INTERNAL NET MIGRATION RESPONSE DIFFERENTIALS FOR THE UNITED STATES BY NON-LINEAR ITERATIVE LEAST SQUARES ESTIMATION PROCEDURE*

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Introduction

This study is concerned with analyses of changes in internal net migration of small population groups stratified by age, sex and color for geographical sub-regions of the United States.

Several widely divergent motives may underlie the migration behavioral pattern of the people of an area. Better wages, or more generally, more favorable economic opportunities, present or potential, represent one major group of factors influencing migration decisions. Another major group of causes stems from socio-cultural environment of the areas of origin of migrants and their anticipated evaluation of corresponding socio-cultural situations in the areas of potential in-migration. Migration decisions are also affected by information, costs, existence of programs of assistance and kindred factors.

A theory of labor migration which regards relative wage ratio as the sole primary determinant of net migration is considered too simple and too inadequate to be useful in theoretical formulations or in empirical investigations. The general remarks in the preceding paragraphs suggest that neither relative wage ratio nor even some of the major relative economic opportunity factors may completely explain migration behavior. Moreover, for some of the major independent variables included in the model, adequately valid data series may not be available; besides, the nature of some particular variable may be such as to preclude its measurability or observability. For example, valid reasons are advanced that relative wage ratio, which by general consensus is regarded as a major economic variable in any model explaining net migration, is nonobservable because the ratio should relate to the marginal workers confronting migration choice and should not be the ratio of average wages.

The principal premise underlying this study is that net migration is a function of more than one major variable even when the analyses are based on data subdivided into small age-sex-color groups, that some of these variables are nonmeasurable or nonobservable and that valid data series for such variables do not exist for use in empirical investigations. It is in this basic premise of the nonobservable character of some of the major explanatory variables that the principal justification for the method of analyses used in this study lies. The procedure used does not permit testing of hypothesis but yields estimates of model parameters which can be interpreted in terms of the hypothesis underlying model specification.

In general terms, a theory of supply of net migrants may be formulated as follows: the number of net migrants from area A to the rest of the nation or to area A by the rest of the nation is a function of several variables, some of which are measurable and some of which are not. It will be assumed that nonmeasurable variables have a significant role to play in explaining variations in the supply of net migrants. Mathematically, we may write:

$$Y = f(Z_1, Z_2, \ldots, Z_n)$$

where Y represents the supply of net migrants and $Z_1, Z_2, \ldots, Z_n$ represent the independent variables such as relative wage ratio, other economic opportunity factors, phase of the business cycle and non-economic factors influencing internal migration.

Since some of the variables are not measurable, we may replace all variables, measurable and nonmeasurable, by one "omnibus" variable by means of the substitution $g(Z) = f(Z_1, Z_2, \ldots, Z_n)$. Hence we have:

$$Y = g(Z)$$

For example, if initially, we considered

$$Y = \alpha Z_1^{\beta_1} Z_2^{\beta_2} \ldots Z_n^{\beta_n} e$$

as the complete specification of the model, we would use the substitution

$$Z^{\beta} = Z_1^{\beta_1} Z_2^{\beta_2} \ldots Z_n^{\beta_n} e$$

and consider the model

$$Y = \alpha Z^{\beta} e$$

where Z is nonmeasurable "omnibus" variable, and e, the random term. The "omnibus" variable Z may be regarded as representing an index of relative opportunity which incorporates all economic and non-economic variables affecting net migration. The problem of estimating Z and the model parameters α and β has been handled by Johnston and Tolley (1968) by using a nonlinear iterative procedure, a slightly modified version of the NILES procedure of Wold (1965). In this study Johnston and Tolley formulation has been used. An essential property of this interative procedure is that the sequence of parameter estimates obtained at various iteration stages converges to the underlying parameter value not in an absolute sense but in a relative sense. Hence the character of Z, α and β estimates obtained at the final iteration stage is not cardinal but ordinal.

Net migration behaviour model of this study is based on the hypothesis that within a color-sex category the net migration rate of an age group is a function of nonobservable index of relative opportunity. Further, all age groups within a color-sex category face the same index at the same time. If suffix i refers to an age group within a color-sex category and suffix t refers to time, the model becomes

$$Y_{it} = \alpha_i Z_t^{\beta_i} \varepsilon_{it}$$

which after taking logarithms is transformed to linear form

$$Y_{it}' = \alpha_i' + \beta_i Z_t' + \varepsilon_{it}'$$

The dependent variable Y_{it} is the logarithm of net migration rate Y_{it} calculated as

$$Y_{it} = (E_{it} + M_{it})/E_{it}$$

where M_{it} = number of net migrants of age group i during time period t of the color-sex category in question, and E_{it} = the population exposed to risk of net migration of age group i during time period t of the color-sex category in question.

Y_{it} represents the 'survival' rate against net migration on the analogy of life table survival rates in the theory of single and multiple decrement tables.

