retirement rules are more pervasive than can be accounted for by a narrow consideration of task demands. Large bureaucracies have age ceilings even when little justification is apparent in terms of work requirements. Rather, the reasons appear to be ones of discouraging rancorous conflict between age cohorts over the timing of succession (N.Y. Times 1977, p. 38), permitting the infusion of young talent and new ideas into an organization (Breen 1966, p. 386), and enabling a firm to gracefully divest itself of workers who have reached an age at which illness is likely to take an increasing toll in work regularity (Report 1973, pp. 69-70).

While the age specified in retirement rules places an upper bound to the age distribution of an occupation, the typical age of departure may be quite different. Considerations relevant to early retirement decisions include pension plan features and skill transfer prospects. Pension plan features are consequential because retirement plans differ in the length of service at which attractive benefits first become available (instances of extreme generosity are the plans of postal workers, military personnel, and New York City policemen and firemen; typically they carry benefits of one-half the terminal year's salary after 20 years employment). Skill transfer prospects are relevant because many early "retirees" wish to remain in the labor force and initiate retirement only after assuring themselves of other job opportunities.³ (For example, the availability of watchmen and bank guard positions for former policemen probably contributes to a high rate of early retirement from this career line.)

Work setting. If many occupations have formal rules which compel departure by a certain age, we can also suggest the kinds of positions which permit individuals to remain in the labor force until a comparatively late age. Elderly workers require occupations in which they can vary the number of hours of employment and set the rate of work according to their daily condition. The most obvious circumstance in which this is possible pertains to free professionals (doctors, lawyers) and self-employed businessmen such as retail shopkeepers. Some situations of employment permit similar flexibilities: Realtors and insurance salesmen are often paid on a commission basis and tie down few organizational resources (machinery, office space); employers therefore might not be adverse to a leisurely rate of work by individuals in these occupations. Building janitors provide another example of an occupation in which employees have some latitude in scheduling tasks and can control their rate of work.

Education and training. To this point we have discussed features of jobs which constrain occupational-age distributions at the upper end of the age continuum. For some occupations, however, the age range is truncated at the lower end, as a consequence of education and training requirements. This is most apparent with respect to professions in which graduate study is a prerequisite for certification (e.g., medicine, law, college teaching), though lengthy training periods are not unusual in blue collar crafts, where they take the form of apprenticeship programs.

Job linkages. In discussing organizational requirements we have stressed constraints on age of input (education and training prerequisites) and limits to continued membership (retirement rules). We wish now to emphasize age patterns which arise from a different kind of organizational consideration, the division of labor and linkages among jobs internal to a firm. In large industrial enterprises, work positions are arranged in hierarchies (job ladders), with service at one occupational rung a prerequisite for employment at the next higher level. In part, the presence of job hierarchies reflects the need for acquiring skills and experience before advancement; in part, it results from pressure by unions to reserve upper-level slots for currently employed workers (internal labor market). Whatever the explanation in a particular firm, the consequence for occupational-age composition is that each position in a job sequence will have a narrow age distribution, with the mean age increasing over the successive positions.

Additional institutional considerations. Occupations that are linked together by a promotion ladder should have narrow age distributions. Institutional arrangements of a different sort associate a "life-time commitment" with many professions and craft trades (Ritzer 1972, p. 203). Provided

these occupations are neither expanding nor contracting in employment, their age distributions should be flat, relative to the age distribution of the total labor force. An occupational-age structure of a still different kind would be expected from positions that belong institutionally to the "secondary labor market."

The concept of a "dual labor market" is associated with the writings of Doeringer and Piore (1971), although the central ideas appear in earlier publications by Kerr (1954) and Dunlop (1957). The basic notion involves the dichotomization of jobs according to whether employers invest resources in the training of workers (primary labor market) or refrain from doing so (secondary labor market). With respect to the former positions, hierarchical job sequences and the provision of periodic salary raises constitute the reward structure in terms of which employers remunerate workers for training and experience. In contrast, the secondary sector consists of jobs for which employers choose not to upgrade worker skills. As a result, employees with several years experience are no more attractive to an employer than new entrants into the firm and there is little reason for the salaries offered to the two groups of workers to differ. Returns to seniority are therefore minimal; in this sense jobs in the secondary sector can be said to lack a future.

Because jobs in the secondary labor market are easy to enter and because new entrants are soon on an equal footing with veteran employees, secondary positions are often turned to for second careers, such as when task difficulty compels a job change. These positions should therefore have an overrepresentation of older workers. However, many secondary positions (e.g., gas station attendant, dishwasher, food service worker) also appeal to very young workers who have not yet committed themselves to a line of work

or otherwise desire intermittent employment (Doeringer and Piore 1971, pp. 170-180). Thus, jobs in this sector should contain a concentration of youthful workers, as well as elderly individuals. Indeed, the age range with the lowest representation rate should be the late 20's to early 40's, a period in which individuals are both able-bodied and have embarked upon careers.

Demographic factors. New occupations are continually being created, accompanying the development of emergent technologies (e.g., computers, television); other occupations are declining in employment (e.g., blacksmith, railroad fireman) as their functions become obviated by technological advance. Employees in expanding occupations, especially when specialized training is required, tend to be drawn from recent entrants into the labor force; such occupations should therefore have a young age structure. Contracting occupations, in comparison, evolve by not replacing workers who have departed and should have an age-distribution skewed to the old end. These comments pertain only to the initial years of occupational growth or decline. Eventually, growth slows in expanding occupations, and replacement becomes necessary in contracting ones. The consequence of such changes in the rate of recruitment is to generate "waves" in the age distribution of the occupation; their passage over the age range may be observed in successive decennial population censuses (e.g., Smith 1973).

Summary. From a review of the preceding comments it should be evident that systematic forces of an institutional and a demographic nature operate on occupations and are capable of creating a diversity of age patterns. Drawing together our assessments of the consequences of the various forces, we expect to find evidence for five types of occupational-age distributions:

1. Occupations in which young workers are overrepresented. These should include entry-level positions in job sequences and occupations organized around emergent technologies.

2. Occupations in which middle-aged workers are concentrated. We expect senior positions in job sequences (supervisors, foremen, managers) to fall in this category.

3. Occupations in which the elderly are overrepresented. These should be the sorts of jobs which permit a worker flexibility in setting his rate of work and scheduling hours of employment. We also expect contracting occupations to be in this category.

4. Occupations with a uniform age distribution. We expect to find the free professions and craft occupations here, since affiliation with these positions tends to be of long duration.

