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AND THE FARM POPULATION

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ON COMPARING FARM MANAGEMENT ASSOCIATIONS AND THE FARM POPULATION

The data from farm management associations are being used for many educational and research purposes. For example, Olson, et. al. (1987, 1986a, 1986b) evaluated the trends of two associations and compiled the annual report of the summary of the individual records; Scott compiled a set of financial benchmarks for business analysis; and Sonka, et. al., analyzed farm differences which may account for profit differences. And there are many other potential uses for which the data could be used.

However, association membership is voluntary and not a random sample of the population. So whether the association data is used appropriately depends upon how it is used and how representative the membership is of the population. The representation question is not whether the data can be used or not, but on what projects is it an appropriate data source. For some uses, such as preparing case studies, the answer to the representation question is not as crucial as it is for other uses, such as evaluating policy impacts. To interpret results and conclusions correctly, the representation question needs to be answered.

Two previous studies which compared record-keeping farms with sample farms from the general farm population had different conclusions. Mueller found that, compared to a random sample of farms, a set of record-keeping farms in Illinois were larger in terms of acreage, had a higher soil quality, used more inputs per acre, and had better management as measured by financial performance. However, Mueller also paired the sample farms and record-keeping farms on the basis of land size and soil quality and found that managerial ability was positively related to size but not related to membership in a record-keeping group. In 1939, Hopkins (as quoted in Mueller) found that record-keeping farms in Iowa used more short-term capital and had higher earnings than comparably sized survey farms. Thus, each association needs to be compared with the local farm population. A general statement can not be made. The need to compare the membership of the same association probably recurs over time as the membership and the general population change.

In this paper, the procedures for comparing association membership and the farm population are discussed. The Southwestern Minnesota Farm Business Management Association membership is used as an example of how comparisons can be made. The objectives are to describe the points at which comparisons should be made, to present the potential pitfalls and problems that may occur, and to exemplify how they can be made.

METHODOLOGY

The common assumption about members of farm management associations is that they will be larger in size and better managed than their counterpoints in the general farm population. This perception is due to two views: (1) better managers will seek out better information--and associations are one source for that information, and (2) better managers will operate larger farms.

To test this assumption mentioned above, the size and managerial dimensions need to be compared between the association membership and the general population. Size is measured in physical and financial terms by acres, livestock numbers, sales activity, investments, and liabilities. Managerial prowess is multi-dimensional; thus, several areas need to be analyzed: profitability (e.g., ROA, ROE), crop yields, livestock productivity, asset turnover rates, financial stress, and other measures. The association data and the population data can be compared on the basis of the basic statistical measures with t-tests performed on the group means. If the data is available, response or cost curves could be estimated and compared between the two groups to compare production relationships. The level of financial stress can be compared by evaluating profitability, solvency, and liquidity or by constructing an index of financial condition. The level of management ability can be compared indirectly by evaluating profitability, productivity, efficiency, and financial stress. For some uses such as policy analysis or market response, it is necessary to know the operator's commitment to farming; age, tenure, and principal occupation are indicators of this commitment. Comparisons are grouped into the areas of physical, financial, operator, and managerial characteristics.

Data sources for this comparison include the membership records, the agricultural census, and other surveys. The Southwest Association includes members from these Minnesota counties: Brown, Cottonwood, Faribault, Jackson, Lincoln, Lyon, Martin, Murray, Nicollet, Nobles, Pipestone, Redwood, Renville, Rock, Watonwan, and Yellow Medicine. The data from the 1982 Census of Agriculture for these counties have been aggregated and reported as the "Southwest Counties".

PHYSICAL CHARACTERISTICS

Physical characteristics of the farm include size, location, and quality. Size includes both the number of both acres and livestock. Size may also be measured in terms of sales which is compared in the next section, "Financial Characteristics." Location may be important in comparing proximity to markets and concentration of association

membership. Quality can be measured by both yields and animal productivities; however, the farmer's management ability may increase yields and productivities beyond the basic quality of the farm. A soil quality index may be a better comparison of the basic productivity of the land resource but that data is not available in the census and most associations do not collect that information for each farm.