Data Required and Their Sources

Statistical data required in this study related to the number of net migrants, M_{it} and the number exposed to risk of net migration, E_{it} used as the appropriate supply shifter. The available material regarding the estimated number of net migrants and the net migration rate for individual color-sex-age groups using census-survival rates was considered unsatisfactory. The problem of estimating the number of net migrants and the net migration rate was investigated independently of the existing procedures and formulas and an alternative approach devised. See Kripalani (1968).

It was recognized that the amount of computational work involved in preparing the basic statistics required in respect of all states for each of the four color-sex categories (white male, white female, nonwhite male and nonwhite female) for small age groups for six decades was very large. Practical considerations therefore suggested that one of the existing series of data would have to be used. It was decided to use the estimates prepared by Lee et al. (1957) in their momentous work, Population Redistribution and Economic Growth, United States, 1870-1950, for the five decades 1900-10 to 1940-50. For 1950-60, however, considerations of comparability warranted that corresponding estimates be prepared on the basis of formulas used by Lee. Lee's estimates of net migration (numbers and rates) are available for each of the four color-sex categories with five broad age groups 0-4, 5-14, 15-34, 35-54, and 55+ at the beginning of the decade (or 10-14, 15-24, 25-44, 45-64, and 65+ at the end of the decade).

The cross-sectional analyses for the 1950-60 decade were based on statistics published by the Economic Research Service of the U. S. Department of Agriculture (1965) in their Population-Migration Report giving net migration numbers and rates by age, sex and color separately for metropolitan and nonmetropolitan state economic areas. The published data were aggregated, wherever necessary, for the age groups 0-9, 10-14, 15-19, 20-24, 25-34, 35-44, 45-54, 55-64, and 65+ at the start of the decade for each of the four color-sex categories.

The iterative procedure was applied to Johnston and Tolley model

$$Y_{it}' = \alpha_i' + \beta_i Z_t' + e_{it}'$$

to obtain estimates of net migration response differentials β's and the non-observable omnibus variable Z's by age, sex and color for the 48 states of the Continental United States and the District of Columbia, (a) based on analyses of time series data for the six decades 1900-10 through 1950-60 and (b) based on analyses of cross section data for 1950-60 decade separately for metropolitan state economic areas (MSEA) and non-metropolitan state economic areas. Analyses were made separately for each of the four color-sex categories--white male, white female, nonwhite male, and nonwhite female. For time series analyses, each category was further subdivided into five age groups based on Lee's data, while for cross-section analyses, each category was subdivided into nine age groups based on USDA data.

Empirical Results of Time Series Analyses

In about 50 percent of the cases, 5 or less than 5 iterations were required to terminate the iterative process. In about 20 percent of the cases, more than 10 iterations were necessary. Total sum of squares explained by the regression equation at the final iteration state was 90 percent or higher in 64 percent of the cases; R^2 was below 50 percent in 17 percent of the cases.

Estimates of Omnibus Variable Z_t' over Time. The ordinal character of parameter estimates permitted the ranking of the index of relative opportunity. The rank analyses showed that there were significant differences in the ranks of the index of relative opportunity between the six decades spanned by the study. The test statistic (Friedman's X^2_r -See Siegel (1956), p. 166-) was generally highly significant for the United States as a whole, and for some important net in-migration and net out-migration regions. (Tables 1

and 2).

Main findings for net in-migration data (Table 1) were: For white male and female categories, Z_t' was highest in 1900-10 decade and touched its lowest value during the 1930-40 depression decade, a result which might have been expected. This is evidence of the fact that during the depression decade the index of relative opportunity which is above unity in net in-migration areas tends to move toward unity or there is a reduction in the strength of the pull forces exercised by an in-migration area on the potential migrants in the rest of the nation. The index progressively declined from 1900-10 to 1930-40 showing that the wider dispersion of economic activity during the World War I and post-World War I decades reduced the attractiveness of traditional net in-migration states for white males and white females. As compared to the depression decade, the relative attractiveness of net in-migration states improved significantly in the subsequent two decades but remained at levels substantially below that of pre-depression decades.

For the nonwhites, the increased economic activity of World War I and the following decade greatly increased the relative attractiveness of the net in-migration states, probably reflecting the fact that during these two decades, the growth of economic opportunities in traditionally nonwhite net out-migration areas did not decrease the incentive for nonwhites to move out as it did for the whites. Contrarily, the strength of the pull exercised by net in-migration states on potential nonwhite migrants increased during these decades. The depression decade considerably reduced the strength of pull forces on the nonwhites as it did for the whites. The index of relative opportunity for net in-migration states for nonwhites picked up again in the 1940-50 decade and the 1950-60 decade from the low levels of the depression decade, but the index was lower than the levels of 1910-20 and 1920-30. A possible reason which might explain this phenomenon could be that some of the main net in-migration states which were important for nonwhites in the early part of the present century might have ceased to grow at the relatively high rate as previously. Another possible reason could lie in the increasing nonwhite population base of these net in-migration states. Reduction in the attractiveness of net in-migration states for the nonwhites could also possibly arise from (a) a rise in the average age of the potential nonwhite out-migrants due to changes in population age composition and (b) increased skill requirements in jobs due to technological developments in the 1940-50 and 1950-60 decades as compared to 1910-20 and 1920-30 decades.

