U.S. INDUSTRIAL EMPLOYMENT PATTERNS BY RACE AND SEX: 1960-1970 *

by Peter Schmidt and Robert P. Strauss**

I. INTRODUCTION

Recent work on employment patterns has primarily been concerned with occupation. For example, Boskin (1974) and Schmidt and Strauss (1975) have investigated occupational patterns using the logit model. On the other hand, industrial employment patterns may also be of interest. In this paper the particular emphasis is on the effect of race and sex on industry of employment. This is equally as interesting as the effect of race and sex on occupation, since discrimination may occur by the exclusion of minorities from certain firms as well as by the exclusion of minorities from certain types of jobs.

Section II of the paper develops and estimates the model of industrial employment. Section III considers regional effects and interactions of race and sex with sone other variables. Section IV concludes.

II. A MODEL OF INDUSTRIAL EMPLOYMENT

We begin by postulating a relatively simple model in which one's chance of employment in a particular industry is influenced by one's education, labor market experience, race and sex. Race and sex are zero-one dummies taking the value one for the more numerous (whites and men) ca-

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tegories. Education is measured in school years, and labor market experience is measured as age minus education minus five.

Using these explanatory variables, we predict individuals to be in the following five industrial groups (which we will simply call industries): « primary », « production », « trade and distribution », « service », and « government ». The aggregation of two digit census industry titles into these five industries is displayed in Table 1.

The results obtained here may be of some interest, apart from the prediction of industry *per se*, because they can also be interpreted as an attempt to investigate race and sex discrimination. Two of the explanatory variables used are race and sex (in the form of zero-one dummies). Non-zero coefficients for these variables indicate that race and sex affect one's industry of employment, even taking into account the effects of the other explanatory variables (which are education and experience). That is, they indicate an effect on industry of employment which is not explainable in terms of differences between races or sexes in education and experience. Non-zero coefficients of the race and sex variables can therefore be interpreted as evidence of race and sex discrimination by various industries.

For the years 1960 and 1970 we analyze samples of size 966 and 1000, respectively, from the Public Use Samples. Each sample was drawn randomly from the parent 1 in 1000 sample after the latter had been modified to include only those over 14 years of age, those who were full-time workers, and those who had non-zero earnings in the reference year. Excluded are part-time workers, the self-employed, and those who received non-monetary wages. The same procedure was followed for 1967 except that a random sample of size 934 was drawn from the representative portion of the 1967 Survey of Economic Opportunity.

The statistical technique used is the multiple logit model, which has been widely used to predict various discrete events (such as, in this case, employment in one of five industrial groupings.) For a concise summary of the multiple logit model as used here, see Schmidt and Strauss (1975a, appendix), or Theil (1969).

We then estimate, for each year, equations of the form:

$$\log_e (P_2/P_1)_t = \beta_{11} + \beta_{12}\,\text{Education}_t + \beta_{13}\,\text{Experience}_t + \beta_{14}\,\text{Race}^3 + \beta_{15}\,\text{Sex}_t$$

$$\log_e (P_3/P_1)_t = \beta_{21} + \beta_{22}\,\text{Education}_t + \beta_{23}\,\text{Experience}_t + \beta_{24}\,\text{Race}_t + \beta_{25}\,\text{Sex}_t$$

$$\log_e (P_4/P_1)_t = \beta_{31} + \beta_{32}\,\text{Education}_t + \beta_{33}\,\text{Experience}_t + \beta_{34}\,\text{Race}_t + \beta_{45}\,\text{Sex}_t$$

Table 1. *Two Digit Census Industries Used in Five-Way Grouping.*

Constructed Title	*Component Titles*
P « ~~T~~rimary » (1)	Agriculture, Forestry and Fisheries Mining Construction
« Production » (2)	Manufacturing - Durable Goods Manufacturing - Nondurable Goods Transportation
« Trade and Distribution » (3)	Communications Utilities and Sanitary Services Wholesale Trade Retail Trade Finance, Insurance and Real Estate
« Service » (4)	Business and Repair Services Personal Services Entertainment and Recreation Services Professional and Related Services
« Government » (5)	Public Administration

Table 2. *Coefficients and « t ratios »*, 1960[1].

