SOME POLITICAL ARITHMETIC OF LARGE AND SMALL

by

B. F. Stanton

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Most economists get caught up in one way or another with size and efficiency issues. We all play a numbers game. It may be to describe output and economic activity in any one of the sectors of the food industry. It may be to make comparisons about farm numbers or output among counties, among states or among countries. Most often it involves changes over time as well. But we are all asked to assemble statistics, to explain how these statistics are collected and to make generalizations about what these statistics mean. This is the very essence of the business of applied economists.

If anything the political arithmetic of large and small seems more topical in 1979 than most could have forecast. Issues of structure and distribution and their implications for equity and efficiency in American agriculture and in other societies around the world are topics for major public debate. Significant numbers of people question whether bigger is necessarily better. Increased size may or may not mean more efficient production. People want to know where the countervailing power will be located that responds to increased concentration of power and production in cotton, irrigated vegetables and feeder cattle.

In a speech to the Farmers Union in March 1979, Secretary of Agriculture, Bob Bergland responded to many of the pressures he has felt in his tempestuous years in office: - the march on Washington by the American Agricultural Movement, the calls for guarantees of cost of production and 100 percent of parity,

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the concerns about corporation agriculture and foreign ownership of land, the rising prices of farm land in the face of reduced prices and returns for corn and wheat. He started his speech this way:

> I am here to open what I hope will become a full-scale national dialogue on the future of American agriculture. I am here to ask you to begin thinking and thinking hard about what kind of agriculture you believe would be in the best interests of farmers and the nation.

He talked about the policies and programs that have evolved over the past 50 years and then asked these major questions:

> Are these policies and programs that helped create a food and fiber program that is the envy of the world at the same time creating or helping to create, something we don't want in American agriculture?
>
> Are they in whole or in part responsible for an unending trend toward larger and larger and fewer and fewer farms that will increasingly dominate and control production? . . .
>
> The truth is, we really don't have a workable policy on the structure of agriculture. To the extent we talk about such a policy - its focus is always on the number of farms. But on what basis do we decide whether we should have 1 or 3 million farms? Surely, it is time to develop a national farm structures policy.

This substantial quotation from a speech which has been stirring response both from within and outside USDA gives some flavor of national interests and concerns. The literature and discussion about "appropriate" technology in all its variations is part of this total. The excitement created by E. F. Schumacher's book, Small Is Beautiful: Economics As If People Mattered is another indicator. The 1978 Yearbook of Agriculture with its wide ranging contents and cryptic title, Living On A few Acres is still another. So is the interest in small farms, limited resource farmers and the growth and development of such organizations as the National Rural Center, National Land for People, Agribusiness Accountability Project and the National Family Farm Coalition. Diverse groups, usually with special interests and a desire to be part of the establishment, have added their voices to the debate about how many farms there should be, how big they should be and who should control them.

Nearly all who interpret the statistics on size distribution of farms and net income per farm operator family bring to these numbers a set of values and judgments about what ought to be in the best interests of society. These perspectives often are substantially different. The statistics are marshalled to support specific views. Often times rhetoric and special interest get in the way of careful analysis.

Reexamination of the Size Distribution Numbers

Annual estimates are made of the size distribution of farms in the United States using gross farm sales as the measure of size. Census data supplemented by annual surveys provide the basis for this series.

Table 1. NUMBER OF FARMS BY VALUE OF SALES
United States, 1960-1977

Gross farm sales	1960	1964	1968	1972	1977
			thousands of farms		
Under $2,500	1849	1558	1280	1109	958
$2,500 - 4,999	617	469	437	390	304
$5,000 - 9,999	660	534	439	374	302
$10,000 - 19,999	497	482	415	367	311
Subtotal	(3623)	(3043)	(2571)	(2240)	(1875)
$20,000 - 39,999	227	268	306	321	321
$40,000 - 99,999	90	114	149	217	348
$100,000 and over	23	32	45	82	162
Total	3963	3457	3071	2860	2706
C.P.I. (1967=100)	88.7	92.9	104.2	125.3	181.5

Source: ESCS, Farm Income Statistics, Statistical Bulletin 609, July 1978.

The familiar data on numbers of farms in the United States for selected years since 1960 are presented in table 1. Over this time span, using essentially the same definition for what constitutes a farm, the total has dropped from nearly 4 million in 1960 to 2.7 million in 1977. The peak number of

6.8 million farms occurred in the 1935 census year. From 1910 through 1940 census farm numbers were over 6 million and still 5.9 million in 1945. The important decline in total numbers suggested in table 1 began shortly after World War II and continues.