Main findings for net out-migration data (Table 2) were: the index of relative opportunity worsened continuously over the six decades except for the reversal witnessed during the depression decade for white males and white females. The index, which has value less than unity in the case of net out-migration states, had the highest rank in the first decade of the century and lowest rank in 1950-60 decade for white males. The highest rank for white females occurred in 1910-20 and the lowest rank in 1950-60. Similarly in the case of nonwhites the lowest rank was observed in the 1950-60 decade, thus showing that the index of relative opportunity tended to worsen for whites and nonwhites of both sexes over the period spanned by the study or the strength of push forces operating on potential migrants in net out-migration states was greater in the 1950-60 decade than in any previous decade of the present century.

The depression decade witnessed a considerable decrease in the strength of push forces operating in net out-migration states in the case of all four color-sex categories; except for white males, the strength of push forces was lowest in the depression decade for the other three categories.

From the analyses pertaining to the net in-migration and net out-migration data, there is adequate support for the hypothesis that during a period of general decline in aggregate demand, human resource adjustment process is greatly slowed down. When national unemployment rate increases, the number of both net in-migrants and net out-migrants falls; hence the dependent variable falls in the case of net in-migration and rises in the case of net out-migration. This is reflected in the reduced attractiveness of net in-migration states and increased attractiveness of net out-migration states for potential migrants.

Estimates of Age Group Response Coefficient, β_i (Tables 3 and 4). Comparative inferences about how different age groups respond to changes in the index of relative opportunity could be made on the basis of η's, $\eta_{ij} = \beta_i/\beta_j$ because the iterative procedure yielded estimates of response coefficients (elasticities) which were ordinal in character. Since the overall analyses were in terms of the structure of the communities of origin of net out-migrants and of destination of net in-migrants, it was expected that behavioral response coefficients would be significantly different in the case of a state for which data permitted both types of analyses. The base population in the case of net out-migrants is the population of the area from which net out-migration is taking place; net in-migrants, on the other hand, are related to the population of the area to which they go and not to the population base which forms the source of their supply. The empirical results showed that this expectation was reasonable.

Response coefficients differed significantly from age group to age group. The test statistic

was highly significant at less than .1 percent level in all the four color-sex categories in both net in-migration and net out-migration data analyses. The substantive findings were:

Considering net in-migration for white male and female categories (Table 3), the response coefficient was highest for the age group 15-34 (at the start of the decade) followed by age group 5-14 and then by age group 0-4. This high level of response by age group 5-14 and 0-4 may be expected because these groups are generally not independent movers but are linked with their parents' migration decisions. The fourth in rank was age group 35-54 followed by 55+. In the case of nonwhite male and female categories (Table 3), the highest response coefficient was observed for the age group 5-14, perhaps an interesting evidence of the fact that nonwhite male and female migrants are younger than the white migrants. Led by age group 5-14, the other age groups in decreasing order of their response coefficients were 15-34, 0-4, 35-54 and 55+.

Considering net out-migration in these analyses (Table 4), the order pattern was the same for all the four color-sex categories, age group 15-34 having the highest coefficient, followed in order by 5-14, 0-4, 35-54 and 55+. In contrast to net in-migration analyses, the nonwhite male and female categories consistently showed rank 1 for the age group 15-34 in all the states covered. A possible explanation for the observed feature in the case of nonwhites, viz. highest β for age group 5-14 for net in-migration analyses but not for net out-migration, may be in fact that nonwhites are coming from the scattered areas in the South but are going to few northern states, giving rise to different population bases for different age groups.

Empirical Results of Cross Sectional Analyses

The substantive results of cross sectional analyses based on metropolitan state economic areas (MSEA), which are mainly urban net in-migration areas, and nonmetropolitan state economic areas (NSEA), which are mainly rural net out-migration areas, separately for the 1950-60 decade are briefly discussed below.

Main Results Based on MSEA Net In-migration Analyses (Part (a), Table 5)

Estimates of age group response coefficient, β_i. There was clear evidence that significant differences existed between the ranks of response coefficients for various age groups. The null hypothesis was rejected at .1 percent level in all the four color-sex categories.

The cross sectional analyses were based on smaller age group subdivisions, 9 in number as against 5 age groups in the time series analyses. The highest response coefficient in the case of whites was among age group 5 (ages 25-34 at the start of the decade) followed by age group 6 (35-44); in the case of nonwhites, however, the highest two ranks were shared by age groups 4 and 5 (20-24 and 25-34), a result indicative of the fact that among nonwhites the highest response to net migration opportunity factors occurs among relatively young age groups as compared to whites. In all the four categories, the lowest three ranks, 7, 8, and 9 for the response coefficients occurred among the youngest age group 1 (0-4) and the oldest two age groups 8 and 9 (55-64 and (65+).