5. Occupations with a U-shaped age distribution. This category should contain jobs of low desirability, having poor advancement prospects.

We wish to emphasize that several of the factors we have enumerated as influencing the age distribution of an occupation may operate simultaneously, making a unique assignment of it to one of the preceding five categories an impossible task. For instance, dentistry is a profession with a life-time commitment; hence, a uniform age distribution would be expected. At the same time, dentists are self-employed and control their hours of work. Thus, they should be able to remain in the labor force until a comparatively late age and we expect a concentration of the elderly in dentistry, relative to their representation rate in other occupations. The age distribution of this profession should therefore reflect the operation of two distinct kinds of considerations.

Finally, in addition to the five patterns we have proposed, other irregular age distributions can be expected to characterize some occupations. These would reflect shaping forces such as changes in the rate of employment growth in prior decades (population waves), the idiosyncratic effects of industry (which we discuss in the final section), and interactions among the factors we

have enumerated when several pertain to a single occupation. Issues of these sorts, however, are second-order considerations in that they require a deep appreciation of the historical circumstance and organizational context surrounding an individual occupation. In the present paper, we avoid explanations of particularistic patterns and concentrate instead upon unimodal and other simple age distributions which have broad relevance for our comprehension of labor market structure.

EVIDENCE FOR A DIVERSITY OF OCCUPATIONAL-AGE DISTRIBUTIONS

In this section we provide illustrations of the occupations associated with each age category and explore the degree to which the five patterns we have postulated adequately summarize the types of age profiles in the labor market. Because the proposed age patterns were derived from theoretical considerations regarding the forces acting on different occupations, we inquire into whether the occupational characteristics that have been associated with each age profile have a basis in empirical fact. Our discussion here is post-hoc; many of our suggested explanations, however, are examined analytically in the next section.

To pursue these issues we used the 1970 Census 1/100 sample tape (5 percent county group file), taking as observations all males over 17 years in age who were employed full-time in 1969⁴ and were not disabled. Because we wish to examine age profiles for detailed occupations (3-digit census codes), a very large sample was required. We would have preferred to limit the investigation to a single labor market area, in recognition of the fact that age patterns differ somewhat among communities, but this would not have provided a sample of sufficient size. Consequently, data from 12 large northern SMSAs were pooled.⁵ To a degree, this regional and city-size restriction serves to reduce the magnitude of city differences in labor market organization.

Occupational-age patterns were constructed in the following manner.⁶ The age distribution of each position was standardized against the age

distribution of the total sample. That is, if P_{ao} = proportion of individuals in age category \underline{a} of occupation \underline{o} , and P_{a+} = proportion of the total sample in age category \underline{a} , then our index of representation in age category \underline{a} is given by $E_{ao} = P_{ao}/P_{a+}$. Thus, to the extent that E_{ao} exceeds 1.00, age category \underline{a} is overrepresented in occupation \underline{o} ; to the extent E_{ao} is below 1.00, the age category is underrepresented in the occupation. The age profile for occupation \underline{o} is given by the row of entries, $\{E_{ao} | a = 18-21, 22-27, \dots, \geq 65\}$.

We excluded from the analysis all occupations with fewer than 75 individuals in our sample (to obtain stable age patterns) or which represent census codes for allocated categories. This left 201 occupations, 80 percent of which ($N = 160$) could be classified, by inspection, into one of the five age patterns. That is to say, a subjective decision was made concerning the category to which an occupation would be assigned. An objective, confirmatory analysis was also performed, but we delay discussion of that procedure until after presentation of the empirical results.

Our first set of age profiles, reported in Tables 1-3, illustrate occupations in which young, middle-aged, and older workers are concentrated. The specific occupations appearing in a table were chosen to depict the variety of types of positions associated with the age category. Turning to occupations in which the young are overrepresented ($N = 43$), we find, consistent with expectation, a cluster which can be identified with heavy physical labor (electrical lineman, stock handler, warehouseman). A second cluster contains positions that are clearly entry-level occupations in career lines (assembler, bank teller, draftsman), in that foremen, managers, and supervisors are commonly recruited from them.

Table 1. Illustrative Age Distributions: Young-Age Occupations^a

Occupation	N ^c	Mean Age	Age Group ^b								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Electrical Lineman (433)	183	36.7	1.43	1.22	1.65	1.37	1.00	.45	.59	.63	.15
Stock Handler (762)	638	34.7	6.87	1.60	.80	.71	.49	.74	.74	.59	.59
Warehouseman (770)	259	39.0	1.64	1.17	1.06	1.38	.81	.79	.80	.93	.44
Assembler (602)	1243	37.8	2.02	1.69	1.10	.87	.78	.78	.84	.80	.32
Bank Teller (301)	118	34.0	4.99	2.44	.87	.60	.39	.46	.35	1.16	.49
Draftsman (152)	888	36.1	2.10	1.80	1.31	1.00	.83	.76	.46	.46	.52
Policeman (964)	1356	37.1	.55	1.41	1.57	1.21	1.12	.77	.56	.34	.21
Hairdresser, Cosmetologist (944)	178	36.8	1.28	1.37	1.50	1.32	1.07	.46	.65	.47	.32
Gas Station Attendant (623)	347	36.0	6.79	1.45	.69	.59	.79	.55	.84	.64	1.25
Computer Programmer (3)	498	30.5	.92	2.79	2.28	.93	.46	.22	.10	.06	.05
Computer Repairman (475)	127	31.9	1.03	2.38	2.00	1.35	.51	.27	.19	.16	.00

^aOccupations selected to illustrate the variety of positions with a young age structure. Number of occupations in this category is 43. Following each occupational title the 3-digit 1970 Census code is shown (in parentheses). Data are for males.

^bEach entry reports proportion of the occupation's members in the age category, relative to this figure for the total labor force. Entry >1 indicates overrepresentation of the age group in the occupation; entry <1 indicates underrepresentation. In particular, an entry equal to 2 means twice the representation that is expected; an entry equal to .5 means half the expected representation.

^cNumber of individuals in the occupation in our sample.

