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Harold W. Guthrie

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Measures of Relative Income for

Testing Theories of Consumer Behavior

Harold W. Guthrie

November 26, 1957

MEASURES OF RELATIVE INCOME FOR
TESTING THEORIES OF CONSUMER BEHAVIOR

Table 1 presents data on the expected relative income position of various

socio-economic groups in a form which has not yet been employed in tests of

Duesenberry's theory of saving. I shall attempt to show that these data are

relevant to this theory and that they provide a basis for tests of several

kinds of hypotheses relating/the interdependence of consumers' choices.
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Analysts of consumer behavior may find that these data can serve as a

frame of reference for studies of specialized groups, e.g., farmers, urban

families, etc., or that some of the hypotheses suggested here are amenable to

testing with other cross-section data.

The measures of relative income presented in Table 1 are calculated from

data collected in the Surveys of Consumer Finances conducted by the Survey

Research Center, University of Michigan, on behalf of the Federal Reserve

Board. These surveys obtain measures of total annual money income for spending

units, which are groups of related persons or individuals who operate as in-

dependent units in the disposition of income. When the total incomes reported

in a given year have been arrayed in order and divided into ten groups, each

containing 10 per cent of the sample, an income decile position is determined

for each spending unit, from 10 if the unit is in the highest income decile

to 1 if the unit is in the lowest. This establishes a measure of relative

income for the given year. With relative income positions determined in-

dependently for each year, surveys representing four years, 1947,1948, 1952

and 1953, have been pooled in developing the data presented in Table 1. Socio-

economic groups of spending units were defined by five classification variables:

race, region, occupation, education and age of the head of the spending unit. For each of the 154 groups, Table 1 shows mean income decile position, the standard error of the mean, the proportion of the universe, and the number of cases. For example, Table 1A shows that in the four surveys used there were 74 spending units representing about 0.6% of all spending units, the heads of which were white, living in the South, skilled workers with grade-school education or no education, and between 18 and 24 years of age. The mean value of the income decile positions for these spending units was 4.5 and the standard error of this sample mean was 0.3.

The Duesenberry theory is based upon a particular behavioral hypothesis which says, in effect, that the principal determinant of the level of consumer expenditures for an individual consumer is the frequency of the frustration he feels when he observes others enjoying higher levels of consumption than the level which he has attained. This postulate, with "frequency of frustration" translated into a ratio of the individual's consumption expenditures to a weighted average of other people's consumption expenditures, is the behavioral hypothesis on which the remainder of the theory is built. The conclusions evolved from the theory are that the aggregate propensity to save is invariant with aggregate income and that "cet. par. the propensity to save of an individual can be regarded as a rising function of his percentile position in the income distribution. The parameters of that function will change with changes in the shape of the income distribution." [1]

Empirical tests of the theory have been of two major types: (1) tests of the behavioral hypotheses or of other related hypotheses, and (2) tests based upon predictions derived from the conclusions reached by the entire theory.

More of the tests are of the former type than of the latter. Several tests
will be summarized very briefly here.

A. Duesenberry found support for the behavioral hypothesis in evidence
that the relative increase in income desired by consumers was negatively re-
lated to current income.

B. He found additional support for the behavioral hypothesis in the
fact that saving ratios among Negroes in New York and Columbus, Ohio were
higher than those among whites at the same income levels in the same cities.

C. Duesenberry tested the conclusion of the theory by measuring the
correlation of saving ratios with relative income position. He noted that
although saving ratios were highly correlated with relative income - and
therefore his hypothesis was substantiated - they were also highly correlated
with absolute income.

D. Duesenberry made another test of his conclusions against Kuznets'
long run data on saving ratios. He argued that all determinants of saving
other than income have tended to remain constant or to offset each other.
Absolute income increased over the period, but he found no evidence that
relative income distributions had changed. Thus the relative income theory
was judged to be consistent with the stable saving ratios, and the absolute
income theory of saving was judged to be inconsistent with these data.

E. Tobin compared the explanatory power of relative income and absolute
income and concluded that, particularly when asset holdings and credit avail-
ability were taken into account, absolute income was the better predictor of
saving ratios. He noted, however, that consumption behavior may depend on
both relative income and absolute income. Tobin's analysis was based in part

upon the same Negro-white comparisons used by Duesenberry, and in part upon
an analysis of consumption among a panel of farm families, 1940-1942.