Σ-Curve

Part (a) of Table 5 gives the ranks of β_i for the United States based on net in-migration analyses for MSEA. A Lorentz type curve, designated Σ-curve may be constructed, the curve being drawn by connecting points whose coordinates are

$$\left(i, \sum_{j=1}^{i} r_j\right)$$

where r_j is the rank for age group j. The Σ-curve corresponding to β_i is given in Figure 1.

Σ-curve may be used as a basis for a broad comparison between two categories. When Σ_A (Σ-curve for category A) lies below Σ_B for values of i up to, say, i = 6, one may reasonably infer that high ranks (low numerical values) occur more frequently among relatively young age groups in category A than in category B.

The highest response coefficient in the case of whites was among age group 5 followed by age group 6; in the case of nonwhites, however, the highest two ranks were shared by age groups 4 and 5. This result might be taken as indicative of the fact that within the two categories of nonwhites the highest response occurred among relatively young age groups as compared to the white categories. In all the four categories, the lowest three ranks 7, 8 and 9 for the response coefficients occurred for the youngest age group 1 and the oldest two age groups 8 and 9.

Table 6 shows the significance levels of X_r^2 for different regions. In the case of net in-migration data analyses, there is no evidence for rejecting the null hypothesis at 20 percent level in (a) East South Central and Pacific regions for white males, (b) West South Central, Mountain and Pacific regions for white females and (c) Middle Atlantic region for nonwhite females. For these regions, therefore, there was no evidence for the hypothesis that ranked elasticity of response with respect to omnibus variable differed significantly among the various age groups. On the other hand, the null hypothesis was rejected at the 5 percent level in (a) West South Central region for white males, (b) South Atlantic for white females, (c) Middle Atlantic, East North Central and West South Central for nonwhite males, and (d) East North Central for nonwhite

females. Thus ranked response elasticities among various age groups differed significantly and displayed a definite ranking pattern among white male net in-migrants moving into the metropolitan state economic areas in the West South Central region. Similar observations might be made for regions cited above for relevant categories. Existence of a definite ranking pattern criterion, X_r^2 significant at 1 percent level, classification e in Table 6, might be taken as indicative of the fact that the region in question was more selective of some age groups rather than others of the category. Classification a or b, on the other hand, reflects that no strong evidence of the region being definitely more selective of some age groups as compared with others. For example, Middle Atlantic was definitely age selective of nonwhite males but not so of nonwhite females. East North Central was age selective for both sexes among the nonwhites. Quite significant were the results for the Pacific region, whose classification "a" (X_r^2 not significant at 20 percent level) showed that the region did not have a definite selection preference for some age groups relative to others among white male and white female net in-migrants moving into the metropolitan state economic areas of the region.

Rank analyses of β_i were of particular significance for Florida. The ranks for response coefficients for the oldest two age groups i = 8 and i = 9 were 3 and 1, respectively, for white males and 1 and 2, respectively, for white females, reflecting the highest net in-migration response by white pensioners of both sexes. The corresponding ranks were 6 and 8 for nonwhite male and 8 and 7 for nonwhite female categories.

Main Results Based on NSEA Net Out-migration Analyses (Part (b), Table 5)

Estimates of age group response coefficient, β_i. There was clear evidence of the existence of significant differences between ranks of response coefficients for various age groups. The null hypothesis of no significant differences between ranks was rejected at .1 percent level in all the four color-sex categories. Generally the highest response coefficient occurred for age group 20-24 followed by age group 25-34. The highest three ranks generally occurred among the three age groups 15-19, 20-24 and 25-34. The lowest three ranks were found to occur among the youngest age group 0-4 and the oldest two age groups 55-64 and 65+.

Part (b) of Table 5 gives the ranks of β_i for the United States based on net out-migration analyses of NSEA. Corresponding Σ-curve is given in Figure 2.

Table 7 gives the significance levels of X_r^2 in the rank analyses of β_i for different regions. Based on net out-migration data, the main results were:

(1) White male--the null hypothesis could be rejected at the 5 percent level in the East North Central, West North Central, South Atlantic, East South Central and West South Central regions. At the 10 percent level the null hypothesis could be rejected in all the regions except the Mountain and Pacific regions, both of which are regions of large net in-migration for white males.

(2) White Female--the null hypothesis could be rejected at the 5 percent level in West North Central, South Atlantic, East South Central, West South Central and Mountain regions. At the 10 percent level it could be rejected in all regions but two, these being New England and Middle Atlantic.

(3) Nonwhite male--in all the three main regions of net out-migration, viz. South Atlantic, East South Central and West South Central, the null hypothesis could be rejected at the .1 percent level.

(4) Nonwhite female--as in the case of nonwhite males, the null hypothesis could be rejected at the .1 percent level in all the three main regions of net out-migration.

