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ABSTRACT

The financial well-being of farm households in 29 Mississippi and Tennessee counties in 1980 and 8 Wisconsin counties in 1982 were analyzed. More than 90 percent of families planning to leave farming were viable under economic conditions at survey time. Almost half of Wisconsin dairy farm households were not viable. Higher debt, younger operator age, and lower farm production efficiency were typical of the least viable households. Less than 20 percent of families with part-time farm operators and nondairy farms were not viable. The most severely stressed operated the largest and least profitable farms. Of families with full-time operators and smaller nondairy farms, 55 percent in Mississippi-Tennessee and 32 percent in Wisconsin were not viable. The typical farm was too small to support a household. Forty-two percent of families with full-time operators and larger nondairy farms were not viable. Production inefficiency and high interest costs aggravated income problems. Options suggested to improve farm family well-being included development of nonfarm job opportunities, vocational training to help younger operators change occupations, greater availability of credit, and commodity programs. (YLB)

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Rural Development Research Report No. 60

Farm Viability: Results of the USDA Family Farm Surveys

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Farm Viability: Results of the USDA Family Farm Surveys, by Priscilla Salant, Melinda Smale, and William Saupe. Agriculture and Rural Economics Division, Economic Research Service, U S Department of Agriculture Rural Development Research Report No. 60

Abstract

More than 30 percent of farm households in the Mississippi-Tennessee Sand-Clay Hills in 1980 and in southwestern Wisconsin in 1982 had insufficient income to cover minimum family living expenses, cash farm operating costs, capital replacement, and principal payments on debt. This report analyzes farm household viability in the two regions and evaluates both public and private options for easing financial stress. These options include economic development efforts to increase nonfarm job opportunities, educational programs directed toward increased farm profitability, and programs that make more credit available or make existing credit less expensive for some farmers.

Keywords Farm families, farm finance, off-farm work, financial viability

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Summary

More than 30 percent of farm households in the Mississippi-Tennessee Sand-Clay Hills and northwestern Wisconsin suffered financial stress which threatened the family farm business in the early 1980's. Their combined farm and off-farm incomes did not cover family living expenses, cash farm operating costs, capital replacement, and principal payments on household debt. While some of these households might continue to farm in the short run by, for example, foregoing capital replacement or postponing debt repayment, their longrun survivability is in doubt.

This report analyzes the financial well-being of farm households in 29 Mississippi and Tennessee counties in 1980, and in 8 Wisconsin counties in 1982. The study sites were selected, in part, because they are typical of other parts of the South, Midwest, and Northeast in that their agriculture is dominated by smaller than average farms, and their population is relatively low-income.

In this report, a "viable" farm household receives enough income from all sources to cover minimum family living expenses, cash farm operating costs, and capital replacement costs at the same time it improves net worth by making scheduled principal payments on its debts. The authors divided farm households in the two study areas into five homogeneous subgroups and compared characteristics of the least viable households with those of the most viable within each group.

- *Families planning to leave farming.* More than 90 percent were viable under economic conditions at the time of the survey. Had they stopped farming in the early 1980's, we estimate that their income would have been sufficient to retire their debts and cover minimum family living expenses.

- *Families on Wisconsin dairy farms.* Almost half were not viable. Higher debt, younger operator age, and lower farm production efficiency were typical of the least viable households. Some of these households would benefit from improved farm management, while others may consider changing their enterprise mix, combining farming with an off-farm job or leaving agriculture.

- *Families with part-time operators and nondairy farms.* Less than 20 percent were not viable. The most severely stressed households operated the largest and least profitable farms and earned the lowest off-farm income.

- *Families with full-time operators and smaller (sales of less than $20,000) nondairy farms.* Fifty-five percent in Mississippi-Tennessee and 32 percent in Wisconsin were not viable. The typical farm was too small to support a household even if farm management improved substantially. Because most operators in this group were at retirement age, increased off-farm employment opportunities would not likely help. Government aid in the form of income transfers will probably be necessary to help this group maintain a minimal living standard.

- *Families with full-time operators and larger (sales of at least $20,000) nondairy farms.* Forty-two percent were not viable. Production inefficiency and high interest costs aggravated income problems.

Given the great diversity among American farm families, no single public or private action is likely to improve the well-being of all who are financially stressed. Options that might be considered include economic development efforts to increase nonfarm job opportunities in rural areas, vocational training and transfers to help younger operators change occupations, educational programs directed at increased farm profitability, programs that make more credit available or make existing credit less expensive for selected farmers, and commodity programs that specifically target households below a certain income level.

Glossary

Estimated annual income from value of net worth. The yearly amount of income a household planning to leave farming can expect to realize from the disposition of farm assets. Upon exiting, households with nonland assets sufficient to cover all debts are assumed either to rent the farm or to sell the farm on land contract (that is, to provide seller financing), depending on the option they specified in the interview. (Those who specified they would turn the farm over to a family member were assumed to sell and to finance the sale themselves.) In addition to income from the sale or rental of their land, these households are expected to receive a 10-percent return on investment of all nonland assets in excess of those liquidated to pay off debts.

Rental income is calculated at 6 percent of the reported market value of land assets. Income from land contracts is based on a 20-year agreement with equal annual principal payments and 10-percent annual interest on the unpaid balance. Federal and State tables were used to estimate the after-tax (that is, after capital gains and normal income tax) income from land contract sales.

Households with debts exceeding the value of their nonland assets were assumed to liquidate the farm in order to pay these debts. To determine the net amount of money available for investment after liquidation, both the value of all debts and the capital gains tax liability were subtracted from the value of assets. Estimated annual income for households liquidating the farm is equal to 10 percent of after-tax earnings from the sale of the farm plus 10 percent of the value of remaining assets.

Estimated capital replacement costs. Calculated at 10 percent of the value of all farm machinery, trucks, and cars.

Estimated minimum consumption. Equaled the poverty threshold income level for various household sizes and ages of household heads, as developed by the U.S. Bureau of the Census. For purposes of this analysis, the household includes all individuals residing together at the time of survey.

Estimated off-farm employment income. Calculated on the basis of the age and off-farm employment experience of both the operator and spouse. We assumed that: persons over 64 years of age in the survey year would retire from off-farm work, individuals, age 50 to 64, would maintain the survey year level of off-farm work, and individuals under 50 years old would begin working full-time off-farm when they left farming, whether or not they had worked off-farm in the past. The estimated wage rate for individuals who reported off-farm work in the survey year equaled their observed rate. The estimated wage income for individuals who did not report off-farm work equaled full-time earnings at the minimum wage rate.

Estimated principal payments. Calculated using the type of collateral under which individual loans were secured. We assumed that loans secured by real estate had 20-year payback periods, loans secured by personal property had 3-year payback periods, and loans secured by crop liens had a 1-year payback period. If loans were not secured, the length of payback period was calculated according to the purpose of the loan—20 years for real estate purchases, 3 years for production input purchases, and 2 years for household-related purchases. We assumed annual payments to be constant over the life of the loan.

Estimated Social Security income. Equaled observed value for operators and spouses who were at least 61 years old. We calculated payments using Social Security Administration guidelines for those persons who would reach age 61 within 5 years of the survey.

Larger farms. Farms with gross agricultural product sales of at least $20,000.

Net cash farm operating income Equaled the sum of gross sales of agricultural products plus receipts from customwork, gas tax refunds, patronage refunds, and Government grain storage payments, minus cash operating expenses and the original purchase cost of livestock that was sold during the survey year, where appropriate We assumed the value of the year's production in inventory to be the same at the end of the year as it was at the beginning of the year, that is, no inventory change

Off-farm employment income. Equaled household income from wage and salary employment plus net income from nonfarm self-employment

Other income. Included public transfer payments, Social Security and private retirement income, rent, interest, and dividends.

Sales-to-cash operating expenses less interest. Equaled total crop and livestock sales divided by total cash operating expenses less interest paid in the survey year The purchase cost of livestock sold in the survey year was subtracted from the numerator of the ratio for dairy farms to represent a value-added concept

Smaller farms Farms with gross agricultural product sales of less than $20,000.

Total household income. Equaled the sum of net cash farm operating income plus off-farm employment income plus other income.

Transfer payments. Included pension and retirement income other than Social Security benefits, welfare and other public assistance, and unemployment insurance

Unearned income Equaled other income and included such types of payments as Social Security and interest.

Farm Viability
Results of the USDA Family Farm Surveys

Priscilla Salant, Melinda Smale, and William Saupe*

Introduction

Today' family farm is an agricultural business in which the operator is a risk-bearing manager, who, with his or her family, provides most of the labor required on the farm (2).[1] Most American farms are family farms, yet they differ widely in such areas as off-farm employment and income, primary occupation of operator, size, land tenure, business organization, and type of commodity produced.