F. In making comparisons of saving ratios among Negroes and whites.
Klein and Mooney used data representing the whole consumer sector rather than
data for selected cities. They did not compare the relative income and absolute
income hypotheses; they concentrated on multivariate relationships which used
demographic and attitudinal variables as well as economic variables. They
concluded that neither relative income alone nor absolute income alone is a
satisfactory determinant of saving ratios and that both measures as well as
other variables should be used in explaining saving ratios. [3]

G. Bilkey tested the conclusion of the Duesenberry theory of saving by
comparing the ratios of consumption expenditures to income with measures of
income inequality over a long period. He found that an increase in the
equality of income tended to be associated with a reduction in the expenditure
ratio, a result which is consistent with the conclusion of Duesenberry's
theory. [4]

H. Another test by Bilkey classifies types of expenditure as conspicuous
or non-conspicuous. The relative income theory (or emulation theory in Bilkey's
terminology) then predicts that as incomes become more equally distributed,
expenditures on conspicuous goods should decrease while expenditures in the non-
conspicuous category should increase. Again he found results which were
consistent with the relative income theory but which, in general, were also con-
sistent with the absolute income theory. [4]

When all of the tests are considered, the relative income theory seems to
be substantiated by tests based on the conclusions evolved from the complete
theory (C., D., G., and H. above). The evidence furnished by more direct tests

of the behavioral hypothesis is less convincing. The errors of estimation

present in the long-term data, and the statistical complications present in

the analysis of time series suggest that the affirmative tests must be supple-

mented by tests which use different methods and different data. It is not

my purpose here to offer further empirical analysis of the relative income theory.

We shall find, however, that the data in Table 1 suggest new tests which may

lead to useful results. We shall consider some characteristics of possible

new tests under three general categories, which are (1) the assumption of

homogeneity of the effect of interdependence, (2) partial vs. complete sector

coverage, (3) short vs. long period analysis.

The Assumption of Homogeneity of the Effect of Interdependence

In presenting his theory, Duesenberry noted that a consumer feels impelled

to consume by the fact that his associates consume goods which he does not

consume. The transition from this "demonstration effect" among associated con-

sumers to income percentile position as a measure of the effect of interdependence

is achieved by assuming a classless society in which interdependence is diffused

through the consumer sector in a fairly homogeneous fashion. With this assump-

tion the intensity of the demonstration effect depends upon how low or how high

a given family stands in an array of incomes.

There are, nevertheless, socio-economic classes in the United States, and

it is not obvious that interdependence between consumers in different socio-economic

classes is strong enough to justify the assumption of homogeneity. Table 1

indicates one possible definition of socio-economic classes. The implication

of the assumption for some consumers who are white, non-south, non-farm, of age

35 to 44 is indicated by the income decile positions for the following groups:

Group	Occupation	Education	Mean Income Decile	Mean Income Decile less 5.1
A.	Unskilled	Grade School	5.1	0
B.	Skilled	Grade School	6.8	1.7
C.	Professional	College	8.9	3.8

The assumption of homogeneity of the effect of interdependence implies that Group C exerts more than twice the upward pull on the consumer expenditures of Group A, than is exerted by Group B. Whether this assumption is true, and, if not, the extent to which the unreality of the assumption prejudices tests of the relative income theory are questions which can be answered by tests which use data describing relative income positions of sub-groups of consumers.

Further tests of the behavioral hypothesis can also take into account another aspect of the assumption of homogeneity of the effect of interdependence of choices among consumers. Katona has argued that motivations underlying consumer behavior are not uniform, that "multiplicity of motives, some re-enforcing one another, and some conflicting with one another, is more common." [5] It is interesting to note in view of Katona's position, a reversal of the relative income hypothesis in a finding by Whyte. In his description of the New Suburbia he says "The job, then, is not so much to keep up with the Joneses; it is to keep down with them." [6] Social pressures in these communities appear to push toward the middle those who deviate far from the norm of consumption. This phenomenon implies the existence of multiple and conflicting motives as mentioned by Katona. It is not immediately clear, of course, that "keeping down with the Joneses" places an upper limit on the consumption expenditures of individual spending units in the socio-economic groups shown in Table 1. It would be possible, however, to test hypotheses that there are such limitations by

comparing expenditure levels of consumers who have common relative income positions, but who belong to different social-economic groups.