A comparison of time series and cross section results yielded some interesting conclusion which might be expected. The highest response coefficient occurred among young persons and the lowest response coefficient among the old age groups. Further, the study of net in-migration data of MSEA which are predominantly urban areas and of net out-migration data of NSEA which are predominantly rural communities did not show significant pattern differences between response coefficients for these two types of areas, viz. rural and urban areas.

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Table 1. Rank Analyses of $\hat{Z}_t$ for the United States and Regions based on Net Inmigration Analyses of Time Series Data - Six Decades 1900-10 through 1950-60

Region	Number of states covered	Sum of ranks of $\hat{Z}_t'$ 1900-10	1910-20	1920-30	1930-40	1940-50	1950-60	Significance[a] Level of Friedman's X_r^2
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
				(i) White Male				
United States	19	46	68	72	81	65	67	.10
New England	2	2	6	9	12	7	6	.20
Middle Atlantic	1	1	3	2	6	5	4	--
East North Central	2	9	2	6	11	7	7	n. s.
South Atlantic	5	25	19	19	13	14	15	n. s.
West South Central	3	3	15	10	11	13	11	.20
Mountain	3	3	11	16	15	11	7	.05
Pacific	3	3	12	10	13	8	17	.10
				(ii) White Female				
United States	20	42	58	65	93	80	82	.001
New England	4	5	10	17	19	16	17	.10
Middle Atlantic	2	2	6	4	10	10	10	.20
East North Central	3	10	5	6	16	14	12	.20
South Atlantic	3	14	9	13	9	10	8	n. s.
West South Central	2	3	10	3	9	9	8	n. s.
Mountain	3	4	9	13	14	13	10	n. s.
Pacific	3	4	9	9	16	8	17	.05
				(iii) Non-White Male				
United States	19	79	43	57	93	63	64	.001
New England	3	11	5	15	16	8	8	.20
Middle Atlantic	3	11	5	4	17	11	15	.05
East North Central	5	24	6	11	29	13	22	.001
West North Central	3	13	6	11	16	11	6	.20
South Atlantic	3	14	15	10	7	10	7	n. s.
West South Central	2	6	6	6	8	10	6	n. s.
				(iv) Non-White Female				
United States	19	81	47	51	82	66	72	.01
New England	3	13	9	15	12	8	6	n. s.
Middle Atlantic	3	12	7	3	16	11	14	.10
East North Central	5	26	8	9	28	13	21	.001
West North Central	3	11	5	7	11	14	15	n. s.
South Atlantic	3	14	14	10	8	8	9	n. s.
West South Central	2	5	4	7	7	12	7	n. s.

[a] n. s. - not significant at 20 percent level.

Table 2. Rank Analyses of $\hat{Z}'_t$ for the United States and Regions based on Net Outmigration Analyses of Time Series Data - Six Decades 1900-10 through 1950-60

Region	Number of states covered	Sum of ranks of $\hat{Z}'_t$ 1900-10	1910-20	1920-30	1930-40	1940-50	1950-60	Significance[a] Level of Friedman's χ^2_r
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
			(i) White Male					
United States	22	58	67	83	71	84	99	.02
New England	4	6	11	16	15	17	19	.20
Middle Atlantic	2	2	8	7	5	10	10	n. s.
East North Central	2	7	3	5	7	10	10	n. s.
West North Central	3	9	8	9	9	15	13	n. s.
South Atlantic	3	15	11	12	12	6	7	n. s.
East South Central	4	10	13	13	8	16	24	.05
West South Central	2	5	8	9	6	6	8	n. s.
Mountain	2	4	5	12	9	4	8	.20
			(ii) White Female					
United States	20	59	51	78	53	89	90	.001
New England	3	5	8	16	7	13	14	.10
Middle Atlantic	1	1	2	3	4	5	6	--
East North Central	3	12	6	11	7	13	14	n. s.
West North Central	4	14	9	14	14	19	14	n. s.
South Atlantic	4	17	11	17	10	17	12	n. s.
East South Central	4	9	13	13	8	17	24	.05
West South Central	1	1	2	4	3	5	6	--
			(iii) Non-White Male					
United States	**10**	**31**	**29**	**37**	**17**	**47**	**49**	**.001**
South Atlantic	**5**	**16**	**11**	**24**	**10**	**19**	**25**	**.05**
East South Central	**3**	**7**	**12**	**8**	**5**	**16**	**15**	**.10**
West South Central	**2**	**8**	**6**	**5**	**2**	**12**	**9**	**.20**
			(iv) Non-White Female					
United States	**10**	**26**	**25**	**41**	**26**	**46**	**46**	**.01**
South Atlantic	**5**	**13**	**11**	**23**	**17**	**18**	**23**	**n. s.**
East South Central	**3**	**6**	**9**	**12**	**6**	**16**	**14**	**.20**
West South Central	**2**	**7**	**5**	**6**	**3**	**12**	**9**	**n. s.**

[a] n. s. - not significant.