Farm Size

If the average association farm is significantly larger than the population average, the data may not be appropriate for use in analyzing the impact of ploicy and market analysis or for monitoring the overall financial condition of the farm population. Misconceptions and misinterpretations can result in using the association data. However, the population also needs to be analyzed in terms of where production takes place. It may be that the larger farms produce the majority of the production entering the market place. Thus, if the association represents the larger farms, they may be a good source of data.

The average farm in the Southwest Association is larger than the average census farm. The average association farm had 541 acres in total and 480 crop acres in 1982 (Table 1). The census farms with sales greater than $10,000 had a larger average size than the average of all farms. If the individual farm data were available from the census, a comparison of the average sizes for the larger farms may show sizes similar to the association farms.

Differences in the mix of enterprises may indicate differences in diversification between association members and the farm population as indicated in the census. The association farms tend to have larger acreages of corn and soybeans, smaller acreages of wheat and similar acreages of oats and hay for those farms which had those crops. The absolute difference may be due to a larger total crop acreage, but the increased importance of corn and soybeans indicates less of diversification on the part of association members. Livestock numbers also point a diversification difference. Association farms tend to have a similar number of hogs and pigs, more beef cows and milk cows, and fewer sheep and lambs.

Yields

Crop yields can be used as an indicator of both soil quality and management ability. Since the data for it is absent, yields are the best estimates of the basic soil quality, but the influence of the farmers' management ability is unknown. The Southwest Association farms have higher average crop yields than all census farms and for census farms with sales greater than $10,000 (Table 2). The difference is largest for corn. The yields are close enough however

that it would be very appropriate to use individual farm data to test the statistical significance of the difference with a t-test.

FINANCIAL CHARACTERISTICS

Financial characteristics measure both the stocks and flows of the farm business. The stocks involve investments and liabilities. The flows involve sales, expenses, cash flow, and profitability. Financial ratios are invloved in both the stocks and flows and relate the two such as with the return to equity.

Investments

Total investment may be more a function of the physical size of a farm business, but the investment per acre may indicate the quality of the land and machinery if they are valued on a market value basis rather than an original cost basis. The machinery value per acre may be influenced by management ability to utilize machinery more efficiently, by a willingness to take more risk versus having a larger machinery investment, or by a choice of new versus used machinery. The differences in appraisal methods and apraisors may be too great to place much emphasis on the comparison with the census data. A separate survey, as Mueller and Hopkins have done, may be the only way to obtain more consistent and comparable asset valuations.

In 1982, Southwest Association farms were larger in acreage and thus had larger total investments in land and buildings per farm, but the investment per crop acre is less than census farms (Table 3). The investments in machinery and equipment per crop acre are also lower for the association farms. However, the machinery and equipment assets was valued on a cost-less-depreciation method in the Southwest Association and on a market-value method in the census so the values are not directly comparable, but the lower investment for association farms is still obvious.

Liabilities

A comparison of the level of liabilities per farm and per acre will indicate differences in the willingness to take on debt and the relative degree of inflexibility caused by the fixed debt servicing commitment. It may also indicate the fact of more recent capital purchases. Since the census does not have liability information, the USDA's 1984 Farm Cost and Return Survey (FCRS) (as reported by Morehart and Prescott) is used. The smallest comparable area in the FCRS data is the Lake States (Michigan, Wisconsin, and Minnesota). In this comparison, the association farms have a debt of $298,933 per farm (Welsch, et al., 1985) compared to $87,794 per farm for the Lake States. The larger debt per farm is expected since the average size is larger. On a per acre basis, the association farms had $623 in

debt compared to $462 per acre for the average farm in the Lake States. The larger debt per acre may indicate a more recent purchase of the land, more willingness to go into debt, or a higher land value. The larger debt level does indicate that, compared to other farmers in the Lake States, a larger portion of the association member's income is committed to debt repayment and he/she is more exposed to loses if income falls. A more detailed survey on purchase schedules and risk atitudes is needed to make a more definitive statement about these differences in the debt load. Further disaggregation of the FCRS data to the Southwest Minnesota area would yield more comparable information.