Dependent variable	Constant	Education	Experience	Race[2]	Sex[3]
$\log_e(P_2/P_1)$	1.976 (2.71)	.01918 (0.44)	.00925 (0.97)	.3679 (0.90)	-1.330 (-3.03)
$\log_e(P_3/P_1)$	1.010 (1.290)	.1134 (2.36)	.01167 (1.13)	-.02497 (-0.06)	-1.906 (-4.26)
$\log_e(P_4/P_1)$	-.03271 (-0.04)	.2831 (5.37)	.03282 (2.92)	-1.315 (-2.91)	-2.927 (-6.41)
$\log_e(P_5/P_1)$	-2.231 (-2.08)	.1746 (2.84)	.03216 (2.43)	.2508 (0.38)	-1.167 (-2.18)
$\log_e(P_3/P_2)$	-.9658 (-1.97)	.09418 (2.93)	.00242 (0.36)	-.3929 (-1.22)	-.5754 (-3.05)
$\log_e(P_4/P_2)$	-2.009 (-3.72)	.2640 (6.92)	.02357 (2.99)	-1.683 (-5.20)	-1.597 (-7.68)
$\log_e(P_5/P_2)$	-4.207 (-4.78)	.1554 (3.11)	.02291 (2.15)	-.1171 (-0.20)	.1629 (0.47)
$\log_e(P_4/P_3)$	-1.043 (-1.79)	.1698 (4.19)	.02115 (2.49)	-1.290 (-3.63)	-1.021 (-4.62)
$\log_e(P_5/P_3)$	-3.241 (-3.53)	.06122 (1.16)	.02049 (1.81)	.2758 (0.45)	.7383 (2.06)
$\log_e(P_5/P_4)$	-2.199 (-2.35)	-.1085 (-1.95)	-.00066 (-0.05)	1.566 (2.55)	1.760 (4.80)

(1) Group 1 = « pr~~ueary~~ imary », 2 = « production », 3 = « trade and distribution », 4 = « service », 5 = « government ».
(2) White = 1, Black = 0.
(3) Male = 1, Female = 0.

$$\log_e (P_5/P_1)_t = \beta_{41} + \beta_{42}\ \text{Education}_t + \beta_{43}\ \text{Experience}_t$$
$$+ \beta_{44}\ \text{Race}_t + \beta_{45}\ \text{Sex}_t.$$

Here P_i refers to the probability of an individual being in group i, where 1 = the « primary » industry, 2 = « production », 3 = « trade and distribution », 4 = « service », and 5 = « government ». We can also derive from these equations the equations for other comparisons. For example, since $\log (P_4/P_2) = \log (P_4/P_1) - \log (P_2/P_1)$, we have:

$$\log (P_4/P_2)_t = (\beta_{31} - \beta_{11}) + (\beta_{32} - \beta_{12})\ \text{Education}_t$$
$$+ (\beta_{33} - \beta_{13})\ \text{Experience}_t$$
$$= (\beta_{34} - \beta_{14})\ \text{Race}_t + (\beta_{35} - \beta_{15})\ \text{Sex}_t.$$

The estimated coefficients and their « t ratios » are given in Tables 2-4. The t ratios are the ratios of the estimated coefficients to the estimated asymptotic standard errors, and are asymptotically distributed as N (0,1) under the null hypothesis that the associated coefficients are zero.

Let us consider first the effects of education. In all three years all coefficients are positive except for those in the « government » versus « service » equation. This means that, other things held constant, more education makes ~~mafles~~ one more likely to be in a higher-numbered industry — except that it makes one less likely to be in industry 5 (« government ») than in industry 4 (« service »). Explicitly, if we order the industries as follows:

« service »
« government »
« trade and distribution »
« production »
« primary »,

additional education increases the probability of being in any industry relative to any other industry lower on the list (and, correspondingly, decreases the probability of being in any industry relative to any other industry higher on the list). This ordering is the same for all three years considered, and is for the most part based on coefficients which are statistically significant (at reasonable levels). Finally, the intertemporal changes in these coefficients are relatively small. For example, none of the changes in these coefficients between 1960 and 1970 is significant at the 5% level. Nor is there any discernible pattern to the changes that do occur.

The effects of labor market experience are much less clear. Many of the coefficients are not statistically significant, and many are not of the same sign over the three sample years considered. In fact the only coef-

Table 3. *Coefficients and « t ratios »*, 1970.