To be "viable," a farm household must generate net income sufficient to meet financial obligations of three types. First, it must provide for the livelihood of its members. Second, to continue operating the farm business as it is currently organized, the household must cover cash operating expenses (including interest payments), and capital replacement costs. Third, to maintain its line of farm credit and prevent foreclosure of the business, the household must also meet principal payments on debt as scheduled. Such principal payments also enhance the net worth of the farm household.

This report describes characteristics of family farm households in two regions of the country, a 29-county area in the northern half of Mississippi and in southwestern Tennessee in 1980, and an 8-county area in Wisconsin in 1982; develops a measure of viability and uses it to evaluate the well-being of these farm households; and explores differences in human resource, farm business, and financial characteristics between more and less economically viable farm households.

Data Source: The Family Farm Surveys

Population estimates in this report are based on data from two U.S. Department of Agriculture (USDA) research surveys, one conducted in 1981 of 1,087 farm households in the Mississippi and Tennessee counties, and the other in 1983 of 529 farm households in the Wisconsin counties (fig. 1).[2] The surveys provided information about the resources available to people living on family farms, their level of income, perceived problems, and goals. Particular concerns in the research were the stability and organization of the family farm, both as an institution and as the predominant form of farm business in U.S. agriculture, and the growing importance of off-farm income and employment among farm families.

For both surveys, USDA defined a farm as a business that would normally produce at least $1,000 of agricultural sales. USDA considered it a family farm if it was not operated by a hired manager, was not a nonfamily corporation, and was not an institutional farm, such as a county or prison farm. The farm operator was designated as the person responsible for major administrative and managerial functions and the day-to-day decisions on the farm.

The unit of observation in both surveys was the farm household. An analysis of the farm household, as opposed to the farm business, can reveal the household's flexibility in diversifying sources of income through off-farm employment and other non-

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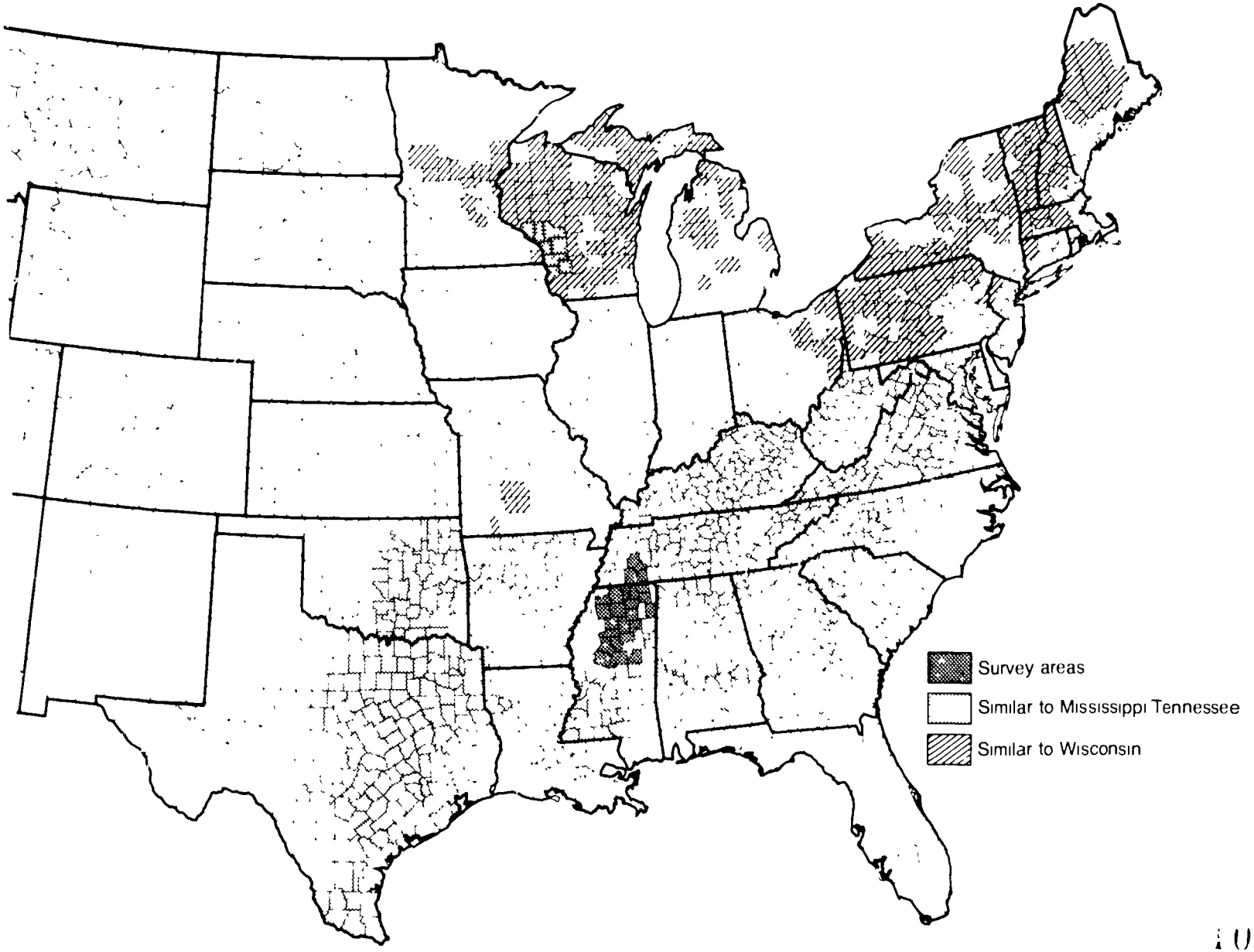
[1]Italicized numbers in parentheses cite sources listed in the References section.

[2]The Mississippi counties include Alcorn, Attala, Benton, Calhoun, Carroll, Chickasaw, Choctaw, Grenada, Holmes, Itawamba, Lafayette, Marshall, Montgomery, Panola, Pontotoc, Prentiss, Tate, Tippah, Tishomingo, Union, Webster, Winston, and Yalobusha, the Tennessee counties include Chester, Fayette, Hardeman, Haywood, Madison, and McNairy, the Wisconsin counties include Buffalo, Crawford, Jackson, LaCrosse, Monroe, Richland, Trempealeau, and Vernon

Figure 1

Family Farm Survey: Study Areas and Agriculturally Similar Counties



farm activities and investments. "Farm household" and "farm family" are used interchangeably in this report.

Data from the two surveys are presented separately here, despite similarities among subgroups of farm households in the two sites. Holding other factors constant, we found differences in viability due to geography. Farms in the two areas had different product mixes and operated on different production functions; that is, there was a different relationship between a given set of inputs and mix of outputs. The climate in the Mississippi-Tennessee area may, for example, allow lower cost per unit of output: crop harvest and storage costs may be lower, less feed may be purchased, and livestock housing requirements may be lower.

Since the turn of the century, much of the Mississippi-Tennessee area's population has been low-income, and its agriculture has been dominated by small farms. The region contains one metropolitan area, Jackson, TN, with a population of about 50,000, and a number of towns with populations under 12,000 which provided some employment opportunities for farm families. Agriculture mainly consisted of small livestock farms, and to a lesser extent, soybean, cash grain, and cotton farms.

The Wisconsin area's population was low-income in relation to the rest of the State, although average income was higher than that of the Mississippi-Tennessee site. The Wisconsin region contains one metropolitan area, LaCrosse, with a population of about 51,000, and a number of smaller towns which provided some off-farm employment opportunities. About two-thirds of the Wisconsin farms were dairy farms. Most of the remaining farmers raised beef cattle or other livestock or grew cash grains.

The two survey sites were chosen, in part, because they were typical of other agricultural areas in the United States (fig. 1). The Mississippi-Tennessee site was typical of parts of the Southeast and Piedmont where agricultural land use was significant but farms were relatively small. The Wisconsin site was typical of parts of the Midwest region and New England where dairying was the major agricultural enterprise and most farms were family operations. Technically, survey results applied only to the specific counties where USDA conducted the interviews. However, we may broadly generalize survey results based on how the regions resembled the survey sites in terms of topography, farm size, and commodity type.

Counties resembling the Mississippi-Tennessee site reported at least 70 percent of all farms with sales of less than $20,000 in 1978 and at least 30 percent of all land in farms. Counties resembling the Wisconsin site reported dairy product sales constituting at least 35 percent of the value of all farm products sold in 1978 and average sales per farm of less than $60,000 (3).

Defining Farm Household Viability

Using an index that compares income to expenses is a common means for evaluating family well-being. The Federal Government, for example, uses a poverty index to determine how many American families cannot afford to meet minimum consumption expenses. We use an index called the viability ratio to evaluate farm family well-being.

Building the Ratio

A viable farm household will generate enough net returns to cover family living expenses and, over the long run, meet its debt payments and replace equipment. A viable farm household must cover costs of the family's minimum consumption, maintain a constant capital stock by replacing equipment when it wears out, and meet principal payments on debt as scheduled, thus preventing foreclosure. By this definition, a viable farm household will both survive and enhance net worth.

