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THE EFFECT OF AN EXPERIMENTAL NEGATIVE INCOME TAX ON FARM BUSINESS DECISIONS AND FINANCIAL MANAGEMENT

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Introduction

The purpose of this analysis was to provide a basis for judging the effect of a universal negative income tax program on farm business and financial management decisions. Of concern here were the effects on level and mix of farm production, on changes in asset/debt relationships, and on sources and purposes of farm loans. Theoretical expectations were reported in this Journal (Meyer and Saupe, Bawden 1970 and Bawden 1971) and are not repeated here.

Multiple regression (calculated by OLS) was the major analytical device used. All models contained a set of theoretically plausible explanatory variables to control for any differences in farm resources or demographic characteristics between controls and experimentals, plus variable(s) for the tax and guarantee levels in the experimental plans. Observations from Iowa and North Carolina were not combined in the analyses because of substantial differences in the underlying agricultural production relationships.

Explanatory Model

The analytical models and empirical findings are reported in detail elsewhere (Saupe) and are briefly summarized in the remainder of this report. An example of the general explanatory model is presented in Table 1. In this illustration the dependent variable is the value of all farm product sales in the middle year of the Experiment.

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While included mainly to account for differences between controls and experimentals, the partial regression coefficients for the demographic and resource variables are still of interest. Demographic variables included race of head only in North Carolina. Being black was associated with $4804 less farm sales there, a substantial amount relative to the mean of $8300. Age of head was not a significant variable in either state. In North Carolina an additional year of formal education was associated with $438 of additional sales, but this variable was not significant in Iowa. Being sick in bed an extra day reduced sales $78.60 in Iowa but was not significant in North Carolina.

In North Carolina, neither acres of tobacco nor acres of other crops significantly affected farm sales but the operator's share of crops produced was significant in both states. In Iowa, an extra acre of cropland added $43 to total sales, a marginal dollar of investment in specialized livestock equipment added 22 cents to sales and an extra dollar of equity in the base period added seven cents to farm sales (see Table 1).

In the models are three dummy variables representing the Experiment's tax rate-guarantee plans grouped by their approximate "generosity." Plans are "equally generous" only at certain limits and approximately so between. The scheme used here was appropriate for the range of income observed among the experimental farmers.

The "low generosity" plans were the 50-50 and 70-75 tax rate-guarantee plans. The 50-75 was the "medium generosity" plan. The

Table 1

An Example Model Explaining Variation in Farm Product Sales in the Middle Year of the Experiment, North Carolina and Iowa

Independent Variable	North Carolina		Iowa	
	Regression Coefficient	"t" Significance Level	Regression Coefficient	"t" Significance Level
Race of head (black = 1)	-4804.	<.01	-	-
Age of head in years	92.	.89	-94.5	.85
Age of head in years - squared	-1.7	.81	1.2	.84
Years formal education of head	438.	.11	15.4	.96
Number of persons supported	-13.8	.98	-132.3	.06
Days head sick in bed	-13.1	.81	-78.6	.06
Acres of tobacco, 1969	191.	.72	-	-
All other cropland acres, 1969	-.36	.99	43.0	<.01
Operator's share of crops	8650.[a]	.03	-6835.[b]	<.01
Livestock investment in 1969	-.05	.96	.22	.03
Equity in 1969 (dollars)	-.08	.40	.07	.10
Index of farm machinery size	-	-	560.7	.25
Estimated hours of farm labor in 1969	2.01	.42	2.1	.43
Estimated hours of farm labor in 1969-squared	-.0001	.53	.0002	.75
Non-farm wage and business income in 1969	-.49	.31	.27	.70
Parameterization of the Experiment				
Low generosity plans	-4109.	.04	3373.	.05
Medium generosity plans	-1152.	.55	-1285.	.50
High generosity plans	-1728.	.30	-2042.	.17
Constant	-451.	.98	9693.	.42
N	111		109	
F-Ratio	4.0		20.8	
F-test significance	<.01		<.01	
R^2	.42		.78	

[a] If the operator received 100 percent of the crops as his share (i.e. a full owner) his farm sales would have been increased by $8650.

[b] If the operator rented 100 percent of his cropland on shares, his farm sales would have been reduced by $6835.

30-75 and 50-100 plans were combined into the "high generosity" group. Other parameterizations tested but not illustrated here were a single dummy variable for being in any experimental plan and a set of five dummy variables, one for each experimental plan.

