Consumer Incomes and Expenditures In the Newport-Toledo Area

SPECIAL REPORT 237
MAY 1967

Agricultural Experiment Station
Oregon State University
Corvallis

CONTENTS

Authors: K. C. Gibbs is Graduate Trainee in Water Quality Economics, Department of Agricultural Economics. H. H. Stoevener is Assistant Professor, Department of Agricultural Economics.

The authors are indebted to E. N. Castle, A. A. Sokoloski, and J. B. Stevens for their contributions to other economic aspects of this research.

The research reported here was supported financially by research and training programs in the economics of water quality sponsored by the Federal Water Pollution Control Administration. The grant numbers are WP-107 and 2TI-WP-71.

CONSUMER INCOMES AND EXPENDITURES IN THE NEWPORT-TOLEDO AREA

by

K. C. Gibbs and H. H. Stoevener

INTRODUCTION

Consumer expenditures are an important segment of the total demand faced by an economy. Nationally, 63% of the gross national product consisted of purchases by consumer households in 1964./1 This proportion is indicative of the important role assumed by household expenditures in affecting economic activity. The level of purchases by consumer units is determined largely by the income of these units. Knowledge of the relationship between these two variables is a prerequisite for analyzing the effects of various economic policies.

In this study we are concerned with estimating the relationship between household income and consumption in the Newport and Toledo area. In analyzing effects of economic policies upon economic activity in a small area such as this, household expenditures are an especially important component in the "multiplier" effect. Household expenditures, more so than many types of expenditures by business firms, are centered predominantly in the local economy. This makes possible future beneficial effects upon the economy under consideration.

Knowledge of household incomes in a certain area and of the relationship between those incomes and the distribution of household expenditures in the area is also useful to business firms for planning purposes. The profitability of investments often hinges upon the availability and interpretation of data on consumer incomes and spending in the market area.

Objectives

The objectives of this study were to determine (1) the relationship between income and consumption for the Newport-Toledo economy, both for aggregate consumption expenditures and for various expenditure categories, and (2) the relationship between consumption and other variables in addition to income.

/1 U.S. Bureau of the Census, Statistical Abstract of the United States, 1964. (Eighty-seventh edition) Washington, D.C., 1966, p. 320.

CONSUMPTION AND INCOME

Many economists have developed hypotheses about the existence of a relationship between consumption and income. Keynes, who was the first to state explicitly that consumption is a particular function of income, asserts that consumption depends primarily upon real income. All other determining factors are given and held constant. He states a fundamental "psychological law" that "men are disposed, as a rule and on the average, to increase their consumption as their income increases, but not by as much as the increase in their income."/2

Duesenberry/3 states that the savings rate depends not on the level of income but on the relative position on the income scale, in his "relative income hypothesis." Friedman,/4 on the other hand, says that incomes tend to fluctuate from period to period while consumption exhibits more stability. From this he argues that consumption must depend more closely on the average income over a number of periods, rather than the current income in any given period.

The discussion above indicates that the analysis of consumption is a very complex matter and that consumption spending does not stem from merely current income, but rather involves some complex average of past and expected incomes. The fields of economics, psychology, and sociology all can add to the explanation of consumer behavior; however, the problem of measurement still prevails. It is very difficult to determine a person's relative income, for example, in a given year. This study used current disposable income as the variable that determines current consumption. Of the hypotheses listed, the one used in this study is most closely related to that of Keynes.

THE STATISTICAL CONSUMPTION FUNCTION

The consumption-income relationship can be observed in two ways. There is the historical record of the relationship between income and consumption in different years, and there are also family budget studies which show how much is consumed and saved at different levels of income during a given period of time.

The historical consumption-income relationship exhibits the relationship of consumption to income over a number of years. It indicates how consumption can be expected to respond to income changes in the future, both the short-run

---

/2 John Maynard Keynes. The General Theory of Employment, Interest and Money. New York, Harcourt, Brace and World, 1935, p. 96.

/3 James Duesenberry. Income Savings and the Theory of Consumer Behavior. Cambridge, Massachusetts, Harvard University Press, 1949.