Table 2. Illustrative Age Distributions: Middle-Age Occupations^a

Occupation	N	Mean Age	Age Group								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Engineer; Chemical (10)	170	41.2	.00	.68	1.29	1.22	1.31	1.29	.83	.43	.51
Engineer; Mechanical (14)	719	42.2	.00	.65	1.12	1.14	1.32	1.29	.97	.67	.48
Bulldozer Operator (412)	88	40.3	.37	.82	.93	1.62	1.27	1.17	.66	.72	.00
Craneman (424)	348	43.4	.75	.60	.69	.94	1.41	1.44	1.05	.97	.50
Cement Finisher (421)	119	40.3	.82	.72	.98	1.56	1.32	1.27	.56	.53	.24
Vocational Counselor (174)	132	39.4	.00	.98	1.30	1.35	1.29	1.14	.75	.24	.21
School Administrator (240)	283	44.9	.00	.17	.70	1.34	1.71	1.31	1.03	1.04	.71
Sales Manager, except Retail (233)	881	43.6	.07	.41	.85	1.32	1.37	1.32	1.07	.81	.69
Pilot (163)	170	37.3	.00	.63	2.34	1.47	.85	1.13	.54	.06	.00

^aNumber of middle-age occupations is 30. See notes to Table 1 for additional details.

Table 3. Illustrative Age Distributions: Old-Age Occupations^a

Occupation	N	Mean Age	Age Group								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Barber (935)	307	44.4	.42	1.08	.74	1.02	.75	.98	1.14	1.20	2.26
Tailor (551)	203	49.7	.48	.28	.71	.63	.81	.88	1.31	2.34	3.56
Sewer and Stitcher (663)	168	46.9	.97	.38	.86	.85	.82	.69	1.34	2.07	2.58
Taxi Driver (714)	505	44.8	.64	.80	.69	.80	1.10	.96	1.33	1.38	1.60
Real Estate Agent (270)	473	46.9	.27	.47	.66	1.03	.98	1.06	1.34	1.43	2.44
Cleaner (902)	425	44.9	1.00	.74	.92	.74	.94	.82	1.08	1.84	1.77
Guard, Watchmen (962)	723	47.5	.90	.68	.58	.63	.79	1.01	1.34	1.75	3.20
Locomotive Engineer (455)	115	50.0	.00	.12	.12	.37	1.25	1.85	2.10	1.83	.75
Railroad Car Shop Repairman (486)	156	45.3	.00	.69	.75	.45	1.09	1.54	1.49	1.55	.37
Lodge Official (223)	154	49.0	.00	.37	.31	.74	.93	1.38	2.06	1.57	1.69

^aNumber of old-age occupations is 38. See notes to Table 1 for additional details.

The remaining occupations of young individuals are of diverse sorts. Police work entails difficult physical labor, but generous early retirement programs also contribute to a high departure rate in middle age. Notice, incidentally, that the very young are underrepresented in police work; often there are legal minimum age requirements in protection services. For cosmetologists and hair-dressers, it is an asset to be physically attractive, an attribute more common among youth; it is interesting that barbers, who perform comparable tasks for men, have an old age distribution (Table 3). Attendant work in a gas station has many of the features we attributed to "secondary labor market" positions; pay is low, turnover is high, the job is easy to enter but leads nowhere, though some workers do acquire mechanic skills. There is even a tendency to a U-shaped distribution ($E_{65+} = 1.25$), although the effect is modest in comparison with the overrepresentation of youth (e.g., $E_{18-21} = 6.79$). For this reason we placed the occupation in the young-age category. The final occupations in Table 1 (computer operator, computer programmer) illustrate industry effects, a topic which we pursue in the next section. Computing services utilize a new technology, and many affiliated occupations have young age distributions.

Middle-aged occupations are more varied in kind. Of the 30 positions in this category, several are engineering occupations⁷ and a number are craft jobs, in particular, heavy machinery operators. The appearance of chemical and mechanical engineers as middle-aged occupations stems from truncation at the lower end of the age distribution due to educational requirements and opportunities in later life for movement into managerial positions. Bulldozer operators and crane-men are entrusted with expensive machinery and often have life-and-death control over other workers. Mature individuals are therefore sought for these jobs and the very young are underrepresented.⁸ Because this work is physically demanding, the dropoff in employment at the upper end of the age continuum is not unexpected.

Yet, the dominant cluster of occupations in this category involves supervisory and mid-level tasks (school administrator, sales manager, vocational counselor). The middle-aged character of these occupations is due clearly to their location in job sequences: promotion is an important avenue of entrance.⁹ This is particularly apparent for school administrators, invariably former teachers; the representation rate of individuals under 30 in this occupation is extremely low. Airline pilot is another middle-aged occupation. Underrepresentation of the young results from lengthy training requirements; underrepresentation after age 50 stems from health and retirement regulations. To summarize, the majority of middle-aged occupations can be understood in terms of placement in a job sequence, or in terms of entry credentials, retirement rules and task difficulty, the latter two considerations serving to limit membership at late ages.

Occupations in which the elderly are concentrated ($N = 38$) conform closely to our prior expectations. One cluster with an overrepresentation of older workers consists of positions with high rates of self-employment (barber, tailor, taxi driver). Indeed, our data exhibit a monotonic increase with age in proportion self-employed. In the age range 28-33, total sample, the rate is 6.3 percent, in the interval 46-51 it is 12.1 percent, and among the older-than-65 population, proportion self-employed equals 24.7 percent.¹⁰

Self-employment provides an individual with the opportunity to schedule his hours of work in accordance with personal needs. For the same reason, the free professions (doctor, lawyer, dentist) should contain an overrepresentation of the elderly, and they indeed do (Table 4). Yet, these occupations also have age features which resemble a uniform distribution and, for didactic reasons, were assigned to that age profile category. As we have noted, multiple processes often influence the age distribution of an occupation and, at the boundary, assignment to a unique category can be somewhat arbitrary.

Some situations of employment permit flexibilities in controlling the rate and hours of work similar to those of the self-employed. Consistent with our earlier discussion, real estate salesman, cleaner, and guard and watchman are found in this age category. Finally, there again is evidence of industry effects. Our data suggest that railroads and apparel manufacturing are industries of the elderly, presumably because of an employment decline in recent decades.¹¹ Notice, however, the impact of retirement rules (which are common in large enterprises) on the age structure of railroad occupations. After age 65 the representation rates fall below even the norm for the total labor force. For this reason, one might alternatively have assigned these occupations to the middle-age category.