Interpretation of the effect of the Experiment does not have to be based on a single model such as Table 1. Also of interest are the pervasiveness of an experimental effect over the three years of the Experiment, among different parameterizations of the tax rate-guarantee plans, the sensitivity of the effect to the particular form of the model, to the specification of the variables and to the addition or deletion of a small number of observations from the groups being studied.

There are no a priori standards for the level of t-statistic that is needed to establish that a partial regression coefficient is "significant." In this new area of investigation the level can appropriately be much broader than the .05 or .10 significance levels that have emerged for hypothesis testing in some long established areas of inquiry. There are relatively small numbers of observations in each cell--from six to fourteen per experimental plan and from thirteen to twenty-four in the generosity groups. The problem of small numbers of observations (i.e. the reduced probability of observing a significant response given a "true" response) thus becomes acute. Under these circumstances, the researcher may want to accept a one-out-of-four or one-out-of-three chance (i.e. significance levels of .25 or .33) that an observed phenomenon is an experimental effect.

Farm Product Sales

The Experiment was found to have opposite and partially offsetting effects on levels of crop sales and on livestock sales (see Table 2). In Iowa, farmers responded by increased sales of crops which were more than offset by decreased sales of livestock for a net decrease in farm product sales. In North Carolina, farmers decreased sales of tobacco and other crops but they were not offset by the increased sales of livestock, for a net decrease in farm product sales.

Table 2 may be considered a summary supported by many other analyses and tests. Supporting the conclusion that in Iowa the experimentals as a group increased crop sales are the positive coefficients shown in Table 2. They are neither very large nor very significant but additional analyses showed pervasive positive coefficients among the experimental plans in each year.

Some decisions affecting livestock sales in 1970 had been made prior to the start of the Experiment in Iowa, e.g. purchase of fattening cattle and selection and breeding of swine. This would tend to dampen any response to being in an experimental plan in 1970. In Iowa, the decrease in livestock sales associated with the experimentals increased both in magnitude and significance during the Experiment (Table 2).

Major livestock enterprises in the Iowa counties in the Experiment were the farrowing or purchase of pigs and feeding them to market weights and purchasing feeder cattle (generally in the fall) and feeding them to slaughter weights and selling the following year. Being in the

Table 2

Regression Coefficients and Their t-Significance Levels for Control/Payments Dummy Variables in Models Explaining Variation in Farm Product Sales, North Carolina and Iowa, 1970-72

	Farm Product Sales			
	Tobacco[a]	All Crops	Livestock	Crops Plus Livestock
Iowa:				
1970:				
Coefficients	-	$310	-$473	-$163
t-significance		.65	.70	.90
1971:				
Coefficients	-	$670	-$954	-$285
t-significance		.50	.40	.82
1972:				
Coefficients		$1251	-$2454	-$1203
t-significance		.37	.21	.52
North Carolina:				
1970:				
Coefficients	-981.	-1137	28.	-1108
t-significance	.05	.04	.94	.07
1971:				
Coefficients	-2126	-2296	32	-2265
t-significance	.06	.07	.94	.08
1972:				
Coefficients	-898.	-1447	437	-1010
t-significance	.29	.31	.38	.50

[a]This includes both the effect of farmers quitting production and the effect of remaining in production but producing less.

experimental plans was associated with a lower conditional probability of selling any market hogs. Among the farms selling market hogs, experimentals sold substantially fewer in all three years, when pre-experiment differences were controlled for. Fewer of the Iowa farms fed any cattle, and the analyses were less conclusive. The number of cattle marketed appeared to be lower for farmers in the experimental plans, however. "Minor" livestock enterprises were enterprises that were small relative to the usual size of that livestock enterprise on all farms in the county, and also were a relatively minor part of the total farm business on the farms studied. The conditional probability that a farm had any minor livestock enterprises was not affected by being in the experimental plans in any year in Iowa, but the number of such enterprises appeared greater on the experimental farms.

In North Carolina, tobacco dominated other crops in gross sales per acre at well over $1000 per acre, five times greater than for any other crop. Tobacco production was controlled by federal allotments, which could readily be transferred from farmer to farmer. Being in the experimental plans was associated with substantial reductions in tobacco sales and all crop sales in all three years (see Table 2).