/4 Milton Friedman. A Theory of the Consumption Function. Princeton, National Bureau of Economic Research, 1957.

and the long-run. Observation of the consumption-income relationship entails the use of time-series data.

The cross-sectional consumption function is obtained by observing household budgets. A sample of families with different incomes in a particular period is used. Given this distribution of family incomes, the relationship portrays the manner in which consumption and savings vary with the level of family income at any given time. Cross-sectional data were used as the basis for this study, principally because data on consumption and income for past years were not available for this area.

Selection of the Sample

Area of study

This study was based on the Yaquina Bay area located in Lincoln County, Oregon (Figure 1). The area contains approximately 220 square miles, with an estimated population of 14,630./5 The geographic distribution of population centers is indicated in Table 1. For example, in the Agate Beach division the populations of four cities are recorded: Newport, South Beach, Agate Beach, and Otter Rock. These towns contain approximately 5,994 of the 7,594 people in the division. The remaining 1,600 reside in the rural areas or in towns with fewer than 50 inhabitants.

Using the 1960 census estimate of an average of three persons per household, there is a total of 4,876 households in the Yaquina Bay area. Table 1 also shows the number of households in each of the census divisions.

The two main cities in the area are Newport and Toledo. Newport is located at the mouth of the Yaquina estuary, has about 5,300 occupants, and is the county seat of Lincoln County. Newport has an adequate harbor for commercial fishing boats and for ocean-going vessels, and some of the commercial catch of fish is processed there. Many sports fishing boats also use this harbor. Because of the availability of water-related recreational resources, its access to inland Oregon, and its location on a major north-south tourist highway, Newport has developed the tourist trade as its prominent industry.

The other major city in this area is Toledo. Toledo, with a population of about 3,100, is located on Yaquina Bay about 10 miles inland from the ocean. Unlike Newport, the lumber industry dominates this town.

The area surrounding Newport and Toledo was included in the study to define approximately the labor market for commercial establishments in the two cities. This delineation makes the study area economically more self-sufficient than it would be if its borders were drawn closer to the two principal towns.

/5 This was estimated by the use of 1960 census data.