In addition to concentrated, unimodal occupational-age distributions, we have postulated age patterns of two additional sorts. Extrapolating from the organizational situations of the free professions and craft occupations, we suggested that there should be a class of occupations which have a flat age profile. The reasons these occupations would employ roughly the same percentage of each age group in the labor force are several. First, professional associations and craft unions control the supply of personnel in order to maintain high and steady demand (Hall 1975:70-71, 188-189; Ritzer 1972:60-61, 202-203). Craft unions do this through dominating apprenticeship programs; professions, by setting licensing standards and influencing the number of slots in professional schools. Since demand for these occupations is responsive to total population size, it is reasonable that shifts in supply would reflect changes in cohort size. Second, membership in these occupations tends to be a "life-time commitment" (Hall 1975:189), obviating any need to overemploy young workers in order to compensate for their later outmovement. For both these

reasons, plus the fact that the majority of free professions and crafts are established and stable--neither expanding nor contracting greatly in total employment--we expect uniform age patterns.

Representative occupations from the collection judged to have a flat age profile ($N = 29$) are presented in Table 4. As expected, many crafts (e.g., carpenter, electrician, plumber, compositor and typesetter) have age distributions which parallel that of the total labor force (i.e., the entries all approximate 1.00 in value). For the free professions (dentist, doctor, lawyer) the age pattern is somewhat different, though over the range of middle years (28-64), it is quite flat. There is considerable underrepresentation of the youngest age groups, a consequence surely of the lengthy education period necessary for entrance. There is overrepresentation in the late ages, due probably to the self-employed character and physical ease of the pursuits. Indeed, because they contain characteristics of both age profile categories, these vocations might equally be viewed as having old age distributions.

Our final type of age pattern was deduced from the features of "secondary labor market" positions, which are, descriptively, "dead end" jobs. By the latter term we mean occupations with low status and earnings, which require minimal skill and training and, especially, are not part of a coherent job sequence. Such occupations tend to absorb the more marginal workers in the labor force--the young seeking temporary work and the elderly who are compelled to change jobs because of task difficulty or retirement rules. For these reasons the age distributions of many "dead end" occupations should be U-shaped.

In Table 5 we report age profiles for a representative selection of occupations which have a U-shaped pattern ($N = 20$). With the exception of bookkeeper, the presence of each occupation on the list is understandable in

Table 4. Illustrative Age Distributions: Uniformly Distributed Occupations^a

Occupation	N	Mean Age	Age Group								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Carpenter (415)	1566	42.6	.79	.80	.98	.97	1.16	1.17	1.10	.98	.81
Electrician (430)	1085	41.8	.63	1.03	1.06	.93	.93	1.11	1.03	1.04	.77
Plumber and Pipefitter (522)	921	43.2	.85	.83	.83	.98	1.02	1.07	1.13	1.21	1.10
Compositor and Typesetter (422)	455	43.1	1.22	.76	.94	1.04	1.03	.85	1.01	1.28	1.59
Heavy Equipment Mechanic (481)	1292	41.9	.66	1.05	.86	.99	1.09	1.14	1.00	1.07	.54
Misc. Mechanic (492)	358	41.3	.73	1.27	.98	.92	1.01	.85	1.07	1.00	.89
Dentist (62)	326	47.6	.00	.15	1.03	.98	1.04	1.09	1.12	1.23	3.46
Doctor (65)	860	44.7	.07	.34	1.14	1.39	1.04	.85	1.01	1.27	1.85
Lawyer (31)	1065	45.4	.06	.46	1.20	1.22	.96	.80	.83	1.35	2.82

^aNumber of uniform occupations is 29. See notes to Table 1 for additional details.

terms of the preceding discussion. The most striking examples of U-shaped distributions are the age profiles of food service worker, and office and messenger boy. In the latter instance, the youngest age group is overrepresented in the occupation by a factor of 4.7, the oldest age group by a factor of 8.0, while individuals of prime working age are substantially underrepresented (0.4 for the interval 34-39). Not only are the U-shapes very pronounced, but the positions constitute classic examples of dead end occupations: remuneration is poor and prospects for promotion or upgrading are dim.

To conclude the description of occupational-age patterns, we present in Table 6 summary profiles for the five categories. These were constructed by pooling individuals from all occupations with a common age profile--those reported in a prior table as well as those not shown--and therefore represent more stable distributions than the ones for individual occupations. The character of each age pattern stands out clearly in this table; conveyed also is the magnitude of representation differences among the categories at various ages. In many instances they are considerable, and reveal a pronounced tendency to age stratification by occupation in the labor force.

As a second way of summarizing the data, one which emphasizes the magnitude of differences among the age categories, Indices of Dissimilarity¹² (Taeuber and Taeuber 1965, P. 236) were computed between each pair of the 201 occupational-age distributions. The means of the indices between occupations in the same age category, and the means between occupations in different categories, are presented in Table 7. Notice that the smallest distances are always within-category (main

Table 5. Illustrative Age Distributions: U-Shaped Profiles^a

Occupation	N	Mean Age	Age Group								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Bookkeeper (305)	848	41.9	1.46	1.37	.82	.73	.85	.88	.86	1.20	1.91
Food Service Worker (916)	125	42.7	3.66	.86	.55	.80	.68	.99	1.20	1.18	2.08
Office and Messenger Boy (333)	104	47.4	4.72	.76	.46	.41	.50	.33	.72	1.42	8.07
Elevator Operator (943)	134	51.5	1.46	.16	.51	.32	.63	1.02	1.55	1.97	5.61
Counter Clerk exc. Food (314)	189	39.4	1.90	1.98	.80	.56	.76	.62	.84	1.06	1.83
Gardener (755)	504	44.8	1.23	.98	.64	.78	.70	1.05	1.12	1.46	2.58
Janitor (903)	2119	47.9	1.15	.47	.54	.59	.84	1.07	1.53	2.07	2.09
Mail Handler except Post Office (332)	209	39.3	4.23	1.69	.69	.58	.54	.49	.76	1.52	1.94
Cashier (310)	214	38.2	4.89	1.45	.70	.56	.70	.90	.70	1.08	1.21

^aNumber of occupations with U-shaped profiles equals 20. See notes to Table 1 for additional details.

Table 6. Summary Distributions for the Five Occupational-Age Categories^a

Age Category	N ^b	Mean Age	Age Group								
			18-21	22-27	28-33	34-39	40-45	46-51	52-57	58-64	≥ 65
Young	43	37.6	1.59	1.56	1.26	1.02	.88	.77	.70	.63	.47
Middle-Aged	30	41.1	.38	.77	1.17	1.27	1.23	1.08	.84	.72	.54
Old	38	44.8	.35	.61	.79	.94	1.10	1.18	1.27	1.25	1.29
Uniform	29	42.4	.86	.92	.97	.98	.99	1.01	1.05	1.06	1.17
U-shaped	20	43.3	2.01	1.05	.73	.70	.77	.91	1.12	1.45	1.87

^aEach distribution based on individuals in all occupations in the age category. See notes to Table 1 for additional details.