The farm household derives its annual net income from three sources: net farm income, earned nonfarm income (from off-farm employment), and unearned nonfarm income (from retirement funds, nonfarm asset earnings, and public transfer programs).

In general, farm household income and financial obligations are used to construct the viability ratio as follows:

$$\text{viability ratio} = \frac{\text{annual household net income}}{\text{annual household financial obligations}}$$

The relationship between income and expenses could also be expressed as their difference. A difference of zero would correspond to an income ratio of 1.0, while a positive residual would correspond to a ratio of more than 1.0. The ratio has

the advantage of facilitating comparisons among farms that vary in size. For example, a household that is $5,000 short of meeting a $100,000 obligation (ratio = 0.95) needs relatively modest changes to be viable. A household that is $5,000 short of meeting a $10,000 obligation may require major reorganization to become viable

The viability ratio has the advantage of gauging economic well-being across farm types and geographical regions. It shows the capacity of the farm household to meet both its business and personal obligations under the current business organization and labor allocation.[3]

The composition of the ratio's numerator depends on the individual household's business plans.[4] For households in which the operator plans to continue farming, the numerator is the sum of observed (year-of-survey) net income from all farm and nonfarm sources. When the operator plans to leave farming, the numerator is an estimate of the income the household can expect to receive from the value of household net worth, transfer income, and off-farm employment. For both types of households, the denominator of the viability ratio is an estimate of the minimum income required to meet financial obligations of both the farm business and the family

Using the Ratio

For farm households intending to continue farming during the 5 years following the survey, the viability ratio, as follows, compares observed household income to the estimated level required to satisfy minimum consumption requirements, make principal payments, and replace capital

$$\text{viability ratio} = \frac{\text{net cash farm operating income}^5 + \text{off-farm employment income} + \text{unearned income}}{\text{(estimated) minimum consumption} + \text{principal payments} + \text{capital replacement costs}}$$

Farm households with a ratio of at least 1.0 will be able to maintain their current (year-of-survey) business organization. Those with a ratio of less

[3]Households under financial stress are likely to adjust farm size, organization, and/or labor allocation. Although these changes will likely result in changes in net income, we could not estimate the magnitude of the changes without additional information

[4]Both Family Farm Surveys included the following question: In the next 5 years, do you plan to expand the size of your farm business, decrease the size of your farm business, maintain the present size of your farm business, or exit from farming?

[5]See appendix B for adjustments made to net cash farm operating income in the Mississippi-Tennessee counties

Why the Interest?

Public debate over family farm viability has a new urgency in the 1980's. Low net farm income, inability to service debt, decline in farm asset values, and involuntary termination of farm businesses have brought wide attention to the topic. Regardless of the specific focus, fundamental questions about the survival of American family farms are not likely to disappear from the political horizon.

The threat to the well-being of American family farms generates public concern for several major reasons. As a cultural institution, the family farm stands for certain perceived attributes: Jefferson's ideals of individualism, thrift, and self-sufficiency. To many people, the family farm symbolizes a democratic creed which is violated when families who choose farming as a way of life are no longer able to achieve their goal.

Concern about the family farm reflects more, however, than interest among some people in perpetuating a philosophy. Some analysts suggest that an agricultural sector dominated by family farms may also have economic efficiency and social equity implications—efficiency because, as a Nation, we attempt to invest our scarce resources where they will be the most productive, and equity because, as farm producers, consumers, and taxpayers, we all are affected by the distribution of income and returns in the farm sector.

than 1.0 will be unable to meet their financial obligations. Although they may be able to survive in the short run by, for example, not replacing capital, they will not be viable over the long run unless they make changes in the allocation of their farm and/or nonfarm resources. Such changes include restructuring their debt and increasing off-farm employment. Households with a viability ratio greater than 1.0 will be able to improve the farm business and/or increase their level of savings or consumption.

For farm families intending to leave farming in the 5 years following the survey, the viability ratio, as follows, compares estimated total household income to estimated minimum consumption expenses:

$$\text{viability ratio} = \frac{\text{(estimated) annual income from value of net worth + off-farm employment income + Social Security benefits + other transfer income}}{\text{(estimated) minimum consumption}}$$

The numerator consists of four types of income that a family who leaves farming may expect to receive. Of particular interest is annual income from the value of net worth. Individual families have different options for realizing the value of their net worth depending on the liquidity of their assets, their debt burden, and whether they plan to continue living on the farm even after they stop operating the business. Off-farm employment after family members stop farming may be restricted by lack of education or limited off-farm work experience.

The ratio's denominator consists of only one element, estimated minimum consumption. We assume that when households cease farming, they liquidate at least some of their assets to pay their debts. Therefore, they have no more principal payments to make. Because they are no longer farming, they also have no more obligation to replace capital.

Households leaving agriculture with a ratio of at least 1.0 will be able to meet minimum consumption requirements. Households with a ratio of less than 1.0 cannot expect to meet these requirements without reallocating their resources by, for example, consuming rather than investing net worth.

Farm Household Types

The term "family farm" may evoke an image of a family that works full-time on the farm, earning a modest income which depends entirely on the agricultural economy. In fact, the American farm population covers a broad spectrum, from farm families who allocate full-time family labor to a relatively large farm business, to those who work off-farm for most of their income, to those who are near retirement age and are leaving both farm and nonfarm employment.

Where an individual family fits into this spectrum affects what factors are associated with its viability. Although it is not feasible to evaluate farm households individually, the approach can be retained by grouping farm households according to shared traits. Individual or public policy initiatives are likely to be similar for households within such groups.

Identifying Five Types of Farm Households

We placed farm households from the two study areas into two categories: those who planned to leave agriculture and those who expected to continue farming. We divided the latter category into the following groups: households that operated dairy farms in Wisconsin; households with part-time operators and nondairy farms; households with full-time operators on smaller nondairy farms (sales of less than $20,000); and households with a full-time operator on larger nondairy farms (sales of at least $20,000). Figure 2 illustrates the sequence of this selection process. The classification scheme represents the two survey areas but is not intended to represent the entire U.S. farm population.

Households planning to leave farming, regardless of the kind of farm they operate or their farm size, have different objectives and expectations than those who plan to continue. The solvency and liquidity of their farm business, their off-farm skills, and their potential for receiving Social Security benefits and investment income, for example, are likely to be of particular concern to these families.

Dairy farms generally produced crops only as inputs into the production of milk and sold livestock as an ancillary enterprise.[6] These households formed a distinct group for two reasons. First, dairy farms were an easily identified commodity group, dependent in large measure on a Federal farm program which supported and stabilized the milk market. Second, household members, especially operators, worked off-farm significantly less

[6]All dairy farms discussed in this analysis were located in the Wisconsin counties. Although there were some dairy farms in the Mississippi-Tennessee area, insufficient data prevented using them in this analysis.

than in other farm groups. The household most commonly depended on the farm business for its livelihood.

We defined part-time operators as those who worked off-farm at least 160 hours during the survey year. Households with part-time operators most often depended on the nonfarm economy for their livelihood. This group was probably less vulnerable to fluctuations in farm commodity prices than to changes in nonfarm employment opportunities.

The remaining farm households had full-time operators who planned to continue farming. The farms varied widely in terms of size and enterprise. We divided these households into a fourth group, those with annual sales of less than $20,000, and a fifth group, those with annual sales of $20,000 or more.

We developed criteria for sorting sample households into the five mutually exclusive groups such that within groups differences in human resource and farm business characteristics were minimized, and between-group differences were maximized. In the case of part-time farmers, for example we tested several alternative definitions to create groups that were homogeneous in terms of operator age, education, and farm type. We made similar tests to define "smaller" and "larger" farms with full-time operators.

Operators Who Planned to Stop Farming

Operators who planned to stop farming were, on average, close to retirement age, had 9 or 10 years of formal education, and had more than 30 years of farm operating experience (table 1). They tended to be older, less educated, and had been farming longer than other operators, except the full-time farmers who had sales under $20,000.[7] On average, their farms were relatively small. The typical Mississippi-Tennessee farm had 85 crop acres and agricultural product sales of about $10,400, while the typical Wisconsin farm had 118 crop acres and about $38,400 of sales.

As these operators neared retirement, their financial positions seemed relatively sound (table 2). Their net worth averaged just under $175,000 in Mississippi-Tennessee and over $240,000 in Wisconsin. Their debt-to-asset ratios suggested that either they had never incurred substantial debts, or if they had, most debt had been retired.

Households in Mississippi-Tennessee reported an average total income of $11,341 in 1980. Roughly 40 percent of this income came from off-farm employment, 40 percent from other unearned sources, and 20 percent from farm earnings. Households in Wisconsin averaged over $25,000 of total income in 1982. Half of this income came from farm sources, one-quarter from off-farm earnings, and one-quarter from other sources.

The viability ratio averaged more than 4.0 for exit households in both survey regions, which means that, on average, households planning to leave agriculture had sufficient equity, past employment experience, and/or unearned income to generate about four times their minimum living expenses once they stop farming.