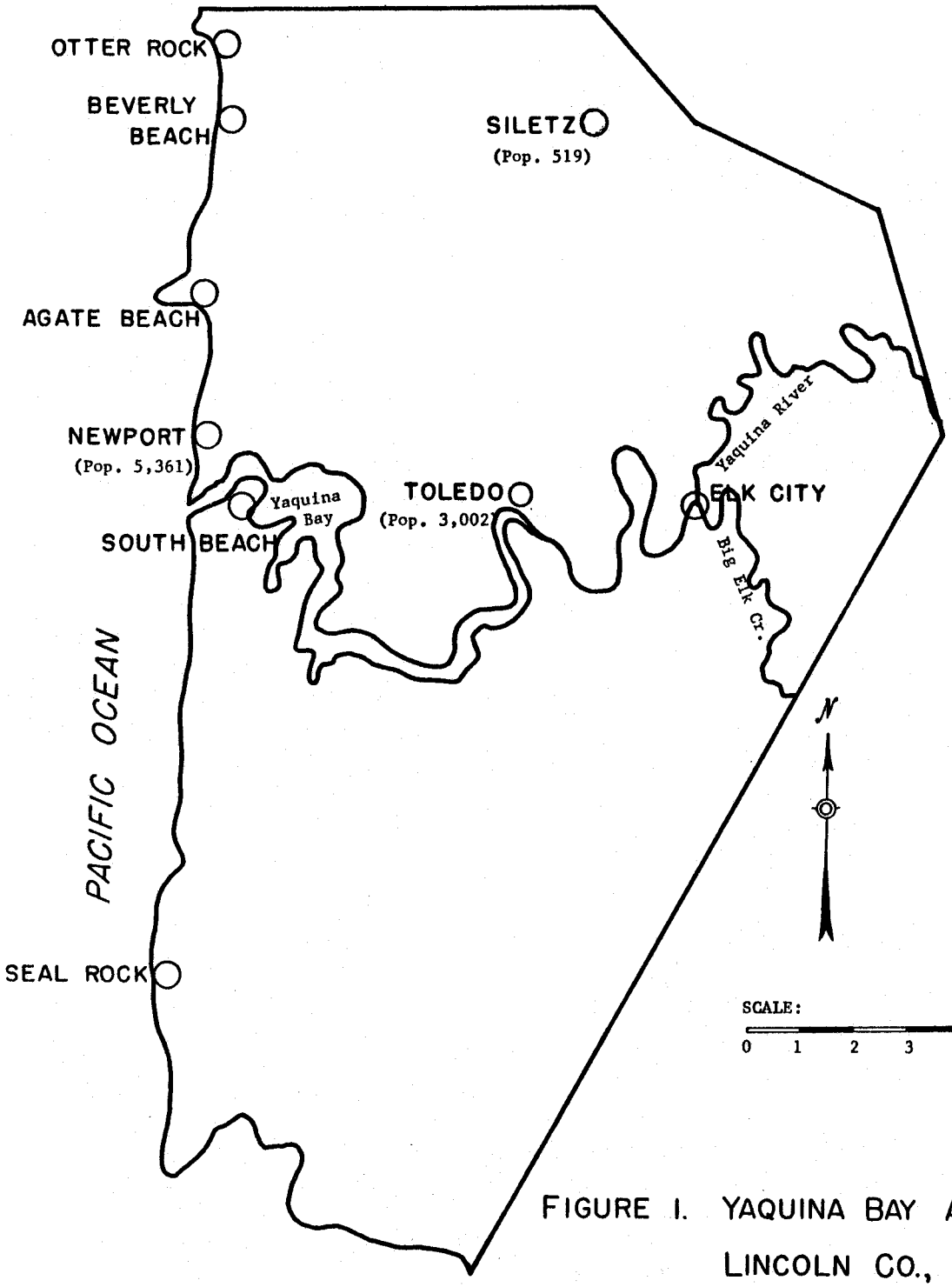

FIGURE 1. YAQUINA BAY AREA, LINCOLN CO., OREGON

Table 1. Population of Yaquina Bay Area by Unit Divisions, 1960

Geographic unit	Population	Households
Agate Beach division:		
Newport	5,344	1,781
South Beach	300	100
Agate Beach	300	100
Otter Rock	50	17
Other/a	1,600	533
Toledo division:		
Toledo	3,053	1,018
Elk City	50	17
Other/a	2,250	750
Siletz division:		
Siletz	583	194
Other/a	400	133
Waldport division:		
Seal Rock	240	80
Other/a	360	120
Eddyville division:		
Other/a	100	33
Total	14,630	4,876

/a Rural areas and towns with fewer than 50 inhabitants.

Source: U.S. Bureau of the Census - U.S. Census of Population: 1960. General population characteristics, Oregon. Final report, PC(1)39A. Washington, D.C., 1961, pp. 1-20.

Sampling

A sampling scheme known as "area sampling" was employed in this study. The selection of sample households proceeded as follows: A starting place was chosen at random for each of the city precincts, as well as for the rural areas; for example, the third house from the northeast corner. The interviewer then began at the designated place and continued interviewing at every k^{th} dwelling unit until the designated quota was obtained. This technique provides a stratified, systematic sample of households with a starting place chosen at random. A total of 199 households were interviewed in this area.

The estimated total income in this economy for 1964 is $24,808,000, while the estimated total expenditures by all households in the area is $19,077,000. The average income per houshold was estimated at $5,652, with a standard deviation of $3,323. That means about 68% of the household disposable incomes lie between $2,329 and $8,975. The lowest household income was less than $800, while the highest was about $27,000. This gives an indication of the variability of incomes in the Newport-Toledo area.

Analysis of Income-Consumption Relationship

Two regression equations were fitted to the data by use of the method of least squares. First a linear function was considered, and then a curvilinear function. The latter contains the same variables as the former, but it also includes a squared term of the income variable. The equations were computed for each of 17 expenditure categories and for the total economy. The choice of the functional form is not a matter of logic but is an empirical decision. The functional form was chosen on the basis of the "best fit" by testing to see if there was any significant difference in the percent of the variation explained by the regression equation of one function compared to the other./6

It should be mentioned here that in the case of the linear function, the ratio of change in consumption given a change in income, known as the marginal propensity to consume (MPC), will be constant regardless of the level of income. This is not the case, however, with the curvilinear function. The MPC will vary according to the level of income, i.e., the additional amount consumed given an additional dollar of disposable income would depend on the financial position of the household.

