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RESPONSE OF FARM FAMILY LIVING EXPENDITURES
TO FLUCTUATING INCOME

by

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BACKGROUND

Consumption may be considered as the final goal of the whole economic process. Broadly considered, consumption means the converting of production into goods and services for human joy and living. The rural home may be conceived of as a consuming institution and the farm as a producing institution, and together they become a mode of living quite as much as a means of livelihood. On many farms consumption expenditures are in competition with the expenditures for the requirements of production. Historically, most of the new capital in agriculture has been financed by farmers from their own incomes and savings.^{1/} Capital formation in agriculture is heavily weighted by the time dimension. Farm families often accumulate much of their capital by a gradual incremental process.^{2/}

Thus the standards and habit of living of farm families have an important influence on the conditions under which farm capital is accumulated.

* The research for this paper was part of a farm finance study at Purdue University under Project No. 987. Helpful comments and suggestions have been received from J. H. Atkinson and G. E. Schuh.

1/ Tostlebe, Alvin S., Capital In Agriculture: Its Formation and Financing since 1870, Princeton University Press, 1957, p 19.

2/ Raup, Philip M., "Farm Family Capital Accumulation and Investment Process", Capital and Credit Needs in a Changing Agriculture, edited by E. L. Baum, et. al., The Iowa State University Press, Ames, Iowa, 1961, pp 163-176.

Capital accumulation requires an excess of production over consumption. It is only when income is in excess of the amount necessary to maintain labor, management, and family replacements, and to achieve the currently socially acceptable level of family living, that capital accumulation can take place or debts incurred for capital expansion can be repaid.^{3/}

Social writers emphasize that standards of living are social forms of behavior, embracing not only consumption of the economic goods, but also the consumption or use of a wide range of non-material elements. The possibilities of the standard of living for individual families are largely determined by the common standard of living, which imposes a general limitation on the competition for the requirements of production. Certain groups of families will delay some consumption until "the farm is paid for," or "until it can be afforded." There appears to be some relationship between the distribution of the items of the budget and the position of the family on the social scale.^{4/}

Studies have shown quite low income elasticity of living expenditures.^{5/} Undoubtedly, this low elasticity is partly due to the impervious demands for consumption goods arising from actual physical needs. However, many estimates are biased on the low side by the method of the studies. These studies have been based on cross sectional data, with very few considering data for more than one year. Farm incomes are noted for their variability.

^{3/} Spitze, R. G. F., "Determinants of Capital Formation", Capital and Credit Needs in a Changing Agriculture, Ed. E. L. Baum, et. al., 22-23, The Iowa State University Press, Ames, Iowa, 1961.

^{4/} Kolb, John H., and Edmund de S. Bruner, A Study of Rural Society, Chapter 17, "Standards of Living and the Rural Home", 283-311, Houghton Mifflin Company, 1952; Katona, George, Psychological Analysis of Economic Behavior, McGraw Hill, New York, 1951, 160-1; and Brady, Dorothy S., "Family Savings in Relation to Changes in the Level and Distribution of Income", Studies in Income and Wealth, Vol. XV, 1952, 101-130.

^{5/} Cochran, W. W., "Farm Family Budgets -- A Moving Picture", Review of Economics and Statistics, XXIX, 3, Aug., 1947, 189-198, and Longmore, T. W., and C. C. Taylor, "Elasticities of Expenditures for Farm Family Living, Farm Production, and Savings, United States, 1946", Journal of Farm Economics, XXXIII, 1, Feb., 1951, 1-19.

In any year an individual's income will contain both a permanent component and a transitory component.^{6/} Families tend to base their consumption on the permanent component of their incomes. Low income groups will contain some families who have negative transitory components in income but who base their consumption expenditures on the expected permanent component which is greater than their actual measured income. Conversely, high income groups will contain families with positive transitory income components who do not increase their consumption expenditures proportionately with their increased incomes. In addition, a random sample will contain some retired or semiretired people who plan to dissave or disinvest to maintain their standard of living. This situation is partially confirmed by the typical pattern of expenditures greater than income in low income groups.^{7/}

The pattern of family living expenditures may be considered as the sum of two separate expenditure patterns: (1) the relatively continuous expenditure for food, clothing, shelter, and household expenses, and (2) the discrete expenditure for durable goods and emergency situations.^{8/} Investigators have found relationships between the expenditures for durable goods and changes in income.^{9/} Thus, while the first category may be

^{6/} The permanent component of a variable annual income may be described as an "average" or "trend" income which the family "expects" annually over a period of several years. The transitory component is the amount by which actual income exceeds or falls short of the "expected" income.