Wisconsin Dairy Farm Households

Dairy farm operators tended to be younger, to have fewer years of operating experience, and to have more formal education than other operators in the Wisconsin study area, except for full-time farmers on larger, nondairy farms (see table 1).

The typical dairy farm had 191 crop acres and sales of about $85,000. We can use output per unit of input measures of efficiency within groups of farms that are homogeneous in terms of products and inputs, such as the Wisconsin dairy farms. Specifically, we use the ratio of farm product sales to purchased input costs (excluding interest) as such an index.[8] The ratio of sales-to-cash operating expenses averaged 1.9, which means that, in general, dairy farms in the study area were relatively efficient compared with other dairy farms in Wisconsin.

The average debt-to-asset ratio among dairy farm households was 0.26, indicating that total assets (which averaged about $370,000), were more highly leveraged than among any other group in Wisconsin (see table 2). Households with debt-to-asset ratios higher than the average may be in relatively vulnerable financial positions and may have cashflow problems resulting from high debt

[7] Unless otherwise noted, all differences between means and proportions reported in the text are significant at the 0.05 percent confidence level based on the T-statistic and the Z-statistic, respectively (1).

[8] Interest payments are excluded from the denominator of this ratio, so the ratio is a general measure of efficiency and is not biased by the extent to which any particular farm is financially leveraged.

service requirements. Despite the potential for financial difficulties, 40 percent of these households planned to expand the size of their operation during the 5 years after the survey. Slightly less than half the farmers expected to maintain the present farm size, while 11 percent planned to decrease either crop acreage, herd size, or both.

Households in the Wisconsin group depended on the farm business for 75 percent of their total household income, which averaged almost $29,000 in the survey year. The average dairy farm household had a viability ratio of 1.4, slightly higher than the level necessary to meet financial obligations and household living expenses. Almost half had a ratio less than 1.0, which means that they will not be able to survive in the long run without changing the allocation of their farm and nonfarm resources.

Households with Part-time Farm Operators and Nondairy Farms

Typical part-time operators were in their late forties or early fifties, had a high school education, and had farmed for 18 years. Part-time farmers tended to be younger and to have more education and less operating experience than either operators who planned to stop farming or full-time operators of smaller farms (table 1).

Table 1—Operator resource and farm business characteristics and plans of five farm household groups[1]

Item	Unit	Stop farming (1)	Dairy farms (2)	Part-time nondairy (3)	Full-time nondairy farms with— Sales under $20,000 (4)	Full-time nondairy farms with— Sales of at least $20,000 (5)
Mississippi-Tennessee						
Farm households	Number	1,680	—	5,115	2,130	2,155
Operator (average)						
Age	Years	63 (3,5)	—	47 (1,4)	62 (3,5)	47 (1,4)
Years of school completed	do	9.1 (3,5)	—	11.6 (1,4)	8.7 (3,5)	11.7 (1,4)
Farm operating experience	do	32 (3,5)	—	18 (1,4)	30 (3,5)	21 (1,4)
Farm business (average)						
Gross sales	Dollars	10,431 (4,5)	—	12,962 (4,5)	5,701 (1,3,5)	128,272 (1,3,4)
Cash operating expenses	do	7,712 (5)	—	9,359 (4,5)	4,987 (3,5)	78,338 (1,3,4)
Sales/expenses (less interest) ratio		1.9	—	1.7	1.8	2.2
Crop acres	Number	85 (5)	—	102 (4,5)	60 (3,5)	690 (1,3,4)
Farm business plans						
Stop farming	Percent	100	—	—	—	—
Increase size	do	—	—	23 (4,5)	8 (3,5)	40 (3,4)
Decrease size	do	—	—	2	5	4
Maintain size	do	—	—	75 (5)	87 (5)	56 (3,4)
Wisconsin						
Farm households	Number	2,175	6,850	1,665	715	835
Operator (average)						
Age	Years	60 (2,3,5)	44 (1,3,4)	50 (1,2,4)	65 (2,3,5)	47 (1,4)
Years of school completed	do	9.9 (2,3,5)	11.6 (1,3,4)	12.3 (1,2,4)	9.7 (2,3,5)	11.5 (1,4)
Farm operating experience	do	31 (2,3,5)	18 (1,4)	18 (1,4)	35 (2,3,5)	20 (1,4)
Farm business (average)						
Gross sales	Dollars	38,384 (2,4,5)	84,916 (1,3,4)	17,406 (1,2,4,5)	6,206 (1,2,3,5)	114,187 (1,3,4)
Cash operating expenses	do	25,779 (2,4,5)	58,561 (1,3,4,5)	18,215 (2,4,5)	6,621 (1,2,3,5)	91,515 (1,2,3,4)
Sales/expenses (less interest) ratio		1.7 (3,4)	1.9 (3,4)	1.1 (1,2,5)	1.0 (1,2,5)	1.7 (3,4)
Crop acres	Numbers	1.8 (2,4,5)	191 (1,3,4,5)	87 (2,5)	62 (1,2,5)	347 (1,2,3,4)
Farm busines plans						
Stop farming	Percent	100	—	—	—	—
Increase size	do	—	40 (4)	43 (4)	13 (2,3,5)	33 (4)
Decrease size	do	—	11	10	13	1
Maintain size	do	—	49 (4)	47 (4)	74 (2,3)	56

— = not applicable

[1]Numbers in parentheses refer to statistically significant differences in means and proportions. For example, the mean age of operators in the "Stop farming" group (column 1) was different from the means in columns 3 and 5.

Sources: 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey.

Part-time farmers ran relatively small farms in terms of both sales and acreage. Their sales-to-cash operating expenses ratio averaged 1 7 in Mississippi-Tennessee and 1.1 in Wisconsin (This ratio cannot be interpreted as a measure of efficiency for any group that is heterogeneous in farm type.) Seventy-five percent of the part-time farmers in Mississippi-Tennessee intended to maintain farm size, while 23 percent planned to expand. Less than half those in Wisconsin planned to maintain farm size and 43 percent planned to increase their present size.

Households with part-time operators in both survey areas depended primarily on off-farm employment earnings. Mississippi-Tennessee farmers received 16 percent of their total household income from farming in 1980· those in Wisconsin reported a small net farm loss in 1982.

The viability ratio in this group averaged approximately 2.0, which means households received two times the income they needed to cover financial obligations and living expenses. Part-time farmers tended to have lower financial obligations to the farm business in terms of principal payments and capital replacement costs than full-time operators of larger farms. On average, part-time farmers had higher financial obligations as well as higher total income than full-time operators of smaller farms.

Table 2—Financial resources, income by source, and farm household viability of five farm household groups[1]

Item	Unit	Stop farming (1)	Dairy farms (2)	Part-time nondairy (3)	Full-time nondairy farms with— Sales under $20,000 (4)	Full-time nondairy farms with— Sales of at least $20,000 (5)
Mississippi-Tennessee						
Farm households	Number	1,680	--	5,115	2,130	2,155
Financial (average)						
Assets	Dollars	179,766 (4,5)	—	167,615 (5)	146,018 (1,5)	502,572 (1,3,4)
Debts	do	5,854 (3,5)	—	21,897 (1,4,5)	8,121 (3,5)	75,957 (1,3,4)
Net worth	do	173,912 (4 5)	—	145,718 (5)	137,897 (1,5)	426,615 (1,3,4)
Debt/asset ratio		03 (3,5)	—	13 (1,4)	06 (3,5)	15 (1,4)
Income by source.						
Net cash farm operating	do	2,578 (4,5)	—	3,713 (4,5)	872 (1,3,5)	42,152 (1,3,4)
Off-farm employment	do	4,352 (3,4)	—	18,446 (1,4,5)	2,870 (1,3,5)	4,162 (3,4)
Other	do	4,411 (3,5)	—	913 (1,4,5)	4,544 (3,5)	1,935 (1,3,4)
Total household	do	11,341 (3,4,5)	—	23,072 (1,4,5)	8,286 (1,3,5)	48,249 (1,3,4)
Viability ratio (average)		4 3 (3,4,5)	—	2 1 (1,4)	1 1 (1,3,5)	1 7 (1,4)
Households by viability ratio						
Less than 1 0	Percent	10 (4,5)	—	18 (4,5)	54 (1,3)	45 (1,3)
1 0 to 1 9	do	18 (4)	—	34	36 (1)	23
2 0 or more	do	72 (3,4,5)	—	48 (1,4)	11 (1,3,5)	32 (1,4)
Wisconsin:						
Farm households	Number	2,175	6,850	1,665	715	835
Financial (average)						
Assets	Dollars	274,511 (2,3,5)	368,991 (1,3,4,5)	201,773 (1,2,5)	214,301 (2,5)	565,354 (1,2,3,4)
Debts	do	33,784 (2,4,5)	95,930 (1,3,4)	35,599 (2,4,5)	5,134 (1,2,3,5)	129,560 (1,3,4)
Net worth	do	240,727 (3,5)	273,061 (3,4,5)	166,174 (1,2,5)	209,167 (2,5)	435,794 (1,2,3,4)
Debt/asset ratio		12 (2,5)	.26 (1,3,4)	18 (2,4)	.02 (2,3,5)	.23 (1,4)
Income by source.						
Net cash farm operating	do	12,029 (2,3,4)	20,808 (1,3,4)	-35 (1,2,5)	-99 (1,2,5)	21,715 (3,4)
Off-farm employment	do	6,017 (3,5)	4,154 (3)	24,262 (1,2,4,5)	4,171 (3)	2,765 (1,3)
Other	do	7,037 (2,3)	3,214 (1,4,5)	3,268 (1,4,5)	10,794 (2,3)	7,837 (2,3)
Total household	do	25,083 (4)	28,176 (4)	27,495 (4)	14,865 (1,2,3,5)	32,317 (4)
Viability ratio (average)		4 2 (2,3,4,5)	1 4 (1,3)	1 9 (1,2,5)	1 6 (1)	1 3 (1,3)
Households by viability ratio:						
Less than 1.0	Percent	3 (2,3,4,5)	47 (1,3)	17 (1,2,5)	32 (1)	42 (1,3)
1 0 to 1.9	do	5 (2,3,4,5)	29 (1,4)	42 (1)	48 (1,2)	31 (1)
2.0 or more	do	92 (2,3,4,5)	24 (1)	41 (1,4)	20 (1,3)	28 (1)