Results will be discussed in two general parts of this report. First the consumption-income relationship, using current disposable income and current household consumption, will be treated. In the second part, the relationship

---

/6 For details about the statistical tests see:

Kenneth C. Gibbs. "An Empirical Analysis of Consumer Spending in the Area of Newport and Toledo, Oregon." Unpublished M.S. thesis, Department of Agricultural Economics, Oregon State University, 1966, p. 37.

between consumption and income and three additional independent variables will be discussed.

Consumption as explained by income

The general form of the regression equation in the first part is as follows:

$$C_i = a + bY$$

where: C_i is the current household consumption in the i^{th} sector, or expenditure category, and Y is the current disposable income of the household, i.e., the gross income of the household less income taxes paid during 1964. The definition of household used in this study is: (1) a group of people usually living together who pool their incomes and draw from a common fund for their major items of expense, (2) a person living alone, and (3) a person who is financially independent but lives with others, i.e., his income and expenditures are not pooled.

The various sectors of consumption expenditures are enumerated below.

Product-oriented wholesale and retail sector. A few examples of consumption items in the product-oriented wholesale and retail sector are groceries, clothing, shoes, home furnishings, flowers, jewelry, electricity, gas, and feed and seed. The average amount consumed per household for these items was $2,092. The average propensity to consume (APC), i.e., the ratio of consumption expenditures to disposable income, at an average income of $5,652, is .37. That is to say, 37% of an average household's income will be spent for goods and services in this sector./7 The positive relationship between expenditures in this sector and current income does not seem unrealistic. As the level of income increases, more furniture, jewelry, shoes, clothing, and the like will be purchased.

Service-oriented wholesale and retail sector. The service-oriented wholesale and retail sector includes such consumption items as services from barber shops, beauty shops, laundries and dry cleaners, nonprofit organizations, painters, plumbers, and hospitals. The marginal propensity to consume is .058, while the average propensity to consume at an average level of income is .066.

/7 The estimated equation pertaining to the product-oriented sector is:

$$C_p = \underset{(.026)}{\$1{,}015.13 + .19Y}$$

where C_p is the amount of consumption per household for items in the local product-oriented wholesale and retail firms during 1964, and Y is the household disposable income for 1964. The figures in parentheses accompanying this and subsequent equations are the standard errors of the coefficients.

The average amount consumed in this sector was $374. Thus, if a household had an income of $5,652, it would be expected to consume about 6.6% of its income, or $374, for services in this sector./8

Again, for the service items combined in this expenditure category one would expect a positive relationship between income and expenditures. Expenditures for entertainment and contributions to nonprofit organizations are readily curtailed at low-income levels and expanded as incomes rise. The services of plumbers and painters may be substituted for "do it yourself" labor as incomes rise.

Local government sector. The local government sector includes expenditures for water and sewage, real estate property taxes, and personal property taxes. The word "consumption" in this context may be misleading. Households make payments to the local government in the form of taxes for the services it provides, i.e., for police and fire protection, education, water and sewage disposal, and so forth. The amount paid to the local government by households is an inadequate measure of the amount of government services consumed by them; however, this amount was used as an approximation of the "consumption" of local government services.

The average amount spent for local government services was $231, with the APC at an average income of .04./9 That is, at an income level of $5,652, a household would be expected to spend approximately 4% of its income for local government services. The MPC is .028; thus, if an additional dollar of disposable income were given to a household, on the average about 2.8 cents of it would be paid to the local government.

Cafes and taverns sector. The cafes and taverns sector consists of local consumption in the cafes, restaurants, and bars. The average amount spent in this sector was $218. There was a high degree of variability of the amount consumed per household in this expenditure category.

The conclusion reached concerning this sector is that, on the average, a household in the Newport-Toledo area spends about 3.9% of its income in the

---

/8 The function chosen for this sector is linear, as:

$$C_s = \underset{(.0095)}{\$48.47 + .058Y}$$

where C_s is the amount of consumption in the service sector by a household in 1964.