^{7/} Reid, Margaret G., and Marilyn Dunsing, Effect of Variable Incomes on Level of Income-Expenditure Curves of Farm Families, Review of Economics and Statistics, XXXVIII, 1, 90-95, Feb., 1956.

^{8/} Fisher, Janet A., "Income, Spending, and Saving Patterns of Consumer Units in Different Age Groups", Studies in Income and Wealth, XV, 1952, 75-102.

^{9/} Deacon, Ruth E., Study of Methods for the Analysis of Family Financial Adjustments from Year to Year, Memoir 347, Agricultural Experiment Station, Cornell University, Ithaca, New York, 1957.

inflexible, and emergencies no respectors of income situation, farm families can still be expected to vary their total living expenditures by timing their purchases of durable goods to coincide with the "good" years. To the extent that they do this, their ability to meet fixed obligations, such as debt repayments, will not be so seriously impaired in a year of low income.

Available published studies are of little help in determining the response of living expenses to income. Nearly all are concerned with cross-sectional data for a single year. Studies that classified families by change in income from the previous year, or on the basis of earning capacity, such as total assets or cows per farm, found a greater response of living expenditures to income than those studies that did not make such classifications.^{10/}

Plotting data from two studies which used data from groups of families for a period of years gave some evidence that a relationship existed between family living expenditures and either gross or net income.^{11/} However, these studies had worked with group averages which tended to cover up individual differences. Also, most of the studies reviewed were more concerned with the permanent component of income, with some attempting to remove the effects of the transitory component. The interest in this study was on the effects of changes in the measured income, including the transitory component.

After exploring the effects of different concepts of income on estimates

^{10/} Mack, Ruth P., "The Direction of Change in Income and the Consumption Function", Review of Economics and Statistics, XXX, Nov. 1948, 239-258; and Kirkpatrick, E. L., P. E. McNall, and M. L. Cowles, Farm Family Living in Wisconsin, Research Bulletin 114, Wisconsin Agricultural Experiment Station, Madison, Wisconsin, 1933.

^{11/} Freeman, Ruth Crawford, and Ruth E. Deacon, Family Cash Living and Other Outlays as Related to Gross Cash Receipts, Bulletin 614, University of Illinois, Urbana, Illinois, 1957, and Tompkins, William Ansel, The Effect of Income Changes on Farm and Family Expenditures of Selected Illinois Farm Families, M. S. Thesis, University of Illinois, 1959.

of consumption parameters Margaret Reid concluded that it was unlikely that the variable annual income was the income farm families had in mind in deciding to spend or save. However, she felt that expenditures would vary in response to income partly because of the timing of the more costly purchases. She suggested a multivariate analysis, beginning with data on individual families, with gross receipts and farm operating expenses as independent variables, as a possible fruitful approach to expenditure estimation.^{12/}

OBJECTIVE, DATA, AND PROCEDURE

This study tested the hypothesis that family living expenditures vary in response to income fluctuations. The specific objective was to obtain a numerical estimate of the effect of variable income on current expenditures for family living. The estimate was made within the framework of "non-economic" shifters of family living expenditures.

The basic data for this investigation were from Home Account Record Summaries of selected Illinois farm families.^{13/} A sample of 19 farm families was selected from the available Home Account Record Summaries. Criteria of selection were families whose major income was from farming and for whom continuous records were available from 1949 through 1960.

^{12/} Reid, Margaret G., "Effect of Income Concept Upon Expenditure Curves of Farm Families", Studies in Income and Wealth, XV, 1952, 131-174.

^{13/} The author wishes to express his appreciation to the Department of Home Economics, University of Illinois for the use of these records, especially to Dr. Janice M. Smith, Head of Department, and Dr. Jean Mann Due, Economist and Research Associate in Family Economics, for making the records available and for helpful comments on the research; and to Miss Jeane L. Hafstrom, secretary, for her assistance in duplicating the records.

The records are collected under Hatch Project 60-362 as part of the Illinois extension program in Family Economics.

The youngest families meeting these two criteria were selected for the sample. One year's data were discarded from each of two of the family records because of incomplete records. The final sample contained 226 observations on 19 families over a period of 12 years.

MODEL

The model for this study was a multivariate regression equation similar to that suggested by Reid. The following equation was estimated linear in logarithms.

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + u$$

where:

Y = Family living expenditures

X₁ = Net income

X₂ = Number of years married

X₃ = Number of persons in household

X₄ = Index of prices paid by farmers for items of living

and u = A stochastic error term with the usual statistical properties

The logarithmic form automatically allows a diminishing effect of each variable and causes the effect of each variable to be dependent on the magnitudes of the others. If these features were incorporated into a polynomial equation the number of terms required would make the model very cumbersome.