— = not applicable

[1]Numbers in parentheses refer to statistically significant differences in means and proportions For example, the mean asset value for the "Stop farming" group (column 1) was significantly different from the mean in columns 4 and 5

Sources 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey

Households with Full-time Farm Operators and Smaller Nondairy Farms

Full-time operators of smaller farms had human resource characteristics similar to those of farmers who planned to stop farming. Full-time smaller farmers were older, had attended school less, and had more years of operating experience than others except for farmers leaving agriculture. The typical operator in the full-time, small-farm group was over 60 years old, had less than a high school education, and had been an operator for 30 years or more (see table 1).

The average farm in this group had approximately 60 crop acres and annual sales of close to $6,000. The majority of operators planned to maintain the size of their farm.

Farm and household assets for this group averaged about $146,000 in Mississippi-Tennessee and $214,000 in Wisconsin. Their equity level in both areas was comparable to that of part-time farmers and, like households that planned to stop farming, their debt-to-asset ratio was very low (see table 2).

These households, with the lowest average total income of any group, relied most heavily on unearned income sources. In Mississippi-Tennessee, the average viability ratio was the lowest among all household groups, reflecting low income rather than high financial obligations. The Wisconsin farmers had an average viability ratio of 1.6 which was not significantly different from the average among any of the other groups planning to continue farming.

Over half the farmers in Mississippi-Tennessee, and about 32 percent of the Wisconsin farmers had viability ratios less than 1.0 which meant that their income was less than their estimated financial needs. While they might cover this deficit by consuming less or by not making principal payments, it is more likely that they will not maintain their stock of onfarm capital, such as machinery. Many had no debts or principal payments to make, and at age 60 and older, may have planned to use their machinery until it wore out.

Households with Full-time Farm Operators and Larger Nondairy Farms

Full-time operators on larger farms, on average, were 47 years old, had nearly completed high school, and had been operators for at least 20 years, similar to part-time operators and Wisconsin dairy farmers (see table 1).

Farms in this group were substantially larger than among other groups. Sales in Mississippi-Tennessee averaged $128,272 in 1980, while sales in Wisconsin averaged $114,187 in 1982. Over half of the operators in both areas expected to maintain the size of their farm.

Households in this group had accumulated the highest level of equity at the time of the surveys, averaging more than $425,000. Average debt-to-asset ratios were significantly higher than those of farmers who were leaving agriculture and households with full-time operators on smaller farms (see table 2).

The average total income for Mississippi-Tennessee households was more than $48,000 in 1980, significantly higher than that among other groups. Nearly 90 percent of this income came from the farm business. The viability ratio averaged 1.7, which meant that their income exceeded basic financial needs.

Total income for Wisconsin households averaged just over $32,300 in 1982, significantly higher than only households with full-time operators and smaller farms. Two-thirds of this income came from the farm business; almost one-quarter came from unearned sources. The viability ratio averaged 1.3, or slightly higher than the level at which longrun survival would have been questionable.

Farm Household Characteristics by Level of Viability

We expected to find differences in human resources and farm business and financial characteristics between more and less viable households. Human resource measures include the operator's age, education, and years of farm-operating experience. Farm business resources include farm size (crop acres, gross sales, and assets) and farm efficiency, which can be measured by gross sales-to-cash operating expenses less interest, when a homogeneous group of farms is being considered. Financial characteristics include the level of household assets and debts and measures of solvency, such as net worth and the debt-to-asset ratio.

For the purpose of comparing households, we sorted them into low, medium, and high viability

brackets within each household group. We then compared average levels of human resource, farm business, and financial characteristics across the brackets.

For households planning to continue farming, the low bracket consisted of those with a ratio less than 1.0. Households in the medium bracket had a ratio of from 1.0 to 1.9 and households in the high bracket, a ratio of 2.0 or greater. Because only 6 percent of farm households planning to stop farming had a ratio less than 1.0, the brackets were based on thirds of the distribution of observations. The low bracket consisted of households with a ratio of less than 3.0, the middle bracket a ratio from 3.0 to 4.5, and the high bracket a ratio over 4.5.

Operators Who Planned to Stop Farming

The major difference among households that planned to stop farming appeared to be financial status (table 3). Considerably lower asset levels among the least viable households contributed to lower net worth and higher debt-to-asset ratios, on average. On retiring from farming, these households could expect a smaller income flow from the value of their net worth than their more viable counterparts.

Differences in average net farm income were also associated with viability among households in Wisconsin. The least viable households tended to operate smaller farms in terms of crop acres and gross sales in both areas.

In Mississippi-Tennessee, another factor was associated with viability among households that planned to stop farming. On average, operators in the least viable households had completed significantly fewer years of school than their counterparts in the most viable households. Less education is likely to result in lower off-farm employment earnings, and therefore, in lower Social Security benefits after retirement.

Wisconsin Dairy Farm Households

Differences in the typical financial structure and in average farm efficiency and nonfarm income were associated with the level of viability of dairy farm households (table 4). Dairy farmers with low viability ratios tended to be younger, more recent entrants to dairy farming. Their age and years of farm operating experience were reflected in the financial structure of their operations.

Less viable, more recent entrants owned assets that averaged the same value as assets owned by more viable dairy farmers, but the recent entrants' debts were higher and their net worth lower. The high debt-to-asset ratios in the least viable group may make additional credit hard to secure in the future. To the extent that large debts generated high interest payments and raised cash operating expenses, they contributed to lower net farm income.

Nonfarm income also appeared to be related to viability among households that operate dairy farms. The least viable households averaged lower off-farm employment earnings and less unearned income than their more viable counterparts.

Neither average farm business size (measured by gross sales, number of dairy cows, and crop acres) nor average milk sales per cow appeared to be associated with viability among the dairy households. However, the most viable households were more efficient, on average, in converting cash operating expenses into gross sales.

Households with Part-time Farm Operators and Nondairy Farms

The first of three key differences between more and less viable households in this group related to the scale and profitability of the farming operation (table 5). We found that the least viable households operated larger farms without generating higher net farm income. In Mississippi-Tennessee, net farm income did not differ between the least and the most viable households. In Wisconsin, the least viable households reported significantly lower net farm earnings; in fact, they lost money on their farms in 1982.

More and less viable households also differed in terms of their financial resources. The least viable group averaged more assets and greater debts. Although there were no indications of financial insolvency, on average, they also reported significantly higher debt-to-asset ratios.

The third major difference was in regard to off-farm employment earnings. The least viable households averaged significantly lower earnings from their off-farm work.

In Mississippi-Tennessee, the average sales-to-expenses ratio was also significantly different between more and less viable households. In order to determine whether this difference could be associated with relative efficiency, we calculated

the ratio for the two largest farm types, which together accounted for 75 percent of the total. Within the subset of beef farms, the ratio averaged 0.6 among the least viable households, and 1.8 among the most viable. Similarly, among soybean farms, the ratio averaged 1.3 and 2.6 for the least and the most viable households, respectively. These results mean that the most viable households were more efficient in terms of their output per unit of input.

Households with Full-time Farm Operators and Smaller Nondairy Farms

Within this group, few conclusions can be drawn that apply to both survey sites (table 6). Therefore, we discuss Mississippi-Tennessee and Wisconsin households separately.