/9 The estimated equation for this sector is:

$$C_g = \underset{(.004)}{\$74.72 + .028Y}$$

where C_g is the amount "consumed" per household in the local government sector.

cafes and taverns sector, while if the household had an additional dollar available, it would spend approximately another 4 cents in this sector./10 It is interesting to note that among the various expenditure categories analyzed, expenditures in the cafes and taverns sector were the only ones for which the APC did not exhibit a tendency to decline as incomes rose.

Automotive sector. The average amount spent in this sector was about $619, with a standard deviation of $847. This includes purchases from service stations, automobile dealers and repair shops, auto supply stores, and motorcycle sales and service establishments. It was concluded that a positive relationship exists between current disposable income and household consumption in this sector./11

The MPC for this sector is .072 for any level of income. This indicates that if, on the average, a household's income went up by one dollar the amount consumed in the automotive sector would increase by 7.2 cents. Such a relationship can readily be explained. Households with higher incomes are likely to maintain more automobiles or more expensive ones and are likely to use them more often than lower-income households. This will result in higher expenditures for car purchases, gasoline, repairs, tires, and so forth.

The APC at the average level of income is .11, and will decrease as the level of income is increased. Thus, a smaller percent of the disposable income will be consumed in this sector by the higher than by the lower-income households.

It is worth noting that more than 87% of the households in the sample made expenditures in this sector. There was a relatively wide range in the amount spent, as can be seen by the high standard deviation.

Communication and transportation sector. Expenditures in this sector are for such consumption items as newspapers, local trucking, telegrams, television cable, shipping, railroad, and taxis.

/10 The equation that best fits this data is:

$$C_e = -\$25.20 + .043Y \quad (.017)$$

where C_e is the dollar value of consumption in the local cafes and taverns in 1964 per household.

/11 The linear function was chosen as:

$$C_{ss} = \$.0002 + .0716Y \quad (.017)$$

where C_{ss} is the consumption for goods and services purchased from the firms in the automotive sector per household during 1964.

A relationship between these expenditures and disposable income exists, with an average amount spent of about $118./12 If, on the average, a household's income is changed by one dollar, the amount consumed in this sector would be expected to change by about one cent. The APC at an average income was computed to be about .02 and is a decreasing function of disposable income.

These conclusions seem logical, since the households with the higher income will be more likely to use the television cable, subscribe to more newspapers, and use the taxi more than the household with a mere subsistence income. There were very few zero entries in this sector, indicating that most people paid for some of these services during 1964.

Professional service sector. These expenditures include such consumption items as services from physicians, dentists, attorneys, optometrists, veterinarians, accountants, and architects.

The average amount consumed for services in this sector was about $109. It is expected that as the income of a household increases, the amount appropriated for professional services will increase, especially in services from architects, accountants, and attorneys.

The MPC at any income level is .014, while the APC at an average level of income is .02./13 The MPC is constant regardless of the income level, while the APC declines as disposable income increases.

Banks and loan agencies sector. Interest and other miscellaneous charges paid to banks, finance companies, or credit and adjustment companies will be accounted for in this sector. There was an average of approximately $185 per household spent for these purposes in 1964.

/12 In this sector the linear function was used because it explained the data better statistically:

$$C_c = \underset{(.002)}{\$53.47 + .014Y}$$

where C_c is the amount consumed per household in the communications and transportation sector in 1964.

/13 The equation that fits the data for the professional sector best is the linear one:

$$C_{ps} = \underset{(.003)}{\$28.11 + .014Y}$$

where C_{ps} is the consumption per household in the professional sector during 1964.

At an average level of income the MPC is approximately .048, while at an income level of $20,000 the MPC is -.05./14 Thus, since the MPC decreased as incomes increased and went from a positive to a negative value, there must be a level of income which is associated with an MPC equal to zero. The MPC is positive up to an income of $12,717, while after this level of income the MPC is negative, i.e., given an additional dollar of income, consumption for these purposes will be reduced. The result of the negative slope of the consumption function at high levels of income seems consistent. As a household's income increases beyond a certain level, less money will have to be borrowed at banks and loan agencies; also, smaller charges will be due for checking account services. On the other hand, at lower income levels there is a positive relation between household disposable income and consumption in the banks and loan agencies sector. One would expect that a household's capacity to utilize these financial services would increase in the low to medium income range. At an average income level, a household is expected to spend about 3% of its income for items in this sector.