Perhaps many important variables determining the division of income between consumption and other expenditures or saving are psychological and sociological in nature, and are not quantifiable. But it was hypothesized that other variables which could be quantified were significant in determining the disposition of income or indirectly represented some of the non-quantifiable factors.

One of these factors was the stage of the family as measured by the number of year married. Tabulations of data from the Illinois Home Accounts for 1959 and 1960 show patterns of consumption expenditures which appeared to be related to the number of years married.^{14/} An attempt was made to estimate the extent to which family stage was a causal fact or in determining family living expenditures by including number of years married as an independent variable in the equation.

Obviously, one would expect some relationship between the number of persons dependent on a given income for their livelihood and the amount of that income used for consumption expenditures. Since family living costs normally include a number of fixed costs which increase little or none as the size of family is increased a proportionate relationship would not be expected. This raises a question of whether the mere counting of the number of persons in the household is a suitable measure of family size.

Some investigators have attempted to construct an economic quantification of family size, such as Friedman's "Ammain" (adult male maintenance unit) which gives each family member a "measure of equivalence" based on sex and age.^{15/} In an analysis of these measures of equivalence Dr. Due found no consistent relationship between age and expenditures when empirical data were tested for families with children in different age groups.^{16/} For dependency comparisons, Dr. Deacon found that the per capita unit appeared to be as satisfactory as the per ammain.^{17/}

^{14/} Due, Jean Mann, Illinois Family Incomes and Expenditures, Extension Service in Agriculture and Home Economics, University of Illinois, Urbana, Illinois, HEE 3718, 1959, pp 26-27, and HEE 3723, 1960, pp 34-35.

^{15/} Friedman, Milton, "A Method of Comparing Incomes of Families Differing in Composition", Studies in Income and Wealth, Vol. 15, 1952, 9-20.

^{16/} Due, Jean Mann, Appendix, Part 1, "Method of Comparing Incomes", Studies in Income and Wealth, Vol. XV, 1952, 21-24.

^{17/} Deacon, Ruth E., Study of Methods for the Analysis of Family Financial Adjustments from Year to Year, Memoir 347, Agricultural Experiment Station, Cornell University, Ithaca, New York, 1957.

For this analysis the unit of measurement chosen was the number of persons in the household. It was assumed that the "diminishing effect" property of the logarithmic equation adequately allowed for the existence of the fixed costs in family living expenditures.

Since the analysis covered a period of years in which prices changed quite rapidly, some recognition had to be given to the effects of price changes. The method used was to enter the index of prices paid by farmers for items of living as one of the variables.^{18/} This method was used, rather than deflating by the price index, to make the estimates suitable for use in a farm finance study which was in current dollar terms.

^{18/} It is recognized that this price series has some limitations as a measure of the cost of living. The index is subject to the usual sampling and clerical errors common to any statistical series. In addition, the index is for an average of the purchases of farmers in the United States rather than for the specific bundle of goods and services purchased by the families in the sample. Also, the bundle of goods and services does not remain constant, but is changed as farm family buying habits change. A change in the index may be the result of either a change in price or a change in the goods and services included in the bundle. However, in spite of these limitations, this series was judged to be the best measure available of prices paid by farmers for items of living. United States Department of Agriculture, Major Statistical Series of the U. S. Department of Agriculture, Agriculture Handbook No. 118, Volume 1, "Agricultural Prices and Parity", pp 40-43, 58-59.

A net income concept was used in this analysis. It was defined as cash farm income, labor earnings off the farm, earnings on investments, and gifts, less farm and business expenses, interest, and income taxes. Ideally, inventory changes and depreciation should have been included in income and capital expenditures should have been considered separately from current expenses. However, data limitations prevented these refinements.

Family living expenditures were obtained by totaling the expense categories as they appeared on the account summaries. These categories included food, operating expense, shelter, clothing, personal, and general. There is some disagreement among students of this area as to whether life insurance is an investment or a payment for protection. For this analysis all premiums below \$200 were treated as payments for protection. Premiums in excess of \$200 were included as investments.^{19/}

In working with groups there is always the possibility that the grouped data will cover up as much evidence as it reveals. To attempt to overcome this difficulty the families were divided into strata. The families were ranked by income, living expenditures, and savings. Five of the families ranked near the top in all three categories. These families were identified as the high income--high saving group. The second group, identified as the moderate income savers group, ranked just below the first five on savings, and were scattered throughout the lower two-thirds of the rankings

^{19/} The arbitrary figure of \$200 was selected because it was approximately the minimum average of life insurance premiums for the Illinois account keepers for any post-war year. The lowest average was \$201 in 1949. Due, Jean Mann, Illinois Family Incomes and Expenditures, 1960, op. cit., pp 40-41.

for income and living expenditures. The third group was also scattered throughout the lower two-thirds of the income and expenditures rankings, but had very low or negative savings for the 12 year period. This group was called the moderate income non-savers group. Two families, whose income and savings patterns were not similar to those of any of the groups, were omitted from the subsorts. The mean values of the characteristics of the sample and strata are summarized in Table I.