Definitions - To interpret the changing distribution of farm numbers through time requires that the census definition of a farm be kept in mind. From the beginning this definition was designed to include nearly any unit beyond a household garden which might be considered an agricultural production center. The 1850 census definition set the pattern:

> The returns of all farms or plantations, the produce of which amounts to $100 in value, are to be included in this schedule; but it is not intended to include the returns of small lots, owned or worked by persons following mechanical or other pursuits, where productions are not $100 in value.

The data in table 1 are based on the definitions used in the 1959, 1964 and 1969 censuses.

> Specifically a place was counted as a farm if it contained 10 acres or more and had an estimated value of $50 or more for total value of products sold . . . or if the place had less than 10 acres, it was counted as a farm if it had an estimated total value of products sold of $250 or more.

The new definition for a farm in the 1974 census increased the lower limit to $1,000 of sales of agricultural products for a unit under the control of one management. The minimum acreage requirement was eliminated. Even though the new definition for a farm has been in place for some time, most USDA officials and all the rest of us seen as part of the agricultural establishment, tend to refer to production agriculture with the statistics that make this sector appear as large as possible.

The impact of the new lower limit on what constitutes a farm is shown for the Northeastern States as well as the country as a whole in table 2. All of the reduction in numbers comes in one size class, those with gross sales under

$2500. It makes a difference in the aggregate in 1977 and 1978 of 11% in the U.S. total and 14% in that for the Northeast. Whether we like it or not there is political significance to these numbers. Formula funds for research and extension are related to farms and numbers of people in rural areas. Part of the mechanisms used at the state and local levels for public funding for agricultural programs relate to these key numbers.

Table 2. NUMBER OF FARMS BY STATE
Northeastern States, 1977-79

State	Old definition		New definition		
	1977	1978	1977	1978	1979
	- USDA Crop Reporting Board Estimates -				
Connecticut	4,000	4,000	3,800	3,700	3,600
Delaware	3,600	3,500	3,300	3,100	3,000
Maine	7,600	8,000	7,200	7,400	7,600
Maryland	17,500	17,400	16,100	16,100	16,000
Massachusetts	5,300	5,300	5,000	4,800	4,800
New Hampshire	3,000	3,200	2,800	3,000	3,000
New Jersey	8,300	8,300	7,600	7,600	7,600
New York	57,000	56,000	47,000	46,000	45,000
Pennsylvania	72,000	72,000	63,000	61,000	59,000
Rhode Island	740	760	640	660	670
Vermont	6,700	6,700	6,000	6,000	5,900
West Virginia	26,000	25,000	19,700	19,600	19,500
Northeastern States	211,740	210,160	182,140	178,960	175,670
United States	2,706,450	2,671,970	2,409,130	2,370,050	2,330,070

Source: Agricultural Situation, January-February 1979.

An Alternative to Gross Farm Sales to Measure Size

Having looked briefly at the current, familiar statistics on numbers and the size distribution of farms, let's return to the question of how to measure size and report change through time. Secretary Bergland has asked for a dialogue on the future of American agriculture and the development of a national policy on farm structure, or size distribution if you will. That means thinking hard about what is happening to farms of different sizes and how to follow these changes as they occur.

The changes in size distributions among farms since 1960 presented in table 1 use gross farm sales as the measure of size. For any single year this way of measuring large and small units has some meaning. But in a period of rising prices the comparability of $20,000 of gross farm sales in 1960 and 1977 is quickly lost. It is easy to forget how relatively stable prices were in the 1960's until one examines the CPI figures included as the last line of table 1.

Number of Commercial Farms Stable - If one uses the Consumer Price Index as a general indicator of changes in the price level, then gross farm sales of $10,000-19,999 in the 1960's are essentially equivalent to sales of $20,000-39,999 in 1977. Further, if one sets a lower limit of $20,000 of gross sales to qualify as a a commercial farm in 1977, then the equivalent lower limit would be $10,000 in the early 1960's. Using these two basic assumptions one can go back to table 1 and develop rough estimates of the total number of "commercial" farms in each of these selected years.