^bNumber of occupations in the age category.

diagonal entries) and the largest are between very different sorts of age profiles (e.g., between young and old occupations), except in the case of the unclassified occupations, which are not very distant from any of the other categories as they constitute a heterogeneous, residual class.

This clear division of occupations into different age categories reflects, in many respects, segmentation of the labor market along the lines of the institutional forces which operate to mold career lines in diverse ways. On the one hand, there are crafts and professions with their life-time commitment and control over occupational entry. At the opposite extreme in regard to individual commitment and associational power are positions in the secondary labor market. The observed age profiles of these two occupational groupings follow from the sorts of theoretical considerations that we have previously outlined. In comparison, concentrated, unimodal age distributions arise from a variety of factors; probably the most significant theoretically is the fact of linkages among many of the occupations in career sequences. In short, they speak to patterns of movement among jobs.

A confirmatory analysis of occupational-age patterns. Our subjective assignment of occupations to age categories may be checked by an objective assignment, according to the following scheme. The Indices of Dissimilarity between all pairs of the 201 occupations were analyzed by means of a Guttman-Lingoes Smallest Space Analysis (Guttman 1968; Roskam and Lingoes 1970). The purpose of SSA is to determine the smallest euclidean space, in terms of number of dimensions, in which the rank order of the distances between points (occupations in the present application) is reasonably well preserved. The Index of Dissimilarity between two occupational-age distributions was used as the measure of distance.

Given size limitations for the SSA program it was not possible to perform the analysis on all 201 occupations simultaneously. Consequently, we

Table 7. Means of Indices of Dissimilarity^a between Occupations Classified in Same and in Different Age Categories

Age Category	N ^b	Young	Middle-Aged	Old	Uniform	U-shaped	Unclassified
Young	43	19.1					
Middle-Aged	30	31.7	13.3				
Old	38	24.1	22.3	14.2			
Uniform	29	22.1	16.4	16.1	10.5		
U-shaped	20	27.5	28.8	21.7	19.5	18.9	
Unclassified	41	23.1	18.2	17.9	13.4	20.6	15.2

^aIndex of Dissimilarity between occupations O_1 and O_2 equals $50 \sum_a |P_{aO_1} - P_{aO_2}|$. Index varies from 0 to 100; large values indicate great differences between occupational-age patterns.

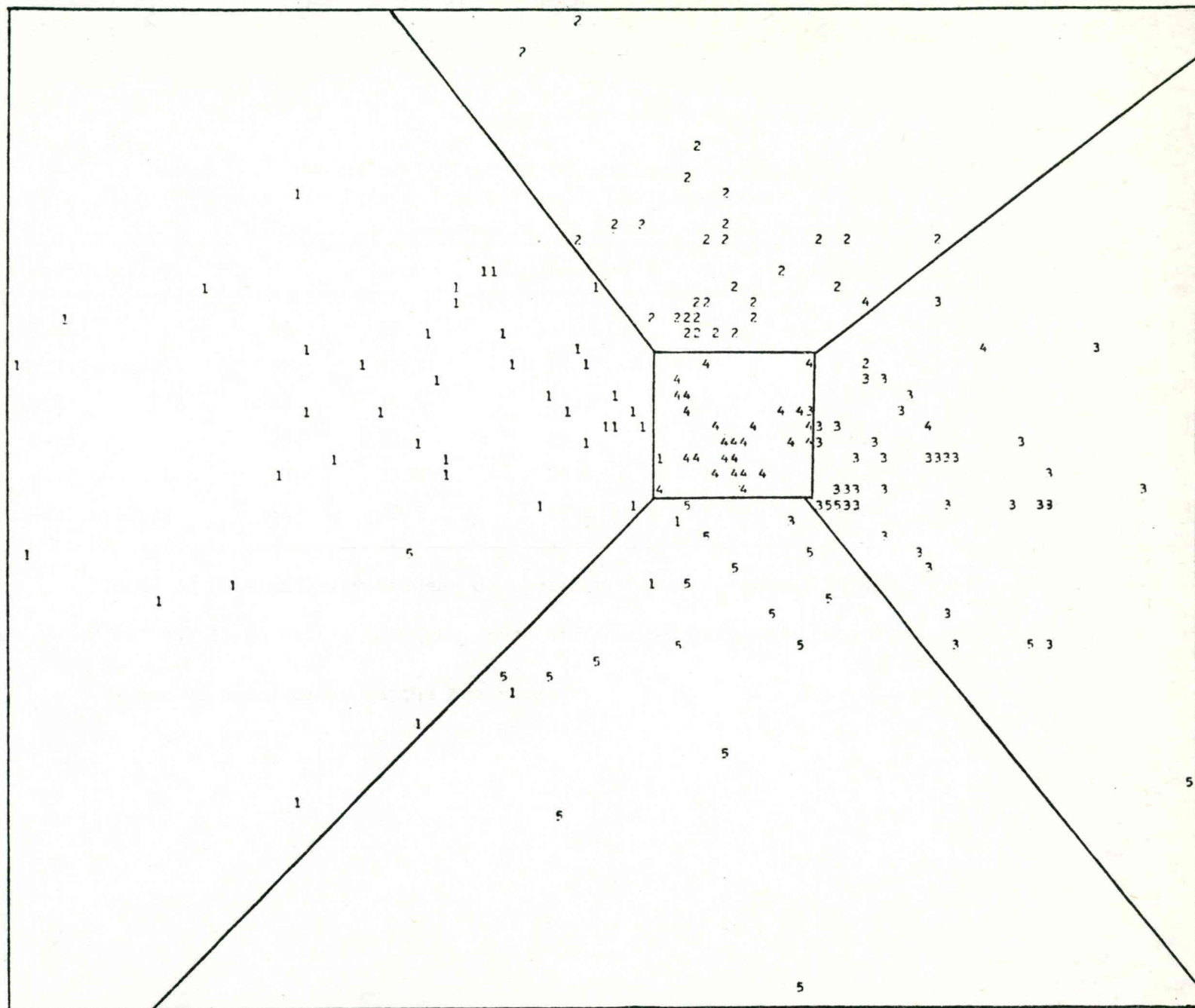
^bNumber of occupations in the age category.

used SSA to produce a spatial configuration for 99 of the 201 occupations (randomly chosen) and then added the remaining 102 occupations to this initial configuration. For the first 99 occupations the coefficient of alienation, which indicates how well the rank order of original distances is preserved, was .319, .113, and .088 for one, two, and three dimensions, respectively. Because the two-dimensional solution adequately fits the data and because of the ease of interpreting two, as opposed to three dimensions, we chose to work with the former solution. The remaining 102 occupations were added one at a time to this two-dimensional space with an average coefficient of alienation¹³ equal to .108, indicating that the rank order of the distances between the additional occupations and the first 99 is well maintained.