Other sectors. Household expenditures in the following business categories were also analyzed: lumbering, fisheries, construction, agriculture, pulp and paper manufacturing, other manufacturing, hotels and motels, and marinas and marine supply firms. As could be expected, no significant relationship was observed between these types of expenditures and the level of household income. The kinds of businesses listed above derive their incomes largely from other businesses either inside or outside of the study area, or from private individuals who do not reside in the Newport-Toledo area. Business expenditures and private expenditures made by individuals who do not reside in the Newport-Toledo area were excluded from the study.

Households also purchase goods and services from other households. Such expenditures were analyzed, but again no significant relationship was found to exist between these and the level of household income.

Total of all sectors. This includes all consumption items previously mentioned; it is the sum of the 17 local sectors. The average amount spent per household in 1964, in the Newport-Toledo area, was $4,347./15

/14 The relationship of current disposable income to consumption in this area is explained by a curvilinear regression line:

$$C_b = -\$164.35 + .088Y - .00000346Y_d^2$$
$$\qquad\qquad\quad (.022) \qquad (.0000014)$$

where C_b is the amount consumed in the bank and loan agencies sector per household in 1964.

/15 The curvilinear function was chosen as the one that best explained the data:

$$C_t = \$699.57 + .82Y_d - .000023Y^2$$
$$\qquad\qquad\quad (.111)^d \qquad (.0000068)$$

where C_t is the total amount of consumption in the Newport-Toledo area per household during 1964.

The APC is .769 for an average income level, i.e., a household with a disposable income of $5,652 would be expected to consume approximately 77% of its income in the Newport-Toledo area. The remaining 23% would either be saved or consumed outside of the area. As the level of income increases, the APC decreases.

The MPC declines as the level of income rises. If an additional dollar of income were made available to a household at the average income level ($5,652), one would expect that 56 cents of it would be spent in the study area. A higher percentage would be spent locally for income increases at lower income levels. For example, a household receiving an additional dollar of income when it has only $2,000 available annually for consumption would be expected to spend 73% of it locally. On the other hand, at incomes larger than $17,826 it is expected that when given an incremental increase in income, a household would actually spend less in this area, but not as much less as the increase in income.

It is interesting to speculate about the possible reasons for the nature of this relationship. Two explanations suggest themselves. First, as incomes increase, the marginal propensity to consume goods, regardless of their place of purchase, may decline. This means that proportionately larger amounts of income increases go into savings at higher income levels than at lower income levels. Given the use of cross-sectional data in the study, this explanation does not seem unreasonable.

Another reason for the curvilinear relationship in this consumption function may be found in the definition of the consumption variable. As will be recalled, the latter reflects only consumption expenditures made in the Newport-Toledo area. It may be that as incomes rise, a greater proportion of consumption expenditures is made outside the local area. Goods and services which are not available locally may be relatively more important in the households with larger budgets than in those with smaller ones. Expenditures for higher education may be an example of this. It may also be possible that households with relatively high incomes exercise a preference for shopping in retail markets which are larger than those available in the study area.

Two warnings should be issued at this point about the interpretation of these consumption function results. First, few observations of household incomes higher than $17,000 were made; thus, not much reliability should be placed on the consumption-income relationship past this point. Second, the implications of the cross-sectional consumption function are crucial for making certain predictions about consumer behavior. Cross-sectional analysis involves the observation of consumer spending patterns carried out by households at different income levels. It may be argued that the estimated functional relationship is a good indicator of the change in behavior of one income group as its financial position changes to that of another income group. Cross-sectional data are an inadequate basis, however, for making predictions about consumer behavior when overall changes in incomes occur which leave a household's <u>relative</u> income unchanged.

The empirical results presented up to this point are summarized in Table 2.