Farm Product Sales

Farm product sales are an indication of farm size and can also be used to evaluate diversification between those products that are sold. This does not capture the diversification potential of a farmer with the choice of selling a feed crop or feeding that crop and selling the livestock.

The sales are larger on a per farm and on a per acre basis for the association farms except for corn and wheat on a per acre basis (Table 4). Both of these comparisons are as expected. The association farms are larger in terms of acres and in terms of cattle numbers. The larger sales per acre for the association may be an indication of better resource utilization, more livestock per acre, and/or better marketing. The higher numbers of livestock per association farm is a major factor in the lower corn and wheat sales per acre for the association. The asset turnover rate may yield a better understanding of the resource utilization efficiency.

In terms of the diversification of product sales, Southwest Association farms are less diversified than Southwest census farms (Table 4). The association farms have 67% of their sales from livestock and poultry and 30% from grain sales. All Southwest Minnesota census farms received 49 percent of the their sales from grains and 49 percent from livestock and poultry sales. This seems to be against the reported acreages (Table 1), but the Southwest Association members are feeding proportionately more of their grain than all of their neighbors; thus placing a higher proportion of their sales in livestock, especialy cattle and calves.

Production Expenses

The comparison of production expenses can show differences in production practices and input use intensity. Differences in input prices may distort the actual differences in the physical levels of input use, but that information is not available without a more detailed survey and a set of assumptions to make the physical numbers comparable. Most associations do have enterprise costs and returns,

but that information is not as readily available for the local farm population. The USDA's cost of production survey may be one source of this enterprise information. If consistent and comparable enterprise information is available, cost functions could be estimated to compare production methods and relationships.

Production expenses are larger for the average association farm than for the average census farm (Table 5). On a per acre basis, the crop production expenses are lower for the association indicating a difference in production practices. The difference may be due to increased efficiencies, better management, or higher land quality allowing lower input use. Livestock expenses are reported per farm but not per head basis because of the differences between livestock types.

Financial Ratios

Comparing the financial performance and condition of member farms and the population is crucial to understanding how well the association represents the population. This involves looking at the debt/asset ratio, the rates of return to investment and equity, the liability structure ratios, and other measures. These ratios show how the business is managed in terms of profitability, cash flow, asset and liability holdings, resource use efficiency, and use of debt over time. Comparisons of these ratios can be very useful in evaluating how we might expect farmers to react to different policies, market conditions, and other stimuli.

A survey such as FCRS is needed for these comparisons since the census does not contain all the needed data. The average association farm has a debt/asset ratio of 51 percent in 1984 compared to the Lake States' average of 29 percent. With the rate of return defined as net cash income divided by total assets, the association has an average of 7.1 percent and the Lake States average 2.4 percent. Defining the rate of return with the net cash income can cause inaccurate comparisons if other noncash costs and incomes are significant so the accural farm income is better if it is available. Other ratios and measures can be calculated also. As with any comparison, better information would be obtained if the survey data comes from an area more comparable to the association area.

Financial Stress

The level of financial stress is an area of special interest and concern. The intensity or lack of intensity of stress can affect how a farmer makes decisions. Hence, if the association differs from the population in the level of stress, the decisions may be different and the association data not appropriate for some research topics.

Financial stress is usually thought of as a cash flow concept. However, in recent years the debt/asset ratio has been used as a crude

measure of stress. The potential problems with the debt/asset ratio can be seen in the financial ratios compared in the previous section. Is the average association farm with a 51 percent debt/asset ratio worse off than the Lake States' average of 29 percent? Compare that to the rate of return as defined of 7.1 percent and 2.4 percent. (This comparison is possibly biased due to the net cash income being used instead of the net accrual income for the rate of return.) Financial stress can also be evaluated in terms of a financial condition index as Lines and Morehart have done using the adjusted cash balance, debt/asset ratio, and the rate of return to assets.

OPERATOR CHARACTERISTICS

A farmer's age, tenure, and principal occupation can affect how she/he reacts to internal and external stimuli and how her/his personal and business goals are shaped. While there are expected behaviors according to these characteristics, individuals can deviate from those expectations. However, the average characteristics for a group can yield expectations of how we may expect the group to behave given different stimuli. By comparing the averages of two groups, we may be able to make some statements as to how the groups may behave similarly or differently.