In Figure 1, the two-dimensional solution is reported with the 160 occupations that could be classified by inspection indicated on the output. Each occupation is labeled by its subjective category: young (1), middle-aged (2), old (3), uniform (4), and dead-end (5); the locations of the points, though, were determined by the objective SSA routine. We see that the space can be partitioned into five regions, each clearly though not perfectly enveloping occupations in one of the five subjectively determined age categories. Even using simple, linear partitions, such as the ones shown, only 14 of the 160 occupations classified by inspection appear in the wrong sector, and the majority of these are close to a boundary division.

Of equal relevance, the two dimensions of the space can be interpreted. The horizontal axis reflects the mean age of an occupation, and ranges (left to right) from young, to intermediate, to old. The vertical axis depicts the extent to which occupations have a concentration of workers in the middle

Figure 1. Smallest Space Analysis of the Occupational-Age Profiles^a



^aNumbers refer to subjective classification: 1 = young, 2 = middle aged, 3 = old, 4 = uniform, 5 = U-shaped. Locations of points (numbers) was determined by the objective SSA procedure. Lines indicate linear partitions for defining occupational-age categories.

years, and ranges (top to bottom) from overrepresented, to uniform, to underrepresented. Overall, the results of the SSA procedure support the contention that occupations have distinctive age structures and indicate that our subjective assignment of them to categories approximates the partitions that would be drawn on the basis of an objective assessment of distance between occupational-age profiles.

Why, then, was an objective procedure not used? In particular, the subjective assignment could have been employed as a first stage, to define partitions on the SSA output; in turn, the partitions could have been used to classify occupations into age categories. Our main objection to total reliance on the objective procedure stemmed from our desire to emphasize certain organizational forces where several act on an occupation. For example, while SSA would have placed dentist, doctor, and lawyer in the old-age category (and while this assignment is not unreasonable), we preferred to emphasize other aspects of their age structures, namely the uniformity of the age profile over the major portion of the age range and the organizational considerations which give rise to this uniformity.

We could have defined "distance" differently, such as by assigning a weight to each portion of the age range, and thereby given precedence to one or another feature of the age profile as a determinant of the category to which an occupation would be assigned. However, because the Index of Dissimilarity is a familiar measure, and because the thrust of our analysis is well supported using this simple distance measure, we chose not to complicate the calculations but to view the objective procedure as a confirmatory test of the main theme of our investigation.

EVIDENCE FOR MECHANISMS WHICH GENERATE OCCUPATIONAL-AGE PATTERNS

Now that an objective basis has been established for the five occupational-age distributions that were postulated, we turn to the matter of validating some of the mechanisms offered to explain their presence. In this section we report an elementary analysis which relates the occupational-age patterns to broader issues of labor market structure. In the following section we indicate some limitations of our formulation, particularly in relation to its neglect of industry effects.

To ascertain how different causal forces contribute to the observed occupational-age distributions, a multivariate logit analysis (Nerlov and Press 1974) was carried out. Multivariate logit regression is appropriate for the following formulation: Assume that an occupation can be in one of five classes (age categories): the classes constitute the set of dependent variables. The regressors, in turn, contain factors which, drawing upon our prior discussion, are believed to influence an occupation's presence in one or another of the classes.

The following variables were used as regressors:

(a) Occupational growth--measured by percentage increase in occupational size, 1950-1970. This variable was expected to differentiate between young-age occupations (high growth rate) and the two categories, old-age plus uniform-age distribution occupations (low rate of growth). Data are from U.S. Bureau of the Census (1968, 1973).

(b) Specific vocational preparation (SVP). This measure is from the Dictionary of Occupational Titles (U.S. Department of Labor 1965) and indexes the amount of specialized training necessary to perform a job task. Our prior expectation is that low SVP should be associated with the U-shaped occupational-age category. We suggested that this category would contain many low-skilled

"secondary labor market" positions, and low SVP should predict to these occupations. This variable was constructed from a merge of our census date tape with a file containing DOT information to which census occupational codes have been assigned. The latter file was prepared by Ken Spinner and we are indebted to him for its availability.

(c) Percentage stayers in an occupation, 1965-1970. This variable was also expected to distinguish the U-shaped age category from several others. In particular, if the U-shaped category contains "secondary labor market" positions--jobs characterized by little opportunity for skill development and a low return to seniority--attachments to the occupations should be low. At the opposite end of the attachment continuum would be occupations with a uniform age distribution. Many of these are professions and crafts, in which training is long and investment in occupationally specific skills is considerable.

For a different reason a low rate of attachment should characterize occupations in the young-age category, and a high rate occupations in the old-age category. In this instance, the difference in rate of staying would be, at least in part, derivative of an individual attribute, the tendency of young persons to be more mobile, occupationally, than mature workers.

(d) Percentage self-employed. This variable was expected to distinguish old-age occupations and uniform-age distribution occupations (both expected to have high rates of self-employment) from the other categories. Percentage self-employed was computed from the 1970 Census 1/100 sample tape.

(e) Mean education. This term was introduced as a control, to hold constant an occupational characteristic that is both a determinant of occupational-age category and correlated with several of the preceding variables that are of more central substantive interest. Mean education was calculated for each occupation from the Census 1/100 sample tape.

The results of the multivariate logit analysis are reported in Table 8.

In most respects our prior expectations are supported. In particular, occupations in the young-age category have significantly low rates of staying and high growth rates, (Column 1). Old-age occupations, in contrast, have high rates of staying, high rates of percentage self-employed, and low growth rates (Column 3). The latter figures are significantly different from those for the young-age category (though some are not statistically different from the population mean); more to the point, there is a consistent shift in the values of the parameters as one moves from young to middle-aged to old-age occupations.