Table I. Mean Values for Characteristics of the Sample and Strata.

Group	Mean Values					
	No. of Families	Net Income	Family Living Expense	Savings	Years Married (1949)	No. in Household
All families	19	\$4703	\$4167	\$529	13.3	3.95
High Income-- High Saving	5	8404	5805	2484	19.6	3.58
Moderate Income Savers	5	3586	2996	540	9.2	3.42
Moderate Income Non-Savers	7	3232	3525	-324	13.3	4.30

The high income--high savings group was made up entirely of the older, well-established families. Age, as measured by years of marriage, ranged from 17 to 22 years at the beginning of the period. Mean incomes, ranging from \$5,101 to \$14,131, were all above any families included in the older two strata.

With the exception of one family, all the families in the moderate income savers strata were younger families. This family had four children, ranging from 9 to 18 years of age at the beginning of the period which may account for its economic behavior pattern being similar to that of the

younger families. Mean incomes in this group ranged from \$2,675 to \$4,145.

The moderate income non-savers strata contained families from the entire range of the age span. Incomes ranged from \$2,675 to \$4,338. The average number of persons in the households was somewhat higher than for the other two groups, with all families in the group having a larger number than the other two group means.

One effect of making subsorts from the sample was to remove some of the variation in the permanent component of income. Separating the high income families from the rest of the sample left groups of families whose permanent income components were more nearly equal. A larger proportion of income variance within the group was due to the transitory component as contrast to the entire sample.

EMPIRICAL RESULTS

The coefficients estimated for the entire sample and for the strata and their standard errors are summarized in Table II. Since the equations were estimated in the logarithmic form these coefficients are the elasticities of response of family living expenditures with respect to the independent variables. The average and marginal expenditures are summarized in Table III.

These results show that expenditures for family living, in this sample, responded to the hypothesized causal variables. They also indicate that the responses varied among the different groups.

The estimates from the model are consistent with the hypothesis that farm families will, in colloquial language, "tighten their belts" when necessary to meet current obligations. The relationship between the groups, in addition to the statistical tests of significance, give credulity to

Table II. Coefficients of Family Living Expenditure Equation

Group	Income	No. Years Married	No. Persons in Household	Price	R ²
All Families	.2776 (.0644)	.3181 (.0506)	.3059 (.0663)	1.2810 (.4803)	.348
High Income High Saving	.2128 (.0787)	-.1557 (.2091)	.2996 (.0721)	2.5157 (.7668)	.407
Moderate Income Savers	.3991 (.2289)	.1516 (.0731)	.3418 (.0942)	2.0435 (.8218)	.370
Moderate Income Non-Savers	.1006 (.0953)	.0628 (.0843)	.0250 (.1813)	2.9980 (.7067)	.236

Table III. Family Living Expenditures Related to Independent Variables at Group Means

Group	Expenditures Per Dollar Income		Expenditures Per Person in Household		Expenditures Per Year Married
	Average	Marginal	Average	Marginal	Marginal
All Families	\$.887	\$.246	\$1055	\$ 324	\$ 668
High Income High Saving	.692	.148	1620	486	-345
Moderate Income Savers	.835	.333	877	300	289
Moderate Income Non-Savers	1.097	.110	820	25	110

these estimates. The high income group, as pointed out previously, was composed of older families who had little reason to curtail their consumption in response to temporary income changes. The moderate income group had an income elasticity of family living expenditures nearly twice as high as the high income group. This group was composed of younger families who did not have the financial reserves of the older group. It is quite likely that data on the first group of families, from a similar stage of their family cycle, would have given similar estimates. The families in the moderate income savers group appear to have felt a need to adjust their living level to income that the families in the high income group did not feel. They also appear to have had a desire to save that was not shared by the families in the non-savers group.