Partial vs. Complete Sector Coverage

Three of the tests (B, E, and F) were concerned with differences in saving ratios between racial groups; yet these three tests arrived at conflicting results. One point of conflict results from Tobin's introduction of asset holdings and credit availability, which is one aspect of accounting for the effect of multiple motivation. The other point of conflict between the three tests is in the extent of coverage of the consumer sector. Both Duesenberry and Tobin used data drawn from only two northern cities. Klein and Mooney, on the other hand used cross-sector data (a sample of U.S. spending units) and one of their more interesting findings concerned differences in saving behavior between northern Negroes and southern Negroes. Certainly the availability of data places a severe restriction on the coverage of any test, nor is it desirable to avoid completely the use of data which is limited in coverage. It is nevertheless worthwhile to point out that tests performed on data which have very limited coverage contribute little to an evaluation of a theory of consumer behavior. The purpose of such a theory is to explain changes in aggregate measures of economic activity. Tests which concern small, isolated sub-groups serve well as bases for developing or modifying general hypotheses but we must look to cross-sector data for relatively complete tests of the theory.

Short vs. Long Period Analysis

Three tests to which the conclusions of Duesenberry's complete theory have been submitted use data which cover several decades (D, G, H). Tobin's analysis of farm families is the only test of the behavioral hypothesis which covers more than one year. He concluded that "additional continuous budget data are badly needed, covering urban as well as rural families and extending over a longer and more nearly normal period of years."

Ideal tests would appear to be those which allow comparisons over time but which use microeconomic data in order to relax, where appropriate, the assumption of homogeneity of the effect of interdependence.

Opportunities to perform tests which approach the ideal are now becoming available. The data gathered in the Consumer Purchases Studies conducted by the Bureau of Labor Statistics can be combined, imperfectly, to be sure, with the Surveys of Consumer Finances which have been conducted annually since 1946. These studies contain observations of a wide variety of promising explanatory variables, and they cover a range of time long enough to gain some insights into questions which involve stability of consumer behavior. In view of defects in aggregative data and in the statistical models for the analysis of time series, studies of this kind appear to be the best resources available for testing theories of consumer behavior.

Table 1A

Mean Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53[1]/

Education Grade-School or less: Age	White, South, Non-Farm				
	Professional, Managerial, Business, Clerical	Skilled	Unskilled	Other	Retired
18-24		4.5-.3			
		.6/74			
25-34		5.3-.2			
		.8/95			
35-44		5.1-.2			
		1.0/109			
45-54		5.3-.2			
		.7/71			
55-64					
		5.4-.3			
65+		.5/66			2.3-.2
					1.1/130

High-School: Age

18-24	3.5-.2	4.7-.3	3.1-.3	4.1-.5	
	.6/72	.5/61	.2/23	.2/20	
25-34	6.6-.2	6.4-.2	3.7-.3	4.7-.4	
	1.2/145	.9/112	.5/56	.4/45	
35-44	6.6-.2	6.5-.2	3.7-.2	5.1-.5	
	1.2/162	.7/87	.6/62	.4/38	

(continued)

Table 1A (continued)

Mean Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53[1/]

	White, South, Non-Farm Professional, Managerial, Business, Clerical	Skilled	Unskilled	Other	Retired
High-School: Age					
45-54	6.9-.2	7.0-.4	3.6-.3	3.5-.4	
	.9/137	.4/49	.4/42	.4/49	
55-64	6.3-.2	} 5.8-.5	2.4-.3	2.8-.3	
	1.1/148	.3/32	.2/20	.4/49	
65+	5.2-.5		1.7-.2	2.3-.2	3.2-.4
	.3/42		.2/19	.6/72	.3/36
College: Age					
18-24	3.8-.3				
	.3/38				
25-34	7.4-.2				
	.9/128				
35-44	7.9-.2				
	.8/127				
45-54	8.4-.2				
	.4/79				
55-65 }	7.2-.4				3.7-.5
65+	.4/66				.2/22

1/ Entries in Table 1 consist of $\frac{A-B}{C/D}$, where A = mean value of income decile
B = standard error of mean income decile   C = proportion of sample represented in the
D = number of cases   cell

Table 1B

Mean Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53

Education Grade-School or less: Age	Professional	Business Owners	White, Non-South, Non-Farm Managers, Officials	Clerical and Sales	Skilled	Unskilled	Other	Retired
18-24					4.2-.4	3.8-.5		
					.3/28	.2/24		
25-34					6.3-.2	4.9-.3		
					1.4/159	.4/47		
35-44					6.8-.1	5.1-.2		
					2.0/258	.7/80		
45-54					6.9-.1	4.9-.2		
					2.3/286	.9/112		
55-64					6.3-.1	4.0-.2		
					1.9/242	1.0/124		
65+					5.7-.3	3.3-.2	2.7-.1	
					.5/59	.6/70	2.7/326	