Mississippi-Tennessee households operated farms with average sales that ranged from $4,828 (among

Table 3—Average characteristics of households that planned to stop farming, by level of viability ratio[1]

Item	Unit	Viability ratio		
		Less than 3 0 (1)	3 0 to 4 5 (2)	4 6 or greater (3)
Mississippi-Tennessee				
Farm households	Number	750	380	550
Operator				
Age	Years	64	65	61
Years of school completed	do	8 0 (3)	8 7 (3)	10 9 (1,2)
Farm operating experience	do	32	34	31
Farm business:				
Gross sales	Dollars	5,950 (3)	9,432	17,210 (1)
Cash operating expenses	do	4,552 (3)	6,104	13,113 (1)
Sales/expenses (less interest) ratio		1 6	1 5	2 6
Crop acres	Number	53 (3)	71	139 (1)
Financial				
Assets	Dollars	70,422 (2,3)	145 533 (1,3)	351,860 (1,2)
Debts	do	4,759	4,893	8,004
Net worth	do	65,663 (2,3)	140,740 (1,3)	343,856 (1,2)
Debt/asset ratio		11 (2,3)	03 (1)	02 (1)
Income by source				
Net cash farm operating	Dollars	1,559	2,839	3,783
Off-farm employment	do	2,571 (3)	4,230	6,856 (1)
Other	do	3,369 (3)	3,917	6,166 (1)
Total household	do	7,499 (2,3)	10,986 (1,3)	16,805 (1,2)
Wisconsin				
Farm households	Number	720	785	670
Operator				
Age	Years	57	63	60
Years of school completed	do	9 8	10 2	9 8
Farm operating experience	do	27	33	31
Farm business				
Gross sales	Dollars	28,166 (3)	29,016 (3)	60,290 (1,2)
Cash operating expenses	do	17,477 (3)	19,208 (3)	42,357 (1,2)
Sales/expense (less interest) ratio		1 8	1.7	1 7
Crop acres	Number	84 (3)	96 (3)	181 (1,2)
Financial:				
Assets	Dollars	164,025 (2,3)	219,155 (1,3)	457,516 (1,2)
Debts	do	33,439	16,042 (3)	54,954 (2)
Net worth	do	130,586 (2,3)	203,113 (1,3)	402,562 (1,2)
Debt/asset ratio		20 (2)	07 (1)	12 (1)
Income by source:				
Net cash farm operating	Dollars	8,416 (3)[2]	9,865	18,427 (1)[2]
Off-farm employment	do	3,748 (3)	4,430	10,303 (1)
Other	do.	6,236	6,658	8,338
Total household	do	18,400 (3)	20,953 (3)	37,068 (1,2)

[1]Numbers in parentheses refer to significant differences between means For example, the mean number of years of school completed by operators in column 1 was different from the mean in column 3

[2]These differences are significant at the 90-percent confidence level

Sources 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey

the least viable) to $8,494 (among the most viable). Despite the small scale of these operations, their profitability appeared to be related to household viability. The least viable group averaged a net cash farm-operating loss of $874, while the most viable group averaged a net cash farm-operating gain of $5,219.

The sales-to-operating expenses ratio among the least viable households averaged less than half that of the most viable operations. To determine whether differences in the ratio might be attributed to relative efficiency, we again calculated the ratio for the largest single farm type within the group, that of beef operations, which constituted 44 percent of the total. In this subset, the sales-to-operating expenses ratio averaged 1.2 among the least viable households, and 2.5 among the most viable households, which means that the most viable households were more efficient at converting purchased inputs into output.

In addition to lower net farm income, the least viable households also averaged lower earnings from both off-farm employment and other income sources.

The Wisconsin study area contained relatively few households with full-time operations and sales of less than $20,000. Thus, few significant differences emerged in the three viability groups. The single outstanding difference was the amount of unearned income received. The most viable households averaged more than four times the unearned income reported by the least viable households.

Households with Full-time Operators and Larger Nondairy Farms

Two major differences existed between the most and least viable households in this group: the amount of net income generated by the farm business and the household's financial status (table 7).

In Mississippi-Tennessee, the least viable households averaged net cash farm-operating income of $20,708, less than one-third that of the most viable households. In Wisconsin, the least viable households averaged a net farm loss of over $4,600, while the most viable operations averaged a gain of over $44,000. In neither area, however, did average sales differ among viability groups.

Table 4—Average characteristics of Wisconsin dairy farm households, by level of viability ratio[1]

Item	Unit	Viability ratio		
		Less than 1.0 (1)	1.0 to 1.9 (2)	2.0 or greater (3)
Farm households	Number	3,195	2,015	1,645
Operator:				
Age	Years	40 (2,3)	46 (1)	49 (1)
Years of school completed	do	11.8	10.6 (3)	11.4
Farm operating experience	do	14 (3)	17 (3)	24 (1,2)
Farm business:				
Gross sales	Dollars	82,607	87,861	85,794
Cash operating expenses	do	69,785 (2,3)	51,208 (1)	45,755 (1)
Sales/expenses (less interest) ratio		1.7 (3)	1.8 (3)	2.2 (1,2)
Crop acres	Number	210 (2)	171 (1)	180 (1)
Dairy cows	do.	44	41	45
Milk sales per dairy cow	Dollars	1,420	1,583	1,463
Financial:				
Assets	Dollars	383,699	322,668 (3)	397,165 (2)
Debts	do	155,269 (2,3)	54,399 (1,3)	31,484 (1,2)
Net worth	do.	228,430 (3)	268,270 (3)	365,681 (1,2)
Debt/asset ratio		40 (2,3)	17 (1,3)	08 (1,2)
Income by source:				
Net cash farm operating	Dollars	10,568 (2,3)	22,160 (1,3)	39,052 (1,2)
Off-farm employment	do.	2,535 (2,3)	5,204 (1)	6,015 (1)
Other	do.	2,042 (3)	3,066 (3)	5,673 (1,2)
Total household	do.	15,145 (2,3)	30,430 (1,3)	50,740 (1,2)

[1]Numbers in parentheses refer to significant differences between means. For example, the mean age of operators in column 1 is different from the means in columns 2 and 3.

Source: 1983 Wisconsin Family Farm Survey.

On the Mississippi-Tennessee farms, differences in average net farm income were accompanied by differences in efficiency. The sales-to-operating expenses ratio was significantly lower among the least viable households within each of the two farm types that together accounted for the majority of operations (soybeans, 49 percent and cotton, 22 percent).

The indebtedness of the farm household also appeared to play a role in viability. The average debt-to-asset ratio of the least viable households, while not high enough to indicate difficulty in securing credit, was at least four times that of the most viable households in both survey sites. Neither total assets nor net worth differed among groups, although total debts differed significantly. The in-

Table 5—Average characteristics of farm households with part-time operators, by level of viability ratio[1]

Item	Unit	Viability ratio		
		Less than 1.0 (1)	1.0 to 1.9 (2)	2.0 or greater (3)
Mississippi-Tennessee				
Farm households	Number	900	1,750	2,465
Operator:				
Age	Years	46	48	47
Years of school completed	do.	10.9 (3)	10.6 (3)	11.7 (1,2)
Farm operating experience	do.	18	17	18
Farm business:				
Gross sales	Dollars	26,652 (2,3)	7,948 (1)	11,578 (1)
Cash operating expenses	do	24,665 (2,3)	6,304 (1)	5,975 (1)
Sales/expenses (less interest) ratio		1.1 (3)	1.3 (3)	2.2 (1,2)
Crop acres	Number	219 (2,3)	75 (1)	79 (1)
Financial:				
Assets	Dollars	265,915 (2,3)	138,349 (1)	153,523 (1)
Debts	do.	69,893 (2,3)	14,889 (1)	9,400 (1)
Net worth	do.	196,022 (2,3)	123,460 (1)	144,123 (1)
Debt/asset ratio		26 (2,3)	11 (1)	.06 (1)
Income by source:				
Net cash farm operating	Dollars	2,668	1,631	5,590
Off-farm employment	do	12,889 (3)	14,691 (3)	23,185 (1,2)
Other	do.	616	808	1,098
Total household	do.	16,173 (3)	17,130 (3)	29,873 (1,2)
Wisconsin:				
Farm households		275	695	695
Operator				
Age	Years	50	49	51
Years of school completed	do.	12.0	11.7	12.9
Farm operating experience	do	18	19	17
Farm business:				
Gross sales	Dollars	24,514 (3)[2]	20,702	11,267 (1)[2]
Cash operating expenses	do	32,381 (3)	18,794	11,969 (1)
Sales/expenses (less interest) ratio		1.0	.9	1.2
Crop acres	Number	149 (3)[2]	84	66 (1)[2]
Financial:				
Assets	Dollars	262,855 (3)	229,920 (3)	149,193 (1,2)
Debts	do	85,774 (3)	30,362	20,765 (1)
Net worth	do	177,081	199,558 (3)	128,428 (2)
Debt/asset ratio		33 (3)	13 (1)	.14 (1)
Income by source:				
Net cash farm operating	Dollars	-7,466 (2,3)[2]	1,787 (1)[2]	1,115 (1)[2]
Off-farm employment	do.	15,127 (3)	22,575	29,603 (1)
Other	do	2,909	2,796	3,884
Total household	do.	10,570 (2,3)	27,158 (1)	34,602 (1)

[1]Numbers in parentheses refer to significant differences between means. For example, the mean number of years of school completed in column 1 is different from the mean reported in column 3.