Uniform-age distribution occupations have high rates of self-employment and low rates of growth, (Column 4); both these effects correspond with our prior expectations. Yet, the most interesting findings surely pertain to the U-shaped age category, (Column 5). Percentage stayers is substantially negative, in comparison with the other occupational-age categories. Similarly, in conformity with our argument, the SVP measure is negatively associated with presence in the U-shaped category. We conclude that occupations with this age distribution display features which many authors (e.g., Doeringer and Piori 1971; Reich, Gordon, and Edwards 1973) have associated with "secondary labor market" positions--low requirements for job specific skills and high rates of turnover.

Thus, despite the small number of occupations ($N = 160$) available for this multivariate analysis, our results are consistent with the operation of mechanisms of the sort postulated above as determinants of occupational-age patterns. In general, we find compelling evidence for the contention that the age categories derive from fundamental organizational features of the labor market. In particular, we note the close correspondence between age structure and occupations that have been singled out as having little future or otherwise being of low desirability.

a

Table 8. Logit Analysis of Occupational-Age Patterns

Independent Variable	Young	Middle-Aged	Old	Uniform	U-Shaped
Occupational Growth	.00260 * (2.51)	.00213 ** (1.95)	.00041 (0.29)	-.00604 * (-2.16)	.00090 (0.50)
SVP	.05183 (0.33)	.41176 ** (1.92)	.11364 (0.74)	.00705 (0.04)	-.58428 * (-2.43)
% Stayers ^b	-.55242 * (-2.29)	.31691 (0.98)	.79578 * (2.33)	.34510 (1.00)	-.90536 * (-2.86)
% Self-employed ^b	-.16356 (-1.54)	-.11406 (-1.11)	.04200 (0.47)	.16590 ** (1.80)	.06971 (0.46)
Mean Education	.06021 (0.57)	.17391 (1.53)	-.29325 * (-2.54)	.06532 (0.54)	-.00620 (-0.03)
Constant	3.92256 ** (1.89)	-7.34907 * (-2.64)	-3.55207 (-1.22)	-2.80635 (-0.97)	9.78493 * (3.33)

a
Entries are unstandardized logit regression coefficients; t-ratios are in parentheses. For a given age category (column) the coefficients report the effects of the independent variables on the log of the odds of being in that age category.

b
The square roots of these variables were used in the analysis to reduce skewness.

* $p < .05$, two tail test.

** $p < .10$, two tail test.

INDUSTRY EFFECTS ON OCCUPATIONAL-AGE PROFILES

To this point we have discussed occupations as undifferentiated entities with respect to the determination of their age profiles. There exist, however, systematic, often divergent, influences on the age structures of segments of occupations. Except for the free professions and vocations in which self-employment is common, occupations are not organized as autonomous units; rather, performance of their roles requires employment in an industry (more precisely, in a firm¹⁴). Growth or decline in occupational size is one consequence of growth or decline in total employment in the industries in which the occupation is concentrated. Thus, occupations associated with several industries may be experiencing expansion and contraction simultaneously in different industry sectors. For example, during the period 1950-70, employment of managers and operatives increased in computer manufacturing while it decreased in apparel manufacturing (U.S. Bureau of the Census 1954, 1972).

The importance of industry growth and decline for occupational-age profiles is that contracting segments of occupations tend to have an old age structure, while expanding segments have a young age distribution. Contracting industries reduce personnel through layoff (which usually proceeds in reverse order of seniority) and by not replacing voluntary departers. In each case the effect is to create an older work force. Expanding industries, in comparison, hire disproportionately from among new entrants into the labor market. Salaries are lower for young workers and a longer expected duration of employment means greater potential return to the firm from training costs.¹⁵ Reinforcing the impact of this hiring preference, mature workers often are reluctant to change employers because investments have been made in seniority and pension rights. In summary, occupations associated with multiple industries may be expanding

and contracting in different sectors. This makes for more complex age profiles than the results we have presented for occupations viewed as undifferentiated units.¹⁶

For the purpose of understanding industry effects on occupational-age profiles, industries can usefully be considered as bundles of occupations in which the occupational mix is determined by technology.¹⁷ Expanding and contracting industries must, to a considerable extent, maintain their technologically determined occupational mix, so changes in total employment in an industry carry analogous implications for the age structures of most associated occupations. Evidence in support of this contention can be found in census data and is reported in Kaufman (1977).

By virtue of their growth histories industries therefore contribute second-order effects, modulating the dominant age structures of occupations. Nor is this the only manner by which industries influence occupational-age patterns. In particular, industries differ in the rules followed for filling upper manual and lower white-collar positions. In some, firms traditionally promote from lower ranks (internal labor market);¹⁸ while in others there is a tendency to hire directly into upper-level slots from outside the firm. Such considerations are relevant to occupational-age distributions as they speak to the rate at which workers pass through an occupation and to the movement prospects of individuals with high seniority (presumably older workers).

The thrust of the argument in this section is to suggest the utility of taking occupation x industry as the unit of observation in analyses of age segmentation, rather than occupation alone. Such an approach has the additional virtue that occupation x industry positions constitute the building blocks of moderately realistic descriptions of career trajectories (sequences of jobs), in that they permit consideration of the two main dimensions of

movement--across occupations and across industries. Moreover, career trajectory categories (e.g., orderly career, chaotic career, craft career) carry strong implications for the age composition of the component positions in a trajectory (Spilerman, 1977),¹⁹ so that the intimate association between the issues of age segmentation and movement patterns is made especially evident.

With all this said about the desirability of using occupation x industry positions as the units of observation, the practical problems of analyzing age segmentation at this detailed level--or studying patterns of movement among the jobs--are immense. For this reason we limited the present investigation to a more aggregate characterization of labor force composition, in which the occupational dimension is emphasized.

IMPLICATIONS OF THE STUDY

One can hardly write about occupational-age structures without noting their special relevance to policy issues facing this nation. In particular, if compulsory retirement rules are eliminated, or the age of compulsory retirement raised, our analysis suggests a very different impact on individual occupations according to the age category each is in. Occupations with an old-age profile or with a U-shaped profile would be little affected, as few currently have retirement requirements. To the extent that they are affected, these occupations stand to lose elderly workers since many are entered late in life by individuals who have departed from a prior career line, often as a consequence of retirement rules. Raising the age of compulsory retirement would therefore reduce the inflow of older workers into these two age-profile categories.

Occupations with a uniform age distribution would also be affected only marginally by a change in retirement policy. This category contains the free professions, in which self-employment is the norm and for which retirement rules

do not apply. Also present here are the craft trades. Many (e.g., carpenter, electrician) provide opportunities for part-time or occasional work upon formal retirement, though this is not common in other crafts (e.g., heavy machinery operator). Raising the age of retirement would permit individuals in the latter trades to remain in the labor force. Thus, the average age of workers would increase, though the aggregate effect on employment in this age-profile category would be small.