The moderate income savers group had been spending about 84% of its income for family living expenditures. The data indicate that these families would curtail consumption expenditures by 33 cents for each dollar that income fell short of the mean. The high income families who had been spending less than 70% of their net income for consumption, changed consumption expenditures by only 15 cents for each one dollar change in income, while the non-savers group made no significant change in living expenditures in response to income changes. All of the families in the sample had been spending an average of 89% of their income for consumption, and adjusted this spending by an average of 25 cents for each one dollar change in income.

The high income group families spent the most per person in the household, and increased or decreased their expenditure the most with the addition

or subtraction of a person to or from the household. The moderate income savers group spent about 54% as much, on the average, per member in the household, but their adjustment for a marginal member was about 62% of the adjustment for the high income group. The non-savers group, while spending nearly the same as the moderate income savers group per person, made practically no adjustment for more or fewer family members.

The coefficients for number of years married show a pattern that might be expected from a priori reasoning. For the sample, the data indicated that expenditures increased annually for the younger families and decreased for the older families. The older families had reached a stage at the time the data was generated when their families were maturing and their children leaving home. The younger families were generating data during a stage when their children were growing into the more expensive high school and college years.

For all three subsorts, the coefficient for the price variable was far in excess of the expected value of one, and highly significant. One possible explanation for this is that the price variable worked as a trend variable in the estimating equation. It was so highly correlated with some relevant variable omitted from the model that it picked up the effects of the unknown variable or variables. In the "all families" equation, the coefficient for number of years married was much larger than for the other three groups, while the coefficient for price was near the expected value. This may have been caused by the years married variable, with the entire range of ages, acting as the trend variable and picking up the effects of the omitted variables.

A second hypothesis which might explain the large coefficients for price is that the variable worked as an expectations variable. The period of the data followed a relatively long period of rising prices. By this time people accepted rising prices as a signal for additional price increases. Therefore, as prices increased they purchased more for future consumption.

The adjustments for years married appear unreasonably large (absolute value). If these adjustments were projected for a few years, they would require the family to move into an entirely different income category or to an entirely different level of living status.

SUMMARY AND CONCLUSIONS

For most farm families expenditures for family living purposes are to some degree in competition with expenditures for production expenses, capital investment, and debt repayment. Often these latter expenditures vary relatively little while farm income may fluctuate rather widely. The willingness and ability of a farm family to adjust its living expenses in response to income changes increases its ability to meet fixed financial obligations.

Data from Home Account Record Summaries from 19 Illinois farm families covering a 12 year period were analyzed to estimate the amount that these families varied their living expenditures in response to income fluctuations. The estimates were made in a multivariate regression model estimated in logarithms. Separate estimates were made for subsorts of the sample based on income level and saving patterns. The model included the age of the family, the number of family members, and prices in addition to income, as dependent variables.

The analysis indicated that, for the families in the sample, the variables tested had significant effects on family living expenditures, and that these effects varied among the different groups of families. The elasticity of response of family living expenditures to changes in net income varied from not significantly different from zero to as high as 0.4. Living expenses increased with number of years married for the group of younger families and decreased for the group of older families. The coefficients for the number of family members were nearly equal for the sample as a whole and for two of the strata, and not significantly different from zero for the third strata.

The ability of farm families to adjust their living expenditures to variable income substantially increases their ability to meet rigid, contractual obligations. In an analysis of an Indiana dairy-hog farm example, the variance of the annual amounts available for debt service and repayment was slightly less than 40% of the variance of annual incomes. This reduction in variance was effected through varying family living expenditures and capital maintenance expenses in response to income fluctuations.^{20/} As the size of the farm is increased so that family living expenditures become a smaller proportion of total farm income, the damping effect of family living expenditures becomes proportionately less.

The competition between living expenditures and capital accumulation can be illustrated by the size of debt a farm family can service and repay with different levels of living expenditures. With a moderate level of

^{20/} Wehrly, James S., Debt Load Capacity of Farms, Unpublished Ph.D. Thesis, Purdue University, 1962.

living, a family could service and repay a debt that would pay for 46% of a dairy-hog farm that required an investment of \$70,000. If the family were able and willing to reduce its living expenditures by 20%, it could service and repay a debt that would pay for 62% of the same business. The comparable figures for a farm business 50% larger are 56% and 68%. These larger debts could be serviced with little increase of risk of default under conditions of weather and price variability similar to those prevailing from 1949 through 1959.^{21/}

The factor of increasing living expenditures as a family becomes more mature suggests that for some farmers debt amortization plans that call for equal payments throughout the life of the loan may not be the most desirable plans. Unless a farmer can expect increasing productivity over the years, or an increasing amount of family labor that can be utilized in the farm business, he might do well to consider an amortization plan that permits declining payments with passing years.

^{21/} Ibid.