Age

A person's age can affect his/her planning horizon. For example, a younger person, just starting to farm, may be planning to expand while an older person, who is near retirement, has expanded in the past and has no expansion plans in the future. However, the financial condition of the farmer also has an impact on expansion plans. A starting farmer may have insufficient resources to expand as desired while an older farmer may have sufficient resources to expand, but no desire to expand. Thus, expansion may be more apt to take place with "middle-aged" farmers who have obtained some resources. Another problem with viewing age as an indicator of what a person may do is that physical age may not be a good indicator of the person's stage in the family-firm life cycle. That is, farmers of the same age may be at different points of their life cycle and thus react differently to the same stimuli. Conversely, farmers of different ages may be at the same stage of their life cycles and will react in the same way.

These differences between individuals may be "averaged out" when group averages are calculated. So comparing the average age of two groups does have some merit because expected behaviors are more likely to occur. (The question remains as to whether the mix of different types of individuals is the same between groups, but the data to answer that question is not collected by associations.)

The age comparison exemplifies the need for consistent data over time and for using data from the same year. In the 1982 Census of

Agriculture, the average age of the operator in the Southwest Counties of Minnesota was 45.6 for those farms with sales greater than $10,000. The association did not collect age information in 1982. In 1985, the average age of the operator was 43.4 in the Southwest Association. It would be incorrect to subtract three years from the 1985 average to attempt to estimate a 1982 average; that step would ignore population dynamics! The average ages appear to be close enough that we can not presuppose that the age difference would cause differences in management, operation, or planning. An improvement that can be made in the comparison of ages is to obtain estimates for the same year and to test for differences in the group means with a t-test. The distribution over ages may be very important to evaluate.

Tenure

A farmer's tenure on the land may affect greatly the outlook he/she has for longterm planning. A full owner is expected to have a longer planning horizon than a tenant. This expectation may not be true in all cases; ownership may be crucial to the length of a planning horzon but it is not the only factor. Other factors may create a short planning horizon regardless of ownership; these factors may include: age, health, development potential, family considerations, and others. As with age, these deviations from the expected pattern of behavior may be "averaged out" when the group characteristics are considered. The 1982 census reports that 41 percent of the operators in the Southwest Counties are full-owners of all the property they farm; 37 percent are part-owners; and 22 percent are tenants. This information is currently not available for the association, but a comparison could indicate differences in tenure and thus potential differences in management and planning.

Occupation

In a similar fashion as tenure, a person's principal occupation may affect the decisions made on the farm. According to the 1982 census, 85 percent of the operators in the Southwest Counties have farming as their principal occupation. In the association, 100 percent of the membership has farming as their principal occupation. The difference in the principal occupation may cause differences in operation decisions such as production timing chosen not to interfere with the nonfarm job and not for optimum farm productivity.

MANAGEMENT

The level of management is usually assumed to be higher for members of management or record-keeping associations. This assumption is linked to the view that the member farms are larger and thus require better management and also to the idea that better managers will join these associations because of the management information that is available to members. Mueller found that compared to the average farm

in the population, association farms had better management, but compared to farms with similar size and soil quality, the management difference disappeared.

There are many common measures of management ability. Land and livestock holdings, large machinery, crop yields, and livestock productivity are often used to infer good management and for bragging; but they do not show good financial management necessarily. Even the total profit is not a good measure of how well resources are used relative to their potential use. Better measures of financial management are the rates of return to assets and equity. Comparisons also could be made on the level of financial stress between association members and the farm population. While there is some inaccuracy, a better financial condition after the recent period of declining asset values and low commodity prices can be a good indicator of financial management. Since experience is a good teacher of managers, we would expect an older farmer with more years farming to have more management skills than a younger or less experienced farmer. However, the events of the last decade have shown that production skills alone is not sufficient for management success.