Dependent variable	Constant	Education	Experience	Race	Sex
$\log_e(P_2/P_1)$	2.118 (2.80)	.02346 (0.53)	-.00048 (-0.05)	-.07240 (-0.17)	-.8961 (-2.43)
$\log_e(P_3/P_1)$	1.079 (1.34)	.09507 (2.00)	-.00438 (-0.46)	.2176 (0.46)	-1.343 (-3.60)
$\log_e(P_4/P_1)$	-.2420 (-0.29)	.2930 (5.70)	.00956 (0.96)	-.9456 (-2.05)	-2.250 (-5.97)
$\log_e(P_5/P_1)$	-1.229 (-1.11)	.1759 (2.54)	-.00616 (-0.45)	-.4599 (-0.74)	-.8995 (-1.86)
$\log_e(P_3/P_2)$	-1.038 (-2.07)	.07161 (2.29)	-.00391 (0.65)	.2900 (0.92)	-.4467 (-2.52)
$\log_e(P_4/P_2)$	-2.360 (-4.43)	.2695 (7.44)	.01003 (1.54)	-.8732 (-3.00)	-1.354 (-7.28)
$\log_e(P_5/P_2)$	-3.346 (-3.67)	.1524 (2.58)	-.00568 (-0.50)	-.3875 (-0.76)	-.00336 (-0.01)
$\log_e(P_4/P_3)$	-1.321 (-2.31)	.1979 (5.27)	.01394 (2.04)	-1.163 (-3.47)	-.9075 (-4.75)
$\log_e(P_5/P_3)$	-2.308 (-2.45)	.08080 (1.34)	-.00177 (-0.15)	-.6775 (-1.25)	.4433 (1.24)
$\log_e(P_5/P_4)$	-.9868 (-1.04)	-.1171 (-1.89)	-.01572 (-1.32)	.4857 (0.93)	1.351 (3.77)

Table 4. *Coefficients and « t ratios »*, 1967.

Dependent variable	Constant	Education	Experience	Race	Sex
$\log_e(P_2/P_1)$	2.055 (2.53)	.03928 (0.87)	-.00015 (-0.01)	.1613 (0.33)	-1.113 (-2.66)
$\log_e(P_3/P_1)$	1.513 (1.76)	.1190 (2.42)	-.00569 (-0.30)	-.2534 (-0.49)	-1.738 (-4.08)
$\log_e(P_4/P_1)$	-.1185 (-0.13)	.2935 (5.46)	.02439 (2.00)	-1.158 (-2.22)	-3.018 (-6.89)
$\log_e(P_5/P_1)$	-1.491 (-1.42)	.2125 (3.55)	.01505 (1.08)	-.4999 (-0.81)	-1.056 (-2.12)
$\log_e(P_3/P_2)$	-.5422 (-1.05)	.07968 (2.54)	-.00554 (-0.79)	-.4147 (-1.29)	-.6248 (-3.38)
$\log_e(P_4/P_2)$	-2.173 (-3.75)	.2542 (6.77)	.02454 (3.01)	-1.319 (-4.05)	-1.905 (-9.07)
$\log_e(P_5/P_2)$	-3.546 (-4.48)	.1732 (3.73)	.01520 (1.41)	-.6612 (-1.40)	.05669 (0.18)
$\log_e(P_4/P_3)$	-1.631 (-2.66)	.1746 (4.41)	.03008 (3.48)	-.9046 (-2.71)	-1.280 (-5.81)
$\log_e(P_5/P_3)$	-3.003 (-3.63)	.09351 (1.91)	.02074 (1.82)	-.2465 (-0.50)	.6815 (2.10)
$\log_e(P_5/P_4)$	-1.373 (-1.60)	-.08104 (-1.56)	-.00934 (-0.78)	.6582 (1.35)	1.962 (5.86)

ficients which are of the same sign for all three years are those in the equations for $\log_e (P_4/P_1)$, $\log_e (P_4/P_2)$, $\log_e (P_4/P)_3$, and $\log_e (P_5/P_4)$, which indicate that more experience increases the probability of being in industry 4 (« service ») relative to any other industry. Nevertheless, there are no changes in coefficients between 1960 and 1970 which are significant at the 5% level.

The effects of race are similar to those for experience in that most coefficients are insignificant over the three years. The only coefficients which are ignificant at reasonable levels are those relating to the « service » industry, and imply that to be black (the smaller value of the race dummy increases the probability of being in the service industry, relative to any other industry. This is true for all three years. The only coefficient which changes significantly (at the 5% level) from 1960 to 1970 is in the equation relating the « service » and « production » industries, and this reflects a change in size, not sign, of the coefficient.

