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Appendix D

1. AN ADDITIONAL CROSS-CLASSIFICATION: BY OCCUPATION

AS MENTIONED IN Chapter 6, the 1950 BLS expenditure survey is available in published form with an additional cross-classification by occupation (seven groups). Of the 756 cells in this four-way cross-tabulation of the North region, 251 (or one-third of the cells) were empty, leaving 505 observations. Of these, 111 (or more than one-fifth) contained only one household, and only fifty-nine (or one-tenth) of the cells contained thirty or more households. Thus, investigating the relationship between expenditures, income, and education across these 505 cells is an approximation to dealing with the individual households themselves, and can be expected to incorporate both the advantages and disadvantages of individual data.

The two principal disadvantages of these smaller cells (or of individual data) are the problems of zero expenditures on items and the problems of biases due to measurement error. The number of zero values for expenditures is greater in these 505 observations—for example, 152 cells spent zero on educational expenditures (i.e., 30 per cent of the cells compared to 7 per cent in the 1960 data used), and three cells spent zero on as common an item as food at home! In the light of the second section of Appendix C, these zeros were replaced with a value of 1.0 in the log regressions ($\ln(1) = 0$). As discussed in Appendix B and in several references cited there, the main advantage of using grouped data is that, when they are appropriately cross-classified, a better proxy for permanent income can be obtained. But this advantage is clearly dissipated as the cells become smaller and smaller in size. Since the average cell in these 505 observations contains approximately eleven households, the proxy for permanent income and expenditure on durable items will presumably contain greater measurement error.

The results of the regressions on the 505 observations for the detailed expenditures are given in Table D.1. (The housing variable here is the total shelter expenditure plus utilities, and so it is not comparable to the housing variable discussed in Chapter 6. The travel item here is the sum of the two travel items shown in Table 21.) The results can be compared with Table 21; the two items (other than housing) with the most important changes in income or education effects are travel and medical care. There does not appear to be any systematic shift in the income elasticity toward or away from unity (six items moved toward, six away), or in the education elasticity toward or away from zero (five toward, seven away). Given the constraint on the mean η and the mean ϵ_E, there cannot be any systematic shift upward or downward.

With these results approximately one-half of the items (or 42 per cent of total consumption) as compared with 60 per cent of the items

TABLE D.1

Regression Equations for Consumption Items, 1950 BLS Data, North Region, 505 Observations[a]

Dependent Variable	ln *Consumption*	ln *Education*	*Age*	*Family Size*	$\bar{R}^2$
Food (home)	0.507	−0.192	−0.001	0.021	.80
	(15.21)	(−4.82)	(−0.64)	(11.30)	
Food (away)	1.458	0.073	−0.010	−0.031	.52
	(15.79)	(0.66)	(−3.00)	(−6.12)	
Tobacco	0.762	−0.841	−0.033	0.010	.57
	(9.38)	(−8.67)	(−11.27)	(2.29)	
Alcohol	1.536	−1.323	−0.034	−0.008	.51
	(12.11)	(−8.74)	(−7.63)	(−1.18)	
Housing	0.758	0.240	0.009	−0.009	.75
	(25.11)	(6.67)	(7.88)	(−5.21)	
Household operations	1.352	0.460	0.013	−0.019	.85
	(34.29)	(9.77)	(9.27)	(−8.51)	
Housefurnishings	1.369	−0.450	−0.024	0.001	.74
	(18.64)	(−5.24)	(−9.02)	(0.24)	
Clothing	1.320	−0.138	−0.011	0.003	.92
	(39.01)	(−3.41)	(−8.98)	(1.62)	
Personal care	0.903	−0.108	−0.009	0.003	.89
	(31.12)	(−3.11)	(−8.26)	(1.73)	
Medical care	0.826	−0.002	0.001	0.006	.62
	(14.47)	(−0.03)	(0.29)	(1.90)	
Leisure	1.294	−0.154	−0.011	0.006	.89
	(31.09)	(−3.09)	(−7.74)	(2.38)	
Education	1.716	0.794	−0.001	0.014	.50
	(10.08)	(3.91)	(−0.19)	(1.48)	
Travel	1.500	−0.159	−0.010	−0.002	.74
	(20.81)	(−1.85)	(−3.76)	(−0.58)	

[a] t values are in parentheses.

(or 65 per cent of total consumption) are consistent with the neutrality model for education. The resulting implied elasticity of consumption income, measured as an average of $\epsilon_{iE}/(\eta_i - 1)$ over the items, and excluding the biased housing variable, is 0.219 unweighted or 0.019 weighted. These results are significantly weaker than those reported in Chapter 6. For the reasons discussed at the beginning of this appendix, it is felt that the results in Chapter 6 give a more accurate picture of the shifts in expenditure patterns as income or education changes.