High-School: Age

	Professional	Business Owners	Managers, Officials	Clerical and Sales	Skilled	Unskilled	Other	Retired
18-24	3.3-.6	6.3-.9	3.9-.5	3.6-.1	5.0-.2	4.1-.3	3.8-.3	
	.4/7	.1/9	.1/8	1.4/202	1.2/146	.5/63	.3/32	
25-34	6.9-.3	7.1-.2	7.7-.3	6.3-.1	6.8-.1	5.3-.2	5.1-.3	(continued)

Table 1B (continued)

Means Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53

Age	Professional	Business Owners	White, Non-South, Non-Farm Managers, Officials	Clerical and Sales	Skilled	Unskilled	Other	Retired
High-School: Age								
	.3/39	.7/98	.3/43	1.8/239	3.7/451	.7/80	.5/63	
35-44	7.4-.3	7.7-.2	7.8-.3	6.7-.1	7.3-.1	5.6-.3	5.2-.3	
	.4/50	1.1/165	.4/58	1.4/209	3.0/382	.5/56	.5/68	
45-54	7.2-.5	7.5-.2	7.4-.3	6.9-.2	7.4-.1	4.9-.3	4.2-.3	
	.2/37	.9/143	.5/75	1.3/183	1.5/200	.4/47	.8/98	
55-64		6.5-.3	6.9-.4	6.3-.2	7.4-.2	4.7-.3	3.2-.2	
	7.1-.5	.7/106	.3/46	.8/120	.7/93	.3/40	1.3/161	
65+	.2/27	5.3-.4	5.3-.7	5.4-.5	5.5-.5	3.1-.4	2.2-.1	3.4-.2
		.3/47	.1/20	.2/27	.1/13	.2/21	1.6/197	.7/95
College: Age								
18-24	5.0-.3	**	7.8-1.1	4.2-.3	5.6-.6	↑	3.4-.3	
	.4/53		*/5	.3/52	.2/20		.4/61	
25-34	7.8-.1	9.0-.1	8.3-.2	6.6-.2	7.8-.2		5.3-.5	
	1.3/188	.3/51	.4/63	.8/120	.4/57		.2/24	
35-44	8.9-.1	8.9-.2	9.0-.2	7.6-.2	7.6-.3		7.1-.7	
	1.1/203	.4/73	.4/73	.5/79	.3/47		.1/16	(continued)

Table 1B (continued)

Means Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53

	Professional	Business Owners	White, Non-South, Non-Farm Managers, Officials	Clerical and Sales	Skilled	Unskilled	Other	Retired
College: Age								
45-54	8.2-.2	9.1-.3	9.2-.2	6.9-.3	7.6-.5	↑	6.5-.8	
	.9/166	.3/58	.4/64	.6/94	.2/27		.1/20	
55-64	8.3-.3				7.2-.3			
	.4/74 }	8.9-.3 }	9.0-.3 }	7.4-.3	.1/17	}	4.5-.6	
65+	7.3-.4	.3/48	.3/50	.3/41	**		.2/33	5.1-.4
	.2/39							.4/74

Table 1C

Mean Values of Income Decile Position

for Selected Spending Units,

1947-48 and 1952-53

Not White

Age	South Grade-School or less	South High-School or more	Not South Grade-School or less	Not South High-School or more	Farmers Grade-School or less	Farmers High-School or more
18-24	2.2-.2 .3/26	2.9-.4 .3/27	4.1-.9 .1/9	3.5-.3 .4/40	2.7-.5 .2/26	4.0-.5 .2/28
25-34	3.3-.2 .5/48	4.0-.3 .5/51	4.4-.3 .4/35	5.3-.2 .7/76	3.7-.3 .7/109	4.4-.3 .6/94
35-44	3.3-.2 .7/70	4.5-.6 .2/21	4.4-.3 .6/57	5.6-.4 .4/51	4.0-.2 1.3/205	4.8-.3 .8/113
45-54	3.0-.2 .6/58		3.9-.3 .6/58		3.8-.2 1.4/204	5.7-.4 .5/74
55-64	2.5-.3 .4/40	3.6-.6 .1/16	4.2-.5 .3/28	5.4-.4 .4/42	3.5-.2 1.3/213	5.2-.5 .3/49
65+	1.6-.2 .6/55		1.9-.3 .2/24		2.9-.2 .9/149	3.9-.6 .2/29

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