Table 2. Consumption by Sector, Marginal Propensity to Consume, Average Propensity to Consume, and Form of Consumption Function (Newport-Toledo Households, 1964)

Sector	Average amount spent/a	Additional amount consumed given an additional dollar of income (MPC)/b	Percent of income consumed (APC)/b	Functional form
	$	¢	%	
Product	2,092	19.0	37.0	Linear
Service	374	5.8	6.6	Linear
Lumber	--	--	--	No relation
Government	231	2.8	4.1	Linear
Hotel, motel	--	--	--	No relation
Cafes & taverns	218	4.3	3.9	Linear
Marinas & supply	--	--	--	No relation
Fisheries	--	--	--	No relation
Automotive	619	7.2	11.0	Linear
Communication	118	1.4	2.1	Linear
Professional	109	1.4	1.9	Linear
Banks & loan	185	4.8	3.3	Curvilinear
Construction	--	--	--	No relation
Agriculture	--	--	--	No relation
Households	--	--	--	No relation
Pulp & paper	--	--	--	No relation
All other mfg.	--	--	--	No relation
Total local	4,347	56.03	76.9	Curvilinear

/a Includes expenditures in those categories only in which the average amount spent was sufficiently large for the relationship with income to be significant.

/b Computed at an average income of $5,652.

Consumption as explained by income and other variables

In the theories of consumer behavior, income is singled out in one form or another as the most important variable in explaining consumption. All other factors are "held constant." Some of these "other factors" are now considered as independent variables (Table 3).

Table 3. Independent Variables Used, Their Means and Standard Deviations

(Newport-Toledo Households, 1964)

Symbol	Variable	Average value of variable (Standard deviation of variable)
x_1	Number living in the household during 1964	3.58 (1.77)
x_2	Number of full-time wage earners in the household in 1964	.90 (.56)
x_3	Age of the head of the household in 1964	42 (18)
x_4	Current disposable income per household in 1964	$5,652 ($3,323)

Each sector was analyzed separately and in each case the independent variables were chosen as the ones thought to have a relationship with consumption in that particular sector. The regression equations were computed using those variables thought to be relevant.

In some of the sectors the independent variables were entered as squared terms, merely indicating that the relationship was curvilinear rather than linear. The statistical procedure used previously was employed here to determine which functional form fit the data best.

The following discussion is devoted to the variables chosen on a sector by sector basis and to the conclusions drawn about those sectors which utilized variables different from those used in the first method. The average amount consumed in each sector was the same as in the method discussed previously.

Product-oriented wholesale and retail sector. The two independent variables chosen in this sector were X_1, the number in the household, and X_4, current disposable income./16

Their relation can readily be justified. As the size of the family increases, more money will be spent for food, clothing, shoes, and other household items; thus, a positive relationship exists between X_1 and consumption in this sector. The relationship of disposable income to consumption in the product-oriented sector has already been established.

If the size of a household is held constant and the income were increased by one dollar, the household would be expected to consume approximately 11.9 cents additional in this sector. On the other hand, if the income level is held constant while the number in the household is increased by one, it is expected that an additional $275 will be consumed in this sector.

Service-oriented wholesale and retail sector. The same independent variables that were assumed to be significant in the products sector were chosen in this sector, for similar reasons./17

In this case, the relationship is linear with respect to the level of income but curvilinear with respect to the size of the household. If the size of the household is held constant and the level of income is increased by one dollar, then an additional 4.6 cents will be consumed in this sector. If, on the other hand, the level of income is held constant and the size of the household is changed from two to three, then an additional $18 will be consumed in this sector. The curvilinear relationship between household size and expenditures in this category indicates that larger additions to consumption for a unit-increase in household size are made in large households than in small ones.

Automotive sector. Disposable income and the number of full-time wage earners were chosen as the independent variables in this sector. If the number of wage earners increased, increased expenditures for commuting to work probably would be reflected as consumption in this sector. If, on the average, the level of income is held constant and the number of full-time

---

/16 The regression equation is:

$$C_p = \underset{}{\$343.96} + \underset{(46.585)}{274.66X_1} + \underset{(.021)}{.119X_4}$$

where C_p is consumption in the product-oriented sector.