Finally, the effects of sex are reasonably clear-cut. Most coefficients tend to be significant, and relatively stable over the three years considered. If we order the industries as follows:

« primary »
« trade and distribution »
« service, »

then being male makes it more likely to be in any industry relative to any other industry lower on the list. (The comparison of the « government » and « production » industries is ambigous.) This ordering is, we think, intuitively reasonable. Also, there are no significant coefficient changes from 1960 to 1970. However, it is true that, for all ten equations, the absolute values of the coefficient of the sex dummy decreased from 1960 to 1970. To the extent that this coefficient measures sex discrimination this would indicate decreasing sex discrimination in employment over this ten-year period.

As a last way of seeing what our results are really saying, we have evaluated the probabilities of being in each of the five industries for each of the three years. These probabi'ities are evaluated at the sample means for education and experience, and for all four permutations of race and sex, using formula (2) of the Appendix of Schmidt and Strauss (1975). The results are given in Table 5. Some of the results are fairly striking. For example, in 1960 a black female of average education and experience had a probability of 635 of being in the « service » industry, compared to 078 for a white male. On the other hand, a white male of average age and experience had a probability of '120 of being in the « primary » industry, compared to '014 for a black female. More generally, the probabilities indicate that to be white, or male, increases the chance of being in the « primary », « production », and « government » industries, and decreases the chance of being in the « service » industry — at least for persons of average education and experience.

III. SOME EXTENSIONS OF THE MODEL

The model used above is an admittedly simple one. In this section we test its adequacy by considering certain extensions (or complications).

The first problem we deal with is the fact that industrial employment patterns may have substantial variation over regions, beyond that explainable in terms of regional differences in education, experience, or racial or sexual composition. To see if taking this into account would substantially change our conclusions, we obtained rando, samples of size 1000, for each of the four census regions (Northeast, North Central, South, West), from the representative portion of the 1967 Survey of Economic Opportunity. The model of the previous section was then estimated for each region. These results are give in Tables 6-9, and the corresponding predicted probabilities (for average age and experience) are given in Table 10.

Coefficients which are significantly different (at the 5% level) from those for the national sample (as given in Table 4) are marked with an asterisk. As is clear from glancing at Tables 6-9, there are relatively few such significant changes. A more detailed analysis of the regional results will be left to the reader, since our main interest in them was simply to verify that the inter-regional differences were not so great as to cast doubt on the usefulness of the national sample.

As the reader may easily observe, the predicted probabilities in Table 10 do show obvious variation across regions. This is due both to the inter-regional differences in estimated coefficients and to differences in average education and experience.

A second possible problem for which we wish to check is the possibility of error due to mis-measurement of the experience variable. As the reader may recall, experience was defined as age minus years of schooling minus five, and should correctly measure experience for individuals who began school at five and worked continuously after leaving school. Obviously this will not be the case for all individuals. More serious is the possibility that this may systematically overstate the experience of females, relative

Table 5. *Probabilities of Being in Each Industry, Given Average Education and Experience.*

Year	Race - Sex Combination	"Primary"	"Production"	"Trade & Dist."	"Service"	"Government"
1960 [1]	Black female	.014	.156	.173	.635	.022
	Black male	.115	.338	.212	.280	.055
	White female	.023	.371	.279	.281	.046
	White male	.120	.511	.216	.078	.074
1970 [2]	Black female	.019	.207	.155	.581	.038
	Black male	.087	.383	.183	.278	.070
	White female	.029	.294	.294	.346	.037
	White male	.105	.433	.277	.131	.054
1967 [3]	Black female	.013	.154	.198	.591	.047
	Black male	.088	.354	.241	.202	.115
	White female	.022	.323	.271	.332	.051
	White male	.107	.505	.227	.077	.084

(1) Average education = 10.742; average experience = 24.570.
(2) Average education = 11.718; average experience = 23.406.
(3) Average education = 11.400; average experience = 24.147.