SUMMARY

Data from farm management associations can be very valuable for research and educational projects. However, these projects have to be careful in how the data is used and the conclusions are drawn from the data. The representativeness of the membership is an important question that needs to be answered. This paper presents the procedures for comparing association members with the farm population. Several problems and pitfalls and their potential solutions or alternatives are discussed. The Southwestern Minnesota Farm Business Management Association membership is used to exemplify the comparison process. By knowing who the membership represents, the data can be used correctly and perhaps in even more projects.

Table 1. Farm Size Measured by Total Acreage, Crop Acreages, Livestock Numbers, and Total Sales in 1982.

Item	Southwest Association	Southwest Counties: All Farms	Southwest Counties: Farms with Sales >$10,000	Minnesota: Farms with Sales >$10,000
	Average per farm by item			
Total Acreage:	541	315	349	374
Crop Acreage:	480	304	328	323
Corn:	198	137	142	115
Soybeans:	192	137	142	126
Wheat:	38	55	55	154
Oats:	25	28	28	36
Hay:	32	25	32	55
Livestock Numbers:				
Beef Cows:	56	32	35	32
Milk Cows:	48	35	36	37
Hogs & Pigs:	298	288	302	249
Sheep & Lambs:	31	71	83	73
TOTAL SALES:	$248,606	$89,266	$99,348	$87,174

Source: Welsch, et. al., (1983) and U.S. Department of Commerce

Table 2. Crop Yields in 1982.

Item	Southwest Association	S.W. Counties ('82 Census) All Farms	S.W. Counties ('82 Census) Farms with Sales > $10,000	Minnesota Farms with Sales >$10,000
Crop Yields/Acre:				
Corn (bu.):	126	112	112	104
Soybeans (bu.):	40	36	36	34
Wheat (bu.):	40	37	37	38
Oats (bu.):	81	73	74	63
Alfalfa Hay (tons)	4.6	3.7	3.3	2.8

Source: Welsch, et. al., (1983) and U.S. Department of Commerce

Table 3. Farm Investments per Farm in 1983.

Item	Southwest Association	Southwest Counties ('82 Census) All Farms	Southwest Counties ('82 Census) Farms with Sales > $10,000	Minnesota Farms with Sales >$10,000
Machinery & Equip. 1/				
Per Farm:	$63,639	$76,509	$83,416	$78,601
Per Crop Acre:	133	252	254	243
Land and Buildings				
Per Farm:	$802,319	$498,755	$552,253	$444,911
Per Total Acre:	1,483	1,583	1,582	1,190

1/ Machinery and equipment investments were valued on a cost-less-depreciation method in the Southwest Association, and on a market-value method in the census, thus, they are not directly comparable.

Source: Welsch, et. al., (1983), and U.S. Department of Commerce.

Table 4. Farm Product Sales in 1982.

Item	Southwest Association	Southwest Counties All Farms	Southwest Counties Farms with Sales > $10,000	Minnesota Farms with Sales > $10,000
		Average Dollars/Farm		
Total Sales	$248,606	$89,266	$99,348	$87,174
All Grains	73,387	43,882	49,148	34,329
Corn for Grain	30,102	21,270	23,838	14,230
Soybeans	40,905	20,525	22,998	11,500
Wheat	1,217	1,413	1,575	5,659
All Livestock and Poultry	165,568	43,500	48,691	48,013
Poultry	4,183	1,920	2,152	5,819
Dairy and Dairy Products	15,019	5,080	5,708	17,562
Cattle and Calves	82,385	17,727	19,848	12,181
Hogs & Pigs	63,673	17,509	19,610	11,816

Table 5. Selected Farm Production Expenses in 1982.

Item	Southwest Association	Southwest Counties All Farms	Southwest Counties Farms with Sales > $10,000	Minnesota Farms with Sales > $10,000
		Average Dollars/Farm		
Livestock & Poultry Purchases	$60,378	$29,393	$32,111	$20,900
Feed	36,394	14,768	16,441	16,125
Commercial Fertilizer	7,274	6,165	6,331	6,607
Hired Farm Labor	6,646	4,700	4,691	5,739
Energy and Petroleum Products	9,947	7,239	7,814	7,625
Interest Expense	30,317	14,231	14,821	14,055

Source: Welsch, et. al., (1983) and U.S. Department of Commerce

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