Table 3. Rank Analyses of β_i for the United States and Regions based on Net In-migration Analyses of Time Series Data- Six Decades 1900-10 through 1950-60

Region	Number of States Covered	Sum of Ranks of β_i					Significance[a] level of Friedman's X_r^2
		β_1	β_2	β_3	β_4	β_5	
1	2	3	4	5	6	7	8
		(i) White Male					
United States	16	45	39	26	57	73	.001
East North Central	4	10	10	9	15	16	n. s.
South Atlantic	2	3	7	3	7	10	.20
West South Central	2	5	7	4	5	9	n. s.
Mountain	5	18	9	7	18	23	.01
Pacific	3	9	6	3	12	15	.02
		(ii) White Female					
United States	23	72	56	34	82	101	.001
New England	2	7	2	4	9	8	.20
Middle Atlantic	1	3	1	2	4	5	--
East North Central	2	6	4	2	8	10	.10
West North Central	1	3	4	1	5	2	--
South Atlantic	4	13	11	4	12	20	.02
West South Central	3	7	6	9	9	14	n. s.
Mountain	7	25	20	7	26	27	.01
Pacific	3	8	8	5	9	15	.20
		(iii) Non-White Male					
United States	18	46	30	34	75	85	.001
New England	3	8	4	6	13	14	.05
Middle Atlantic	3	8	5	5	14	13	.05
East North Central	5	13	7	10	20	25	.01
West North Central	3	6	5	9	11	14	n. s.
South Atlantic	3	8	7	3	13	14	.05
West South Central	1	3	2	1	4	5	--
		(iv) Non-White Female					
United States	18	45	36	44	66	79	.001
New England	2	3	7	6	6	8	n. s.
Middle Atlantic	3	7	4	7	12	15	.05
East North Central	5	10	7	13	20	25	.01
West North Central	3	10	8	9	10	8	n. s.
South Atlantic	4	12	9	7	14	18	.20
West South Central	1	3	1	2	4	5	--

[a] n. s. - not significant at 20 percent level.

Table 4. Rank Analyses of β_i for the United States and Regions based on Net Out-migration Analyses of Time Series Data-Six Decades 1900-10 through 1950-60

Region	Number of State Covered	Sum of Ranks of β_i					Signigicance[a] level of Friedman's X^2_r
		β_1	β_2	β_3	β_4	β_5	
1	2	3	4	5	6	7	8
		(i) White Male					
United States	26	84	65	44	96	101	.001
New England	4	12	12	4	16	16	.05
Middle Atlantic	1	3	1	2	4	5	--
East North Central	2	7	6	5	6	6	n. s.
West North Central	7	23	15	13	31	23	.02
South Atlantic	3	14	6	3	11	11	.05
East South Central	4	9	9	6	16	20	.01
West South Central	1	3	1	2	5	4	--
Mountain	4	13	15	9	7	16	n. s.
		(ii) White Female					
United States	26	72	55	54	96	113	.001
New England	3	9	7	5	9	15	.20
Middle Atlantic	1	4	2	1	5	3	--
East North Central	2	3	5	4	9	9	.20
West North Central	7	20	13	13	28	31	.01
South Atlantic	4	12	9	7	15	17	.20
East South Central	4	9	6	9	17	19	.02
West South Central	1	3	1	2	4	5	--
Mountain	4	12	12	13	9	14	n. s.
		(iii) Non-White Male					
United States	10	33	22	10	38	47	.001
South Atlantic	5	16	10	5	19	25	.001
East South Central	4	14	10	4	15	17	.05
West South Central	1	3	2	1	4	5	--
		(iv) Non-White Female					
United States	9	30	19	10	34	42	.001
South Atlantic	5	16	9	6	19	25	.001
East South Central	3	11	8	3	11	12	.20
West South Central	1	3	2	1	4	5	--

[a] n. s. - not significant at 20 percent level.

Table 5. Rank Analyses of β_i for the United States based on (a) Metropolitan State Economic Areas Net Inmigration Data and (b) Nonmetropolitan State Economic Areas Net Outmigration Data for 1950-60 Decade.

Category	Number of States Covered	Rank of β_i									Significance Level of Friedman's X^2_r
		i=1	i=2	i=3	i=4	i=5	i=6	i=7	i=8	i=9	
		(a) MSEA - Net Inmigration Analyses									
White Male	18	7	4	6	3	1	2	5	8	9	.001
Σ^a	-	7	11	17	20	21	23	28	36	45	--
White Female	17	7	3.5	5.5	3.5	1	2	5.5	8	9	.001
Σ	-	7	10.5	16	19.5	20.5	22.5	28	36	45	--
Nonwhite Male	13	7	4	3	1	2	5	6	8	9	.001
Σ	-	7	11	14	15	17	22	28	36	45	--
Nonwhite Female	13	7	4	3	2	1	5	6	8	9	.001
Σ	-	7	11	14	16	17	22	28	36	45	--
		(b) NSEA - Net Outmigration Analyses									
White Male	31	7	4	3	1	2	5	6	8	9	.001
Σ	-	7	11	14	15	17	22	28	36	45	--
White Female	30	7	4	2	1	3	5	6	8	9	.001
Σ	-	7	11	13	14	17	22	28	36	45	--
Nonwhite Male	16	8	5	4	2	1	3	6	7	9	.001
Σ	-	8	13	17	19	20	23	29	36	45	--
Nonwhite Female	17	7	5	3	1	2	4	6	8	9	.001
Σ	-	7	12	15	16	18	22	28	36	45	--

Σ^a - denotes the progressive summation of ranks up to and including i.