[2]These differences are significant at the 90-percent confidence level.

Sources: 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey.

terest expense associated with that debt appears to have cut sharply into farm profits

Implications and Conclusions

Debt-related stress was a major problem among the least viable dairy farm households and, to a slightly lesser extent, among households with full-time operators and larger farms and households with part-time operators (Households that are in these subgroups and that have viability ratios less than 1.0 made up about 25 percent of the entire sample.)

The question of how to enhance viability among farmers with debt-related stress is not easy to

Table 6—Average characteristics of farm households with full-time operators and sales of less than $20,000, by level of viability ratio[1]

Item	Unit	Viability ratio		
		Less than 1.0 (1)	1.0 to 1.9 (2)	2.0 or greater (3)
Mississippi-Tennessee				
Farm households	Number	1,140	755	235
Operator				
Age	Years	61	63	65
Years of school completed	do	8.4	9.0	9.3
Farm operating experience	do	28	32	33
Farm business:				
Gross sales	Dollars	4,828 (3)	6,230	8,494 (1)
Cash operating expenses	do	5,858 (2,3)	3,607 (1)	3,346 (1)
Sales/expenses (less interest) ratio		1.2 (2,3)	2.4 (1)	2.7 (1)
Crop acres	Number	65	56	52
Financial:				
Assets	Dollars	143,014	152,172	168,648
Debts	do	13,771 (2,3)	1,820 (1)	1,158 (1)
Net worth	do	129,243	150,352	167,490
Debt/asset ratio		.10 (2,3)	.02 (1)	.01 (1)
Income by source:				
Net cash farm operating	Dollars	-874 (2,3)	2,726 (1,3)	5,219 (1,2)
Off-farm employment	do	1,243 (2,3)	2,620 (1)	5,715 (1)
Other	do	2,942 (2,3)	5,368 (1,3)	10,016 (1,2)
Total household	do	3,311 (2,3)	10,714 (1,3)	20,950 (1,2)
Wisconsin:				
Farm households	Number	230	345	140
Operator:				
Age	Years	63	65	68
Years of school completed	do	9.8	9.3	10.7
Farm operating experience	do	36	36	30
Farm business:				
Gross sales	Dollars	6,980	6,314	4,645
Cash operating expenses	do	7,597	5,868	6,877
Sales/expenses (less interest) ratio		.9	1.3 (3)	.5 (2)
Crop acres	Number	85 (2,3)	56 (1)	39 (1)
Financial:				
Assets	Dollars	177,983	214,367	274,664
Debts	do	2,155	8,707	1,167
Net worth	do.	175,827	205,660	273,497
Debt/asset ratio		.01	.04	[2]
Income by source:				
Net cash farm operating	Dollars	-1,128	439	275
Off-farm employment	do.	390	6,133	5,566
Other	do	5,283 (2,3)	9,728 (1,3)	22,646 (1,2)
Total household	do.	4,541 (2,3)	16,300 (1)	28,487 (1)

[1]Numbers in parentheses refer to statistically significant differences For example, the mean gross sales in column 1 is different from the mean in column 3.

[2]Less than 0.01

Sources 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey

answer. Initiatives from the public sector can take two approaches. First, Government programs may attempt to raise and/or stabilize commodity prices. However, such programs have not been the most cost-effective means of assisting households with serious debt problems. Commodity programs are not designed to assist only low-income farm families, that is, they benefit households that are already viable as well as those in trouble.

Second, Federal farm programs can more directly ease debt problems by making more credit available or making existing credit less expensive. These programs include below-market interest rates, and more recently, farm loan guarantees and incentives to private lenders to forgive a percentage of each farm loan and restructure the remainder. Such public initiatives are constrained by Federal budget considerations and by a lack of consensus on

Table 7—Average characteristics of farm households with full-time operators and sales of $20,000 or more, by level of viability ratio[1]

Item	Unit	Viability ratio		
		Less than 1.0 (1)	1.0 to 1.9 (2)	2.0 or greater (3)
Mississippi-Tennessee				
Farm households	Number	985	485	685
Operator				
Age	Years	46	48	48
Years of school completed	do	11.8	11.4	11.9
Farm operating experience	do	19	22	22
Farm business				
Gross sales	Dollars	116,695	116,919	153,013
Cash operating expenses	do	89,960	69,234	68,076
Sales/expenses (less interest) ratio		1.6 (2,3)	2.3 (1,3)	3.0 (1,2)
Crop acres	Number	749	602	667
Financial				
Assets	Dollars	527,330	528,439	448,524
Debts	do	127,018 (2,3)	43,645 (1)	25,425 (1)
Net worth	do	400,312	484,794	423,099
Debt/asset ratio		.24 (2,3)	.08 (1)	.06 (1)
Income by source				
Net cash farm operating	Dollars	20,708 (2,3)	36,998 (1,3)	76,387 (1,2)
Off-farm employment	do	3,314	4,843	4,869
Other	do	2,070	1,099	2,354
Total household	do	26,092 (2,3)	42,940 (1,3)	83,610 (1,2)
Wisconsin				
Farm households	Number	350	255	230
Operator				
Age	Year	47	46	50
Years of school completed	do	10.9	12.5	11.2
Farm operating experience	do	18	18	24
Farm business				
Gross sales	Dollars	109,539	136,255	96,884
Cash operating expenses	do	113,222 (3)	100,071	49,543 (1)
Sales/expenses (less interest) ratio		1.2 (2,3)	1.9 (1)	2.1 (1)
Crop acres	Number	465 (2)	210 (1)	323
Financial				
Assets	Dollars	759,837	429,025	423,592
Debts	do	223,159 (2,3)	95,149 (1)	27,014 (1)
Net worth	do	536,678	333,876	396,578
Debt/asset ratio		.29 (3)	.22 (3)	.06 (1,2)
Income by source				
Net cash farm operating	Dollars	-4,605 (2,3)	37,241 (1)	44,114 (1)
Off-farm employment	do	1,428	4,872	2,453
Other	do	7,997	5,451	10,221
Total household	do	4,820 (2,3)	47,564 (1)	56,788 (1)

[1]Numbers in parentheses refer to statistically significant different means. For example, the mean sales-to-expenses ratio in column 1 is different from the means in columns 2 and 3.

Sources: 1981 Mississippi-Tennessee Family Farm Survey and 1983 Wisconsin Family Farm Survey.

whether credit assistance in its various forms can be either justified or effective.

Private sector options for addressing debt-related stress are few. Interest rates are determined through national money markets. Although private lenders may extend repayment schedules for selected borrowers, they cannot readily reduce interest rates.

The concept of viability used here includes enhancing net worth while meeting the cash outlays for capital replacement and family living expenses. A less viable farm household that has debt-related problems may have the option of liquidating, paying off debts, and investing the remaining money in a new occupation and residence.

Operators Who Planned to Stop Farming

All households in this group indicated that they planned to leave farming within 5 years of the survey. In general, this decision was the implementation of their retirement plans, rather than a response to financial stress. On average, the projected receipts from their investments, Social Security payments, and other retirement income, and their off-farm earnings were expected to sum to more than four times their minimum financial obligations.

Two points are worth noting. First, the projections made here assume preservation of net worth. An alternative that permitted converting assets into a lifetime stream of income, for example, an annuity, would result in higher income levels. Second, households whose total debts exceeded the value of their nonland assets were assumed to sell their farm upon exiting, and therefore no longer owned the farm residence. For some, this option would be a major hardship.

The typical household in this group is not likely to need public assistance in order to maintain a decent standard of living. Institutions or regulations that ease the conversion of farm assets into lifetime retirement annuities would, however, be helpful to some.

An estimated 6 percent of the households planning to stop farming (1 percent of the whole sample) did not have the combination of net worth, accumulated retirement funds, and off-farm work skills to be economically viable after exiting. For less viable households headed by persons of labor-force age, public sector involvement may be needed to enhance employment skills and earnings capacity. For households headed by older individuals, public transfers are likely the most effective form of assistance. Such transfers include existing Food Stamps, Supplemental Security Income, Medicare/Medicaid programs, and subsidized housing.

Wisconsin Dairy Farm Households

Almost half of the households in this group were not viable. Higher debt, younger operator age, and lower farm production efficiency were typical of the least viable households. We assumed that younger dairy farm operators acquired their assets at more recent, higher prices than their older counterparts. They may have started farming too recently to have obtained long-term financing at relatively low, fixed interest rates as was commonly done by farmers a few years earlier.

High levels of absolute debt and high debt-to-asset ratios indicate that these households are vulnerable to declines in asset valuation and therefore to maintenance of their access to credit sources. These households were also financially disadvantaged by currently high interest payments relative to receipts, as reflected by their low net farm operating income.