Table 6. *Coefficients and « t ratios »* 1967, *North East region.*

Dependent variable	Constant	Education	Experience	Race	Sex
$\log_e(P_2/P_1)$	2.475 (2.54)	.09082 (1.85)	.00942 (0.89)	.1420 (0.30)	-2.181 (-3.50)
$\log_e(P_3/P_1)$	1.557 (1.52)	.1369 (2.60)	.01208 (1.07)	.2366 (0.46)	-2.798 (-4.45)
$\log_e(P_4/P_1)$	-.5241 (-0.50)	.3706 (6.66)	.01953 (1.65)	-.5116 (-1.00)	-3.520 (-5.55)
$\log_e(P_5/P_1)$	-2.542 (-1.97)	.2958 (4.39)	.03102 (2.06)	.05403 (0.08)	-2.215 (3.19)
$\log_e(P_3/P_2)$	-.9176 (-1.81)	.04604 (1.53)	.00265 (0.42)	.09460 (0.30)	-.6171 (-3.59)
$\log_e(P_4/P_2)$	-2.999 (-5.66)	.2798 (8.26)	.01011 (1.46)	-.6536 (-2.14)	-1.339* (-7.15)
$\log_e(P_5/P_2)$	-5.017 (-5.37)	.2050 (3.98)	.02159 (1.84)	-.08795 (-0.15)	-.03391 (-0.10)
$\log_e(P_4/P_3)$	-2.081 (-3.53)	.2337 (6.34)	.00745* (0.99)	-.7481 (-2.14)	-.7223* (-3.57)
$\log_e(P_5/P_3)$	-4.099 (-4.20)	.1589 (2.95)	.01894 (1.55)	-.1826 (-0.29)	.5832 (1.67)
$\log_e(P_5/P_4)$	-2.018 (-2.08)	-.07478 (-1.38)	.01149 (0.93)	.5656 (0.92)	1.305 (3.70)

Table 7. *Coefficients and « t ratios »*, 1967, *North Central region.*

Dependent variable	Constant	Education	Experience	Race	Sex
$Log_e(P_2/P_1)$	2.065	.06084	.00725	-.2753	-1.039
	(2.35)	(1.22)	(0.70)	(-0.52)	(-2.66)
$Log_e(P_3/P_1)$	.5891	.1459	.00754	-.1884	-1.522
	(0.62)	(2.69)	(0.68)	(-0.32)	(-3.78)
$Log_e(P_4/P_1)$	-.5449	.2971	.02476	-.9330	-2.436
	(-0.56)	(5.24)	(2.13)	(-1.62)	(-6.00)
$Log_e(P_5/P_1)$	-2.634	.2677	.03765	-.9981	-.9549
	(-2.20)	(3.84)	(2.53)	(-1.45)	(-1.92)
$Log_e(P_3/P_2)$	-1.476	.08511	.00029	.08784	-.4834
	(-2.65)	(2.53)	(0.04)	(0.25)	(-2.66)
$Log_e(P_4/P_2)$	-2.610	.2362	.01751	-.6567	-1.396*
	(-4.57)	(6.48)	(2.38)	(-2.01)	(-7.48)
$Log_e(P_5/P_2)$	-4.699	.2068	.03040	-.7218	.08045
	(-5.11)	(3.76)	(2.53)	(-1.42)	(0.24)
$Log_e(P_4/P_3)$	-1.134	.1511	.01721	-.7446	-.9133
	(-1.75)	(3.77)	(2.10)	(-1.91)	(-4.41)
$Log_e(P_5/P_3)$	-3.223	.1217	.03011	-.8097	.5674
	(-3.30)	(2.10)	(2.38)	(-1.46)	(1.59)
$Log_e(P_5/P_4)$	-2.089	-.02941	.01289	-.06512	1.481
	(-2.14)	(-0.50)	(1.01)	(-0.12)	(4.16)

Table 8. *Coefficients and « t ratios »*, 1967, *Southern region.*

Dependent variable	Constant	Education	Experience	Race	Sex
$Log_e(P_2/P_1)$	1.976	.02807	.00012	.1265	-1.656
	(3.33)	(0.61)	(0.01)	(0.47)	(-4.53)
$Log_e(P_3/P_1)$	.9952	.1129	.00022	.2254	-2.226
	(1.57)	(2.99)	(0.02)	(0.81)	(-6.08)
$Log_e(P_4/P_1)$	.00846	.2849	.03650	-1.558	-3.756
	(0.01)	(6.61)	(3.49)	(-4.76)	(-9.73)
$Log_e(P_5/P_1)$	-2.706	.2837	.02304	-.1650	-1.779
	(-3.23)	(5.71)	(1.87)	(-0.37)	(-4.11)
$Log_e(P_3/P_2)$	-.9804	.08482	.00010	.1268	-.5901
	(-2.24)	(2.94)	(0.01)	(0.49)	(-3.33)
$Log_e(P_4/P_2)$	-1.967	.2568	.03638	-1.687	-2.120
	(-4.02)	(7.41)	(4.52)	(-6.39)	(-9.85)
$Log_e(P_5/P_2)$	-4.681	.2557	.02292	-.2936	-.1429
	(-6.65)	(5.91)	(2.15)	(-0.71)	(-0.49)
$Log_e(P_4/P_3)$	-.9868	.1720	.03628	-1.813*	-1.530
	(-1.93)	(4.90)	(4.41)	(-6.30)	(-6.97)
$Log_e(P_5/P_3)$	-3.701	.1708	.02282	-.4204	.4472
	(-5.12)	(3.88)	(2.09)	(-0.97)	(1.53)
$Log_e(P_5/P_4)$	-2.714	-.00113	-.01346	1.393	1.977
	(-3.66)	(-0.02)	(-1.18)	(3.26)	(6.36)