Livestock sales in North Carolina were not statistically different between controls and the experimentals in all three years. Hog production was the most common livestock enterprise among the farmers in the experiment and it appeared generally unaffected. The conditional probability of having minor livestock enterprises, and the number of such enterprises, was greater for the experimentals in 1970 and 1971 but the effect on total sales was minimal.

Farm Financial Management

The management of farm business and farm family finances are usually intertwined. Every expenditure for consumption, farm operating expenses and farm investment draws from the same pool of receipts. For example, a change in total farm family income caused by being in the Experiment may influence farm net worth by a change in farm assets or farm debts. But the income change may instead affect current consumption, purchase of consumer durables or investment in human capital, and leave farm assets and debts unchanged. This section of the report concentrates on how farm financial management differed between Experimental and control farms, without first exploring the theoretical expectations.

Iowa farmers in the experimental plans increased farm net worth $4415 less than controls during a 45 month period in the Experiment from 1969 to 1973, after controlling for the different initial endowment of assets and other control-experimentals differences. The t-significance level of this coefficient was .12; mean net worth at the end of the Experiment for all farmers combined was $33,920. The percentage increase in farm net worth for experimentals was also less than controls. In North Carolina the net worth increases of controls and experimentals were not different in a statistically significant way.

The effect of the Experiment on farmers' debt to asset relationships can be measured but can not be predicted. In general, the ratio reflects the farmers' (and their agricultural lenders') views of risk and the expected marginal returns from capital. The analyses showed some weak evidence that Iowa control farmers increased their debt to asset ratio

more than experimentals. That is, Iowa controls increased farm net worth more than Iowa experimentals and the controls may also have increased their debt-to-asset ratio relative to experimentals as well. There were no significant differences in the debt to asset ratios of controls and experimentals in North Carolina.

Information about sources and purposes of farm business loans was asked for directly in the interviews. Questions were asked about lending institutions, the amount owed, and the reason for borrowing from that institution.

For the established farm borrower, the improved financial position caused by being an experimental might permit him to move from less desirable to more desirable lenders. On the other hand, the improved financial position might raise a previously high risk non-borrower to the minimum position where he becomes acceptable to (say) loan companies, but not to banks.

Among the various loan sources reported by the farmers, the loan company is probably the least desirable institutionalized source. Loan companies or collection agencies usually do not provide on-farm supervision or farm management advice with their loans and are often associated with relatively disadvantageous interest rates and repayment schedules. In Iowa, experimentals reported substantial reductions in the amount borrowed from this source between 1970 and 1972 and used this source relatively less than the controls in 1972. Regression analyses supported the conclusion that Iowa experimentals reduced their reliance on these loan sources.

In North Carolina there was a net increase of five experimentals reporting any farm loans from 1970 to 1972 while controls remained unchanged. Regression analyses controlling for between-group differences established that experimentals increased their farm business loans $1145 more than controls from September 1970 to September 1972 (t-significance of the controls/experimentals dummy variable = .30). Because experimentals were starting from a smaller base of loans in 1970, their percentage increase was substantially greater than for controls.

The major difference between controls and experimentals in North Carolina regarding sources of farm business loans was that experimentals increased their use of the Farmers Home Administration and loan companies relative to controls. The federal Farmers Home Administration (FmHA) makes farm loans to applicants that are unable to obtain funds from banks and conventional leaders, but who do appear to have farm business potential. In the years of the Experiment, FmHA provided some on-farm loan supervision and business analyses for their clients. The dollar change in borrowings from the Farmers Home Administration was regressed against a set of relevant explanatory variables, and experimentals increased borrowings from them $996 more than controls (t-significance level = .19). A regression analysis of dollar change in borrowings from loan companies resulted in a $458 greater increase for experimentals over controls (t-significance level = .12).

Controls and experimentals were little different in their reasons for farm borrowing, i.e., in the purpose of farm loans. In both states, controls and experimentals both increased their borrowings for purchase of land, buildings and machinery. In North Carolina, both groups increased borrowing for automobile purchase and repair, but the changes

were more pronounced for experimentals. The number of experimentals borrowing for this purpose increased from 7 to 23, the average dollars from $780 to $1631, and the percentage of total borrowings from 3.5 percent to 13.5 percent. The number of controls also increased but the experimentals increased borrowing for automobiles $587 more than controls from 1970 to 1972 when other relevant differences were controlled for (t-significance = .01).

NOTES

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