When a family started farming is not the only factor indicative of viability. Efficiency of farm production, measured in terms of gross sales per dollar of operating expenses (excluding interest), was typically lower among the least viable households. This finding suggests that individual farm households could increase their viability with improved farming technology and farm business management. Extension Service farm management training programs designed to help younger farmers increase their sales per dollar of expenses (rather than to increase their size over some minimum level) may increase net farm income and debt-servicing capacity and, in turn, enhance viability.

Dairy farm households that are not viable may consider leaving agriculture. We estimated total income for dairy farm households with a viability ratio less than 1.0 to evaluate the consequences of such an action. Given the average financial and human resources reported by these households, we estimated that after-tax income upon leaving farming at the time of the survey would have been roughly $25,000, or two-thirds more than observed

income in the survey year.[9] Because land and machinery assets have declined in value since the survey year, after-tax income in 1986 will be significantly lower

Households with Part-time Farm Operators and Nondairy Farms

Part-time farm operators worked off-farm for a period equivalent to at least 4 weeks during the survey year. Their attempt to find a mix of farm and off-farm work consistent with their objectives seemed, in general, to have worked well. However, some part-time farmers appeared to have overextended their labor commitment. The least viable households, on average, had the largest and at the same time, the least profitable farms. (In Mississippi-Tennessee, they also appeared to be the least efficient.) In addition, they reported the least off-farm income. These relatively larger farms may have required more farm labor input from farm operators than they had been able to commit, given the requirements of off-farm work.

The most viable households, on the other hand, more successfully combined farm and off-farm employment. On average, they received more than twice as much net household income as the least viable households

These findings are important in light of the current debate over the changing structure of agriculture. Some analysts suggest that because off-farm income provides a financial buffer, part-time farmers may be less vulnerable to fluctuations in farm commodity prices and to "boom-and-bust" periods in the agricultural economy. This study suggests, in fact, that off-farm work is not a panacea for all part-time farm families.

An estimated 17 percent of the households with part-time farmers were not viable Public options for enhancing their viability include Extension Service assistance to better manage their farms, to help define and achieve their family goals, and to combine farm and off-farm activities to the household's greatest benefit. Some families may wish to maintain a rural lifestyle and be able to achieve this goal with a smaller commitment to farming

As with other farm households in severe financial stress, the least viable households may be able to convert some of their assets to ready cash and leave farming We estimated that after-tax income for the typical household with a viability ratio less than 1.0 would have averaged roughly $28,000 in Mississippi-Tennessee and $29,000 in Wisconsin, had they stopped farming in the year of the survey.

Forty-seven percent of the households surveyed were in the most viable group Because they relied most heavily on off-farm earnings, they may indeed withstand farm-related yield or price shocks, but conversely, may be vulnerable to changes in the demand for their off-farm labor.

Households with Full-time Farm Operators and Smaller Nondairy Farms

Viability appeared tenuous for about half of the households in this group. Instead of providing supplementary income, farming was apparently a drain on limited resources. Among the least viable households, the average farm business was not successful in converting purchased inputs into marketable products, nor was it profitable. The typical farm, with an average of only 65 crop acres in Mississippi-Tennessee and 85 crop acres in Wisconsin, was probably not large enough to support a household even if it could be made more profitable

In terms of improving household viability, farm management assistance programs, job training programs, and other rural development efforts are not likely to have a major impact, primarily because the typical operator in this group was at retirement age.

Leaving agriculture was a possible option for households whose farm businesses did not generate a profit, particularly for those with low debt levels It may be practical for these families to rent out their acreage, sell their nonland assets, and continue to live on the farm. On the other hand, they may choose to sell their farms We estimated that the average household with a viability ratio of less than 1.0 would have realized total annual income of about $13,100 in Mississippi-Tennessee and $15,600 in Wisconsin, had they sold their farm in the year of the survey.

Public assistance from Food Stamps, Supplemental Security Income, Medicare/Medicaid programs, and

[9] To estimate after-tax income for the average household with a viability ratio of less than 1.0, we assumed all farm real estate and other assets were sold and debts were retired, after-tax value of remaining equity was invested at an annual return of 10 percent, and the operator worked full-time off-farm for minimum wage (in the case of dairy farmers, part-time farmers, and larger full-time farmers) or retired (in the case of smaller full-time farmers)

subsidized housing would likely be necessary. Establishing institutions that facilitate the conversion of farm assets into a lifetime retirement annuity is also an option. (For example, Federal capital-gains taxes on land sales might be waived for distressed older households.)

Households with Full-time Farm Operators and Larger Nondairy Farms

The farm business was the most important factor in determining viability among these households. Overall inefficiency (in Mississippi-Tennessee) and high interest expenses characterized the least viable households, which made up 40 percent of the total Average net farm income, particularly in light of high net worth, was very low.

Financial stress did not appear to be related to how long these farmers had been operating, as it was among dairy farmers. (Neither operator age nor experience differed between more and less viable households.) This finding suggests that some operators adopted an expansion strategy based on extensive use of credit.

Public options for improving viability among these farmers are similar to those which applied to the dairy farm households. Extension education aimed at increasing farm management ability may help the less efficient farmers. Credit assistance in the form of refinancing and payment rescheduling may help farm households with high debt levels. These two types of programs would be especially important to households that operate midsize commercial farms Households in this group typically depend on the farm for their livelihood, but their farms cannot generate large (absolute) profits. They have less margin to absorb the consequences of inefficiency or to pay high interest costs

Individual families who are less viable may choose to leave farming and convert their net worth into liquid assets. The after-tax value of their assets may be sufficient to establish these families in new residences and occupations. We estimated that the average household with a viability ratio of less than 1 0 would have realized an annual income of about $36,000 in Mississippi-Tennessee and $46,800 in Wisconsin, had the farm been sold in the year of the survey. An alternative option might involve postponing capital replacement in the short run.

No public program will cure all the ills in the farm sector, nor does the entire farm sector seem to need a cure Some families need direct income transfers to maintain a decent standard of living, some need training and education some are farming successfully with the resources on hand Understanding this diversity is crucial to designing effective agricultural and rural development policy.

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Appendix A—Survey Design

A stratified, two-stage cluster design was used to draw the sample in the 1981 Mississippi-Tennessee survey. The selection of segments constituted the first stage of the sampling procedure. The 29-county site was divided into segments ranging from about one-tenth of a square mile in urban residential areas to 2 square miles in less densely populated, rural areas. Each segment was classified by land use. Categories ranged from intensively agricultural to urban. Agricultural categories were sampled most heavily to ensure an adequate sample size. In the second stage, all households in each of the 859 selected segments were contacted to determine whether they qualified as family farm households. Eligible households were asked to participate in the survey

In the 1983 Wisconsin survey, a random sample of farm operators was drawn from a regularly updated list of all operators in the eight-county area. Developed from several sources, the list included but was not limited to operators listed in township assessors' books, operators who sell milk and test their animals for brucellosis, persons certified to apply pesticides, members of commodity groups, and participants in Federal farm commodity programs.

Trained enumerators conducted onfarm interviews with the farm operator. When the operator was not available, they interviewed the next most knowledgeable person.

Appendix B—Normalizing Income for Mississippi-Tennessee Households

In the Mississippi-Tennessee study area, farm production data were collected for 1980, a year of unusually low crop yields. Crop prices in 1980 fell considerably below the level expected in an average year. To evaluate the viability of these farms under more representative conditions, yields of major crops (cotton, corn, wheat, and soybeans) were "normalized" for each farm. Gross farm sales, net cash farm operating income, and related variables were calculated on the basis of these normalized figures. The "normal" yields for each of the four crops were estimated as follows:

$$Y_{n_i} = (Y_{o_i}/\bar{y}_{o_i})(\bar{y}_i),$$

where: Y_{n_i} = estimated normal yield for sample household, crop i,

$\bar{y}_{o_i}$ = mean observed yield for survey area, 1980, crop i,

Y_{o_i} = observed yield for sample household, crop i,

$\bar{y}_i$ = 5-year average yield for survey area, crop i.

The relationship between the observed yield on each sample farm and the mean observed yield for the survey area was used as the basis for projecting "normalized" yields. It is assumed, for example, that a farmer who could achieve a crop yield 10 percent higher than other farmers in a bad year could also have achieved a yield 10 percent higher in a normal year. Likewise, a farmer who only reached, for example, 80 percent of the average observed yield in the bad year is assumed to reach 80 percent in a normal year. This adjustment shifts the mean of the sample yield distribution without affecting the variance of sample observations. We assumed that adverse weather in 1980 affected all farmers in the survey area and reduced all farmers' observed yields by the same proportional amount.

Most crop production expenses (for example, seed, fertilizer, pesticides, fuel, and labor) were incurred before farmers knew that yields in 1980 would be seriously affected by drought. Therefore, in the process of normalizing farm income, we did not adjust observed production expenses. Because they do not vary significantly with yields, observed harvest and marketing costs were also not adjusted. Because prices for the affected crops are determined primarily in national and international markets, we did not make product price adjustments.

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