/17 The data from the sample support this hypothesis. The equation is:

$$C_s = \underset{}{\$1.34} + \underset{(1.745)}{3.62X_1^2} + \underset{(.006)}{.046X_4}$$

where C_s is the amount consumed in the service sector per household.

wage earners increases by one, then an additional $236 would be consumed in this sector./18

Professional services sector. The main expense items in this sector are for services provided by physicians and dentists; thus, it was thought that the level of income, the size of the household, and the age of the household head were appropriate independent variables. It should be noted that the age variable, X_3, was not found to be significant./19 This can be attributed, in part at least, to the fairly high correlation between the variables X_1 and X_3. When X_1 is entered into the solution, most of the variation is explained, i.e., X_3 accounts for very little additional unexplained variation.

If the level of income is held constant and the size of the household is allowed to vary by one person, then it is expected that consumption in this sector will change on the average, by $15.

Total of all sectors. Two independent variables were chosen as relevant for consumption in the Newport-Toledo area: household size and disposable income.

If the level of income were held constant and the size of the household increased from two to three, an additional $204 would be expected to be consumed in this area per household, while if the size changed from four to five, $368 additional could be expected to be consumed./20 Thus, total local consumption is a function, increasing at an increasing rate, of the household size. If the size of the household were fixed and the level of income increased from $2,000 to $3,000, then, on the average, an additional $502 could be expected to be consumed in the area. If, however, the income level changed from $10,000 to $11,000, one could expect only $310 more to be consumed in this area. That is to say that total local consumption is a function, increasing at a decreasing rate, of disposable income.

/18 The following equation was estimated:

$$C_{ss} = \underset{}{\$143.01} + \underset{(114.54)}{236.25}X_2 + \underset{(.016)}{.041}X_4$$

where C_{ss} is consumption in the automotive sector per household.

/19 The equation that exhibits the relationship of these items is:

$$C_{ps} = \underset{}{-\$5.01} + \underset{(5.550)}{15.04}X_1 + \underset{(.00025)}{.00937}X_4$$

where C_{ps} is consumption in the professional services sector.

/20 The computed equation is:

$$C_t = \underset{}{\$726.79} + \underset{(10.184)}{40.89}X_1^2 + \underset{(.0924)}{.562}X_4 - \underset{(.0000048)}{.000012}X_4^2$$

where C_t is the total amount consumed in the Newport-Toledo area per household.

SUMMARY

This study had a two-fold objective: (1) to determine the relationship between income and consumption for the Newport-Toledo economy, and (2) to determine the relationship between consumption and other independent variables, in addition to income. The economy of this area was segregated into 17 expenditure categories. A sample of households was chosen, and each one was personally interviewed to determine its income and the corresponding amount of consumption in each of the expenditure categories for the year of 1964.

The results of this analysis fall into two main categories. The first deals with the consumption-income relationship. This method had two variables: current disposable income was the independent variable, and current annual expenditures for 1964 the dependent variable.

The equation computed for the total local consumption was:

$$C_t = \$699.57 + .82Y_d - .000023Y_d^2$$

where C_t is the total local consumption per household and Y_d is the current disposable income of the household. The average level of income in this area was approximately \$5,652, which projects an estimated total income in the economy of \$24,808,000. The average amount spent per household in 1964 was \$4,347; there was an estimated total expenditure in the Newport-Toledo area of \$19,077,000. The previous figures indicate that about 77% of the income of the total area was spent within the area.

The second category in which the results were classified is the relationship between consumption and three additional independent variables. The dependent variable was current annual expenditures for 1964. The independent variables were chosen, from a list of four, for each sector individually. The four possible variables were: the size of the household; the number of full-time wage earners; the age of the household head; and current disposable income. Four sectors, namely product, service, automotive, and professional, were found to exhibit a relation significantly different from that when disposable income was the only explanatory variable. The equation derived for total local consumption was:

$$C_t = \$726.79 + 40.98X_1^2 + .562X_4 - .000012X_4^2$$

where X_4 is current disposable income, X_1 is the size of the household, and C_t is the total local consumption per household. Total local consumption is a function, increasing at an increasing rate, of household size. On the other hand, however, total local consumption is a function, increasing at a decreasing rate, of disposable income.