Table 9. *Coefficients and « t ratios », 1967, Western region.*

Dependent variable	Constant	Education	Experience	Race	Sex
$\text{Log}_e(P_2/P_1)$	1.644 (1.74)	.04701 (1.11)	-.00106 (-0.11)	-.2701 (-0.41)	-.7316 (-1.81)
$\text{Log}_e(P_3/P_1)$	1.346 (1.31)	.03624 (0.83)	-.001347 (-0.13)	.7714 (1.01)	-1.765 (-4.46)
$\text{Log}_e(P_4/P_1)$	-.9237 (-0.90)	.3191 (6.36)	.01280 (1.18)	-.5251 (-0.75)	-2.957 (-7.28)
$\text{Log}_e(P_5/P_1)$	-.1145 (-0.11)	.1801 (3.46)	.00396 (0.34)	-.9762 (-1.40)	-1.201 (-2.75)
$\text{Log}_e(P_3/P_2)$	-.2979 (-0.43)	-.01077 * (-0.35)	-.00029 (-0.04)	1.041 * (1.93)	-1.034 (-5.19)
$\text{Log}_e(P_4/P_2)$	-2.567 (-3.76)	.2721 (7.12)	.01386 (1.78)	-.2550 * (-0.59)	-2.226 (-10.29)
$\text{Log}_e(P_5/P_2)$	-1.758 * (-2.39)	.1331 (3.24)	.00502 (0.56)	-.7062 (-1.61)	-.4696 (-1.74)
$\text{Log}_e(P_4/P_3)$	-2.270 (-2.98)	.2829 * (7.28)	.01415 (1.84)	-1.296 (-2.34)	-1.192 (-5.89)
$\text{Log}_e(P_5/P_3)$	-1.460 (-1.76)	.1438 (3.37)	.00530 (0.58)	-1.748 * (-3.05)	.5641 (2.17)
$\text{Log}_e(P_5/P_4)$	.8092 (1.01)	-.1390 (-3.01)	-.00884 (-0.91)	-.4511 * (-0.97)	1.756 (6.56)

Probabilities

Table 10. *~~Probabilities~~ of Being in Each Industry Given Average Education and Experience.*

[illegible]	[illegible]	"[illegible]"	"Production"	"Trade & Dist."	"[illegible]"	"[illegible]"
Black Females	US[1]	.013	.154	.200	.591	.047
	NE[2]	.007	.287	.208	.464	.035
	NC[3]	.015	.282	.172	.474	.057
	S[4]	.013	.128	.121	.704	.033
	W[5]	.020	.176	.114	.518	.173
Black Males	US[1]	.088	.354	.241	.202	.115
	NE[2]	.097	.467	.183	.198	.054
	NC[3]	.069	.462	.174	.193	.102
	S[4]	.179	.342	.178	.225	.076
	W[5]	.097	.417	.096	.133	.257
White Females	US[1]	.022	.323	.271	.332	.051
	NE[2]	.007	.361	.288	.304	.040
	NC[3]	.026	.369	.246	.323	.037
	S[4]	.027	.297	.317	.302	.057
	W[5]	.025	.174	.319	.397	.085
White Males	US[1]	.107	.505	.227	.077	.084
	NE[2]	.093	.516	.222	.114	.055
	NC[3]	.102	.518	.213	.112	.056
	S[4]	.197	.427	.253	.052	.071
	W[5]	.121	.399	.260	.098	.121

(1) Average education = 11.509; average experience = 24.203.
(2) Average education = 11.552; average experience = 24.730.
(3) Average education = 11.458; average experience = 24.245.
(4) Average education = 10.807; average experience = 24.245.
(5) Average education = 12.219; average experience = 23.265.

to males, since females (especially married females) are more apt to periodically leave the labor force than males are. In fact, this is a possible explanation for the non-zero coefficients of the sex dummy in the previous results.