2. THE GAINFULLY EMPLOYED

Of the 505 observations from the 1950 BLS data discussed in the previous section, sixty-nine concerned a group of families whose occupation was reported as "not gainfully employed." Since these sixty-nine differed significantly from the other 436 observations in several characteristics, they were omitted in the regressions discussed in this section.

For a comparison of the means of several characteristics of the two subsamples, see Table D.2. The results of the weighted regressions for goods and services are as follows (with t values in parentheses):

TABLE D.2
Selected Means and Coefficients of Variation for Subsamples of the 1950 BLS Data, North Region[a]

Variable	*All Households*	*Gainfully Employed*	*Not Gainfully Employed*
Family size			
Mean	3.0	3.1	2.4
Coefficient of variation	28	25	41
Age			
Mean	47	44	64
Coefficient of variation	20	15	10
ln Education			
Mean (antilog)	2.27 (9.7 years)	2.29 (9.9 years)	2.12 (8.4 years)
Coefficient of variation	13	13	13
ln Consumption			
Mean (antilog)	5.87 ($3,560)	5.94 ($3,810)	5.40 ($2,220)
Coefficient of variation	8	7	11

[a] Sample size is 505 observations for "all households," of which 436 were "gainfully employed" and 69 "not gainfully employed."

Item	ln *Consumption*	ln *Education*	*Age*	*Family Size*	$\bar{R}^2$
Goods	0.940	−0.082	−0.002	0.004	.983
	(90.58)	(−6.49)	(−4.64)	(6.54)	
Services	1.161	0.231	0.004	−0.009	.904
	(40.53)	(6.59)	(2.85)	(−6.11)	

The corresponding regressions for the thirteen items are given in Table D.3. Here, too, only 50 per cent of the items (or 42 per cent of total consumption) are consistent with the neutrality model. But although the unweighted average of ϵ_{Y_cE} of the eleven[1] relevant items is 0.206 and similar to the estimate above, the weighted average here is 0.098 and as such much more similar to the result in the text.

TABLE D.3

Regression Equations for Consumption Items, 1950 BLS Data, North Region,[a] (gainfully employed, 436 observations)

Dependent Variable	ln *Consumption*	ln *Education*	*Age*	*Family Size*	$\bar{R}^2$
Food (home)	0.5552	−0.2321	−0.0033	0.0190	.793
	(16.00)	(−5.46)	(−2.00)	(10.34)	
Food (away)	1.3384	0.2709	−0.0015	−0.0314	.431
	(13.40)	(2.13)	(−0.31)	(−5.72)	
Tobacco	0.7173	−0.7412	−0.0293	0.0066	.378
	(7.90)	(−6.66)	(−6.73)	(1.37)	
Alcohol	1.5854	−1.2466	−0.0357	−0.0133	.393
	(11.30)	(−7.25)	(−5.30)	(−1.79)	
Housing	0.7835	0.2007	0.0061	−0.0090	.734
	(22.81)	(4.77)	(3.68)	(−4.97)	
Household operations	1.3332	0.4882	0.0145	−0.0183	.835
	(30.71)	(9.18)	(6.94)	(−7.99)	
Housefurnishings	1.4797	−0.5166	−0.0279	−0.0054	.676
	(18.65)	(−5.31)	(−7.33)	(−1.30)	
Clothing	1.2284	−0.0630	−0.0053	0.0038	.899
	(35.26)	(−1.48)	(−3.17)	(2.05)	
Personal care	0.8414	−0.0634	−0.0060	0.0035	.850
	(27.61)	(−1.70)	(−4.10)	(2.18)	
Medical care	0.9525	−0.0960	−0.0047	0.0014	.618
	(15.53)[b]	(−1.28)	(−1.58)	(0.44)	
Leisure	1.3423	−0.2070	−0.0163	0.0034	.860
	(29.31)	(−3.69)	(−7.41)	(1.42)	
Education	1.8696	0.8447	0.0056	0.0137	.480
	(9.94)	(3.67)	(0.62)	(1.38)	
Travel	1.6103	−0.2615	−0.0172	−0.0036	.734
	(21.13)	(−2.80)	(−4.70)	(−0.89)	

[a] t values are in parentheses.

[b] Coefficient not statistically different from one (the t value for testing the difference from unity is −0.77).

[1] These two averages exclude the biased housing variable as well as the medical care item, since the income elasticity of the latter is not statistically different from unity.