Table 6. Significance levels of Friedman's X_r^2 in the rank analyses of β_i based on MSEA[a]. Net In-migration data for 1950-60 decade.

Region	White male	White female	Nonwhite male	Nonwhite female
New England				
Middle Atlantic			e	a
East North Central	b	c	e	e
West North Central				
South Atlantic	c	d		
East South Central	a			
West South Central	e	a	b	c
Mountain	c	a		
Pacific	a	a		
United States total	e	e	e	e

Table 7. Significance levels of Friedman's X_r^2 in the rank analyses of β_i based on NSEA[a]. Net In-migration data for 1950-60 decade.

New England	c	a		
Middle Atlantic	c	a		
East North Central	d	c		
West North Central	e	e	b	a
South Atlantic	e	e	e	e
East South Central	d	e	e	e
West South Central	e	e	e	e
Mountain	a	d		
Pacific	a			
United States total	e	e	e	e

[a] a - not significant at 20 percent level; b - significant at 20 percent level; c - significant at 10 percent level; d - significant at 5 percent level e - significant at.1 percent level.

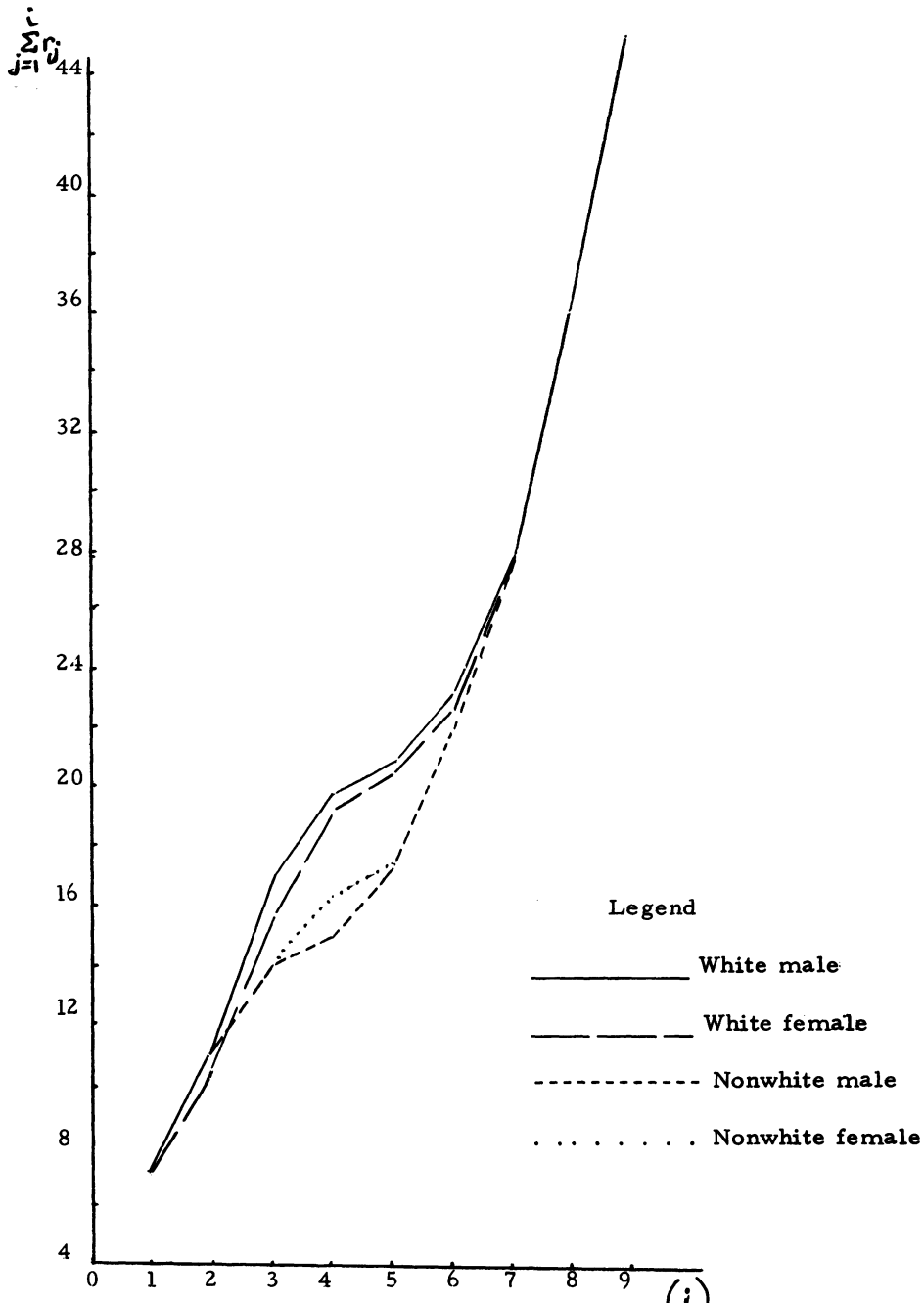

Figure 1.
$\sum$ curves for ranks of β_i for different color-sex categories based on MSEA net in-migration data for 1950-60

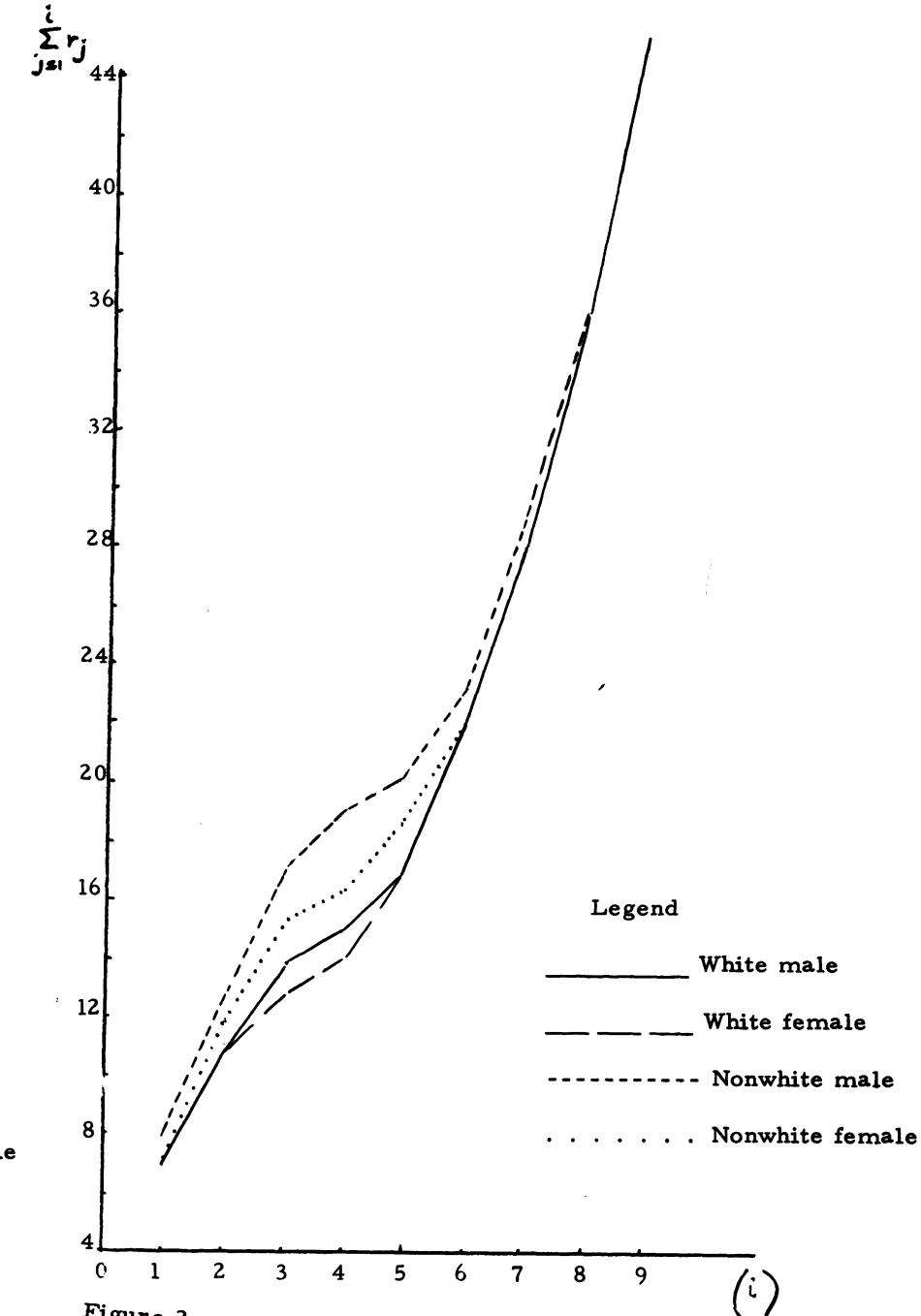

Figure 2.
$\sum$ - curves for ranks of β_i for different color-sex categories based on NSEA net out-migration data for 1950-60