To check on this possibility, we generated random samples of 1000 females and of 1000 males from the representative portion of the 1967 Survey of Economic Opportunity. These samples were selected just as in Section II except that here we generated separate samples of males and females. On each such sample we ran the model of the previous section, except, of course, without the sex dummy. If experience were systematically overstated for females, relative to males, we would now expect the coefficients of the experience variable to be systematically *smaller* (in absolute value) for females — since a year of measured experience, being less actual experience, would have a smaller effect.

The results of the model applied to the stratified samples are given in Tables 11-12. They do not support the above hypothesis, since the experience coefficients are smaller (in absolute value) for females only five times out of ten. Furthermore, only one of the changes in coefficients is significant at the 5% level.

The third and last possible problem for which we wish to check is the possibility of mis-measurement of the education variable. In particular, it has sometimes been argued (see, e.g., Coleman (1966)) that blacks receive inferior education, for a variety of reasons, compared to whites who have attended school the same number of years. If this is so, and if employees take this into account, then we have perhaps systematically overstated « actual » education of blacks relative to whites. This would predict that, in subsamples of blacks and whites, the coefficients of the education variable would by smaller (in absolute value) for blacks.

To check this, we generated random samples of 1000 whites and 1000 blacks from the representative portion of the 1967 Survey of Economic Opportunity, and on each sample ran the model of the previous section, except without the race dummy. The results are given in Tables 13-14. They do not support the above hypothesis, since the education coefficients are actually *larger* (in absolute value) for blacks than for whites in six cases out of ten. However, it may be noteworthy that the changes in coefficients were significant at the 5% level in eight cases out of ten.

From the results on the samples stratified by race and sex, it is again possible to generate the predicted probabilities that an individual be in eac industry, given average education and experience. These probabilities are given in Table 15. For ease of comparison the original 1967 probabilities, given in Table 5, are recopied here as well. The probabilities based on the

Table 11. *Coefficients and « t ratios », 1967, Sample of Males Only.*

Dependent Variable	Constant	Education	Experience	Race
$Log_e(P_2/P_1)$	.5737 (1.00)	.07830 (2.12)	.01638 (1.82)	-.4937 (-1.30)
$Log_e(P_3/P_1)$	-.6154 (-0.95)	.1455 (3.50)	.00378 (0.37)	-.5653 (-1.34)
$Log_e(P_4/P_1)$	-3.253 (-4.32)	.3049 (6.61)	.01933 (1.70)	-.7819 (-1.64)
$Log_e(P_5/P_1)$	-3.703 (-4.12)	.2015 (3.98)	.03953 (3.13)	.09906 (0.16)
$Log_e(P_3/P_2)$	-1.189 (-2.56)	.06719 (2.27)	-.01260 (-1.73)	-.07164 (-0.25)
$Log_e(P_4/P_2)$	-3.809 (-6.49)	.2266 (6.48)	.00295 (0.33)	-.2882 (-0.81)
$Log_e(P_5/P_2)$	-4.277 (-5.54)	.1232 (3.00)	.02315 (2.11)	.5927 (1.10)
$Log_e(P_4/P_3)$	-2.620 (-4.07)	.1594 (4.16)	.01555 (1.57)	-.2166 (-0.55)
$Log_e(P_5/P_3)$	-3.088 (-3.76)	.05603 (1.26)	.03575 (3.14)	.6644 (1.17)
$Log_e(P_5/P_4)$	-.4680 (-0.53)	-.1034 [illegible]	.02020 [illegible]	.8810 [illegible]