A change in retirement policy would have greater impact on the young and middle-aged categories. Occupations with a young age distribution that are part of a career track²⁰ would experience an increase in the mean age of incumbents. This is because if the proportion of senior-level slots in the economy remains fixed, raising or eliminating the age ceiling for them will produce a later average age of promotion from positions in the young-aged category.

Yet the impact of a change in the age of compulsory retirement would be most consequential for occupations in the middle-aged category. We refer especially to senior-level positions, in career tracks, which are entered late in an individual's work life. Managers, administrators, and other supervisory personnel constitute the most evident examples. Our data (Table 6) show that the highest fall-off in representation rate between ages 58-64 and post-65 occurs for this age-profile category, and our results surely would be stronger were the industry dimension included in the analysis. In particular, the most severe impact should be on supervisory positions in industries where promotion into senior positions occurs at a late age and where the age of mandatory retirement is low. As these positions have a concentrated age distribution (e.g., 50-65), removal of the upper-age constraint would have a considerable impact on their age composition.²¹ The fact that these occupations tend to be ones

of power and influence in our society should create special cause for concern about the consequences of altering retirement policy.

1. Where we distinguish "job" from "occupation" we shall mean by job an occupation x industry position. Common parlance would associate job with an occupation x employer position, but lacking data at the employer level we use 3-digit industry codes as a first approximation. (Thus we exploit the fact that firms in the same industry tend to employ similar technologies; as a result much of the interfirm variation in the organization of work can be attributed to industry differences.) Where confusion is unlikely, we shall use "job" interchangeably with work position or occupation.
2. For discussions of occupational age structures from the special perspectives of counseling and industrial psychology, the reader is referred to Griew and Tucker (1958), Murrell (1962), Richardson (1953), and Smith (1968; 1969; 1973).
3. More generally, workers may delay changing employers until they have accumulated enough years of service to qualify for a pension, or until rights to a pension have become vested.
4. Working full-time was defined as employed 40 or more weeks in 1969 and having earned \$2,000 in that year.
5. The 12 SMSAs are: Boston, Chicago, Detroit, Kansas City, Los Angeles, Minneapolis-St. Paul, New York, Philadelphia, Pittsburgh, San Francisco-San Jose, St. Louis, Washington-Baltimore.
6. Similar approaches to age standardization have been taken by Lehman (1953), Murrell (1962), and Smith (1968; 1969; 1973).
7. All engineering occupations were classified as middle-aged.
8. Our information concerning the reasons underlying the age structures of these trades comes from a telephone conversation with Mr. Reese Hammond, Research and Education Director, International Union of Operating Engineers.
9. In our sample, 30 percent of vocational counselors in 1970 were elementary or secondary school teachers five years earlier.

10. In every age group proportion self-employed is higher in the old age profile category. For example, the figures from this category comparable to those in the text are 12.0%, 17.4% and 31.9% for the three age groups.
11. Between 1950 and 1970 employment in apparel and fabricated textile manufacturing declined by 12.1%; in railroad transportation the decline was 54.8%. During this same period total employment in all industries increased by 15.5%. Data are from the U.S. Bureau of the Census (1954, 1972).
12. For two probability distributions $\{P_{1i}\}$ and $\{P_{2i}\}$, the Index of Dissimilarity is defined as $50 \sum |P_{1i} - P_{2i}|$. The extent of difference between the distributions ranges from 0 to 100.
13. For each occupation added to the initial configuration SSA computes a coefficient of alienation which indicates how well its placement preserves the rank order of the distances to the occupations in the initial configuration. These values were averaged to produce a summary measure of fit.
14. Although firms are the employing units, lacking data at the firm level we use industry as a proxy. As remarked in footnote 1, much of the interfirm variation in organizational features arises from industry differences. Firms in the same product category industry tend to use similar technologies, which limits the variety in organizational arrangements that can be established.
15. Bogue (1959, p. 501) reaches a similar conclusion: "...the younger generations enter new fields that are just opening up, and avoid fields that are declining in importance."
16. For example, the mean ages of managers in computer manufacturing and apparel manufacturing are 39 and 47, respectively. The corresponding mean ages of operatives in the two industries are 33 and 46. Systematic calculations reveal that in every major occupational category there is a correspondence between industry

growth rate and age distribution. Thus, in industries which expanded by less than 70% between 1950 and 1970, proportion of managers older than 52 years equals 38%, while in industries which expanded by more than 140% proportion of managers older than 52 equals 26%. For sales workers the corresponding figures are 39% and 24%; for operatives they are 32% and 24%. The above analysis cannot be carried out with detailed occupations (3-digit census codes) because many of them (e.g. policeman, teacher, railroad engineer, typesetter) are industry specific. Data are from our tape on 12 SMSAs.

17. The extent of technological determination of the occupational mix differs by industry. In some (e.g., auto assembly production), few alternate technologies (to the assembly line) are available, and there is a considerable degree of determination of firm organization and the occupational mix by technology. In other industries (e.g., housing construction) alternative technologies are in use (site construction, prefabrication) and variability is present among firms in occupational composition. For enlightening discussions on the relation between technology and firm organization see Woodward (1965), Blauner (1964), Stinchcombe (1959), and Perrow (1967).

18. See Kerr (1954), Doeringer and Piori (1971), Stinchcombe (1959), and Zald (1971, pp. 61-65) for discussions of promotion rules, labor market organization, and how these considerations relate to industry.

19. An "orderly" career trajectory may be thought of as a collection of jobs in which movement among the component positions is principally in one direction. This usually entails performance of low occupational tasks at the outset, followed by higher-level positions within the firm (Slocum 1966, p.5). The implications for age segmentation are that the successive jobs would be characterized by correspondingly higher mean ages of incumbents, and that the standard deviation of worker ages in each position would be

small. In comparison, a "chaotic" career trajectory consists of a collection of jobs in which there is a high density of movement but without a coherent direction; in short, cycling among the positions is common. This implies little difference among the component jobs in mean age of workers and a large standard deviation of worker ages for each position.

20. We exclude from this discussion occupations having young age profiles as a consequence of their presence in expanding industries.

21. Ignored in this brief discussion are demographic considerations. For example, the short-term consequence of raising the retirement age is a function of the current age distribution in the occupation. Similarly, if an occupation is expanding in size, raising the retirement age will have a smaller impact on its age composition than if it is contracting.

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