Table 12. *Coefficients and « t ratios », 1967, Sample of Females Only.*

Dependent Variable	Constant	Education	Experience	Race
$Log_e(P_2/P_1)$	3.314 (1.79)	-.08815 (-.062)	-.00751 (-0.27)	1.472 (1.80)
$Log_e(P_3/P_1)$	1.516 (0.81)	.04897 (0.35)	-.01515 (-0.55)	1.855 (2.20)
$Log_e(P_4/P_1)$	.7178 (0.39)	.2278 (1.62)	.01716 (0.63)	-.07062 (-0.09)
$Log_e(P_5/P_1)$	-1.819 (-0.93)	.2960 (2.00)	.02725 (0.94)	-.4707 (-0.55)
$Log_e(P_3/P_2)$	-1.798 (-3.18)	.1371 (3.60)	-.00764 (-1.10)	.3829 (1.05)
$Log_e(P_4/P_2)$	-2.596 (-5.18)	.3159 (8.51)	.02467 (3.67)	-1.543 (-5.75)
$Log_e(P_5/P_2)$	-5.133 (-6.20)	.3841 (6.45)	.03475 (3.00)	-1.943 (-4.97)
$Log_e(P_4/P_3)$	-.7985 (-1.48)	.1788 (4.90)	.03232 (4.83)	-1.926 (-5.93)
$Log_e(P_5/P_3)$	-3.335 (-3.93)	.2470 (4.19)	.04240 (3.67)	-2.326 (-5.40)
$Log_e(P_5/P_4)$	-2.537 (-3.28)	(.06822) (1.25)	.01008 (0.92)	-.4001 (-1.18)

Table 13. *Coefficients and « t ratios »*, 1967, *Sample of Whites Only.*

Dependent Variable	Constant	Education	Experience	Sex
$\log_e(P_2/P_1)$	2.004 (2.66)	.06228 (1.39)	-.00104 (-0.10)	-1.293 (-3.00)
$\log_e(P_3/P_1)$	1.567 (1.99)	.1174 (2.46)	-.00628 (-0.58)	-1.984 (-4.56)
$\log_e(P_4/P_1)$	-1.649 (-1.94)	.3616 (6.91)	.01146 (0.98)	-2.953 (-6.61)
$\log_e(P_5/P_1)$	-1.366 (-1.45)	.1948 (3.41)	.01502 (1.15)	-1.419 (-2.90)
$\log_e(P_3/P_2)$	-.4373 (-0.96)	.05510 (1.80)	-.00525 (-0.78)	-.6912 (-3.88)
$\log_e(P_4/P_2)$	-3.653 (-6.73)	.2993 (8.23)	.01250 (1.59)	-1.660 (-8.21)
$\log_e(P_5/P_2)$	-3.371 (-4.89)	.1325 (3.02)	.01605 (1.59)	-.1255 (-0.44)
$\log_e(P_4/P_3)$	-3.216 (-5.73)	.2442 (6.48)	.01774 (2.17)	-.9689 (-4.73)
$\log_e(P_5/P_3)$	-2.933 (-4.10)	.07738 (1.68)	.02130 (2.02)	.5656 (1.96)
$\log_e(P_5/P_4)$	.2823 (0.37)	-.1668 (-3.43)	.00356 (0.32)	1.535 (5.11)

Table 14. *Coefficients and « t ratios »*, 1967, *Sample of Blacks Only.*

Dependent Variable	Constant	Education	Experience	Sex
$\log_e(P_2/P_1)$	.9599 (1.24)	.1643 (3.71)	.00677 (0.59)	-1.431 (-2.98)
$\log_e(P_3/P_1)$	1.013 (1.23)	.1357 (2.79)	-.00448 (-0.36)	-1.663 (-3.37)
$\log_e(P_4/P_1)$	.9252 (1.12)	.2049 (4.15)	.04148 (3.26)	-4.104 (-8.48)
$\log_e(P_5/P_1)$	-3.615 (-3.77)	.4343 (7.55)	.03774 (2.59)	-1.998 (-3.85)
$\log_e(P_3/P_2)$	.05297 (0.10)	-.02858 (-0.82)	-.01125 (-1.27)	-.2323 (-1.07)
$\log_e(P_4/P_2)$	-.03464 (-0.07)	.04065 (1.22)	.03470 (4.13)	-2.673 (-13.42)
$\log_e(P_5/P_2)$	-4.574 (-6.66)	.2700 (6.16)	.03097 (2.80)	-.5671 (-2.13)
$\log_e(P_4/P_3)$	-.08761 (-0.15)	.06920 (1.79)	.04595 (4.71)	-2.441 (-10.64)
$\log_e(P_5/P_3)$	-4.627 (-6.16)	.2986 (6.15)	.04221 (3.45)	-.3348 (-1.15)
$\log_e(P_5/P_4)$	-4.540 (-6.41)	.2294 (5.09)	-.00374 (-0.33)	2.106 (7.63)

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