Year	Gross farm sales	Total number
1960	$10,000 and over	837,000
1964	$10,000 and over	896,000
1968	$10,000 and over	915,000
1972	$13,000 and over	820,000
1977	$20,000 and over	831,000

All the farms with gross sales of $10,000 or more for 1960, 1964 and 1968 are considered to be roughly equivalent to the number with $20,000 or more of sales in 1977. In a rather arbitrary fashion 200,000 of the 367,000 farms in the $10,000-19,999 class were included in the aggregate for 1972. Surprisingly, this suggests the total number of "commercial" farms has been remarkably stable.

This is not a sophisticated analysis, but it does suggest a somewhat different hypothesis about the number of commercial farms going out of business

or being absorbed by others during the last two decades. It does not say which farms came in or which went out. It does not tell much about changes within the group. To study changes in distributions of farms by size over time it does point to the need to use a different measure of size than gross farm sales or at least convert such data back to constant dollars if this measure is used for comparisons.

Further study of these aggregate numbers at the upper end of the size distribution is also interesting. Using the same logic or methodology, the 162,000 farms with gross sales over $100,000 in 1977 (table 1) are roughly comparable to all the farms selling $40,000 or more of product in 1964 which add up to a total of 146,000. In 1968 these two classes (all over $40,000 of sales) add to a total of 194,000 farms. If it were possible to go back to the original data and take out the influence of prices, that is count all the farms in 1960, 1964, 1968, and 1972 that sold the equivalent of $100,000 of agricultural produce based on 1977 values, the increase in numbers of farms of this size would be modest or non existent!! One can honestly ask if it is so that we have more large farms in 1977 than we did in 1960 if $100,000 of gross sales using 1977 prices is the lower limit of our definition of "large".

Size Classification Based on Labor - How might one measure the size distribution of farms in a manner that is more readily understandable and that is not tied to the problem of changing prices like gross farm sales? One alternative would be to use units of labor employed in agricultural production on each farm as the key and basic measure of size. If one set up classes that centered on a full year of labor used in farm operations, one might develop a size distribution of farms with these as the first class intervals:

less than 0.5 years of farm labor or equivalents
0.5 - 1.49 " " " " " "
1.5 - 2.49 " " " " " "
2.5 - 3.49 " " " " " "
3.5 - 4.49 " " " " " "
4.5 - 5.49 " " " " " "

As size of farm increased at the upper end of the distribution some of the intervals might well be larger including two or more year equivalents.

This measure of size would emphasize labor inputs from all sources used in production. It would require converting piece work on fruit and vegetable farms into hourly or daily equivalents. Nevertheless most farmers could quickly identify with this type of distribution. The bulk of farms would likely fall in the first five intervals. Reporting both gross farm sales and labor equivalents as measures of size would allow exploration of underemployment and levels of productivity in each of the size classes as well.

A Two-Way Classification of Farms

Substantial efforts have been made by economists and others to classify and sub-divide farms into meaningful categories on some basis other than size. One of the more comprehensive efforts was made by Foote for the USDA in 1970. Ownership of land and farm resources, form of business organization, number of managers, principal source of income and similar indices are used commonly to group farms. The more complex the classification system to consider all the variations that occur across this great country, the less likely one is to obtain agreement on the system or to make it comprehensive and include all the farms. Small farms are particularly difficult to categorize. Any comprehensive system that seeks to consider the reasons why these units are operated as they are soon runs out of objective criteria for the classification (Wood).

One simple approach is to divide farms into two groups: (1) those where the principal business of the manager or operator is farming and (2) part-time units of all types, commercial and otherwise. The intent of such a division would be to recognize and study as one group the units which produce the bulk of agricultural output where the primary business of the operator is farming. Then more serious consideration could be given separately to the kinds of

changes occurring within each group and if possible the transfers of individual units from one group to the other. This would put the limited resource farmers struggling to farm on a full time basis directly into the first group because they are making farming their primary business. It would also put the big hobby farm with one or more year round employees, including a manager, into the commercial class because the principal business of that manager (operator) is farming.

Such a classification would also call attention to the large number of part time farms of all types and their contributions to rural communities, to agricultural production and their significance as part of the agricultural system. In many states these units have more votes and more political muscle in the aggregate than do commercial farm families. Changes within this sector would be more readily identified. Needs of particular groups could be highlighted.

Family Income From All Sources

Consider current statistics on farm family incomes by size classes for 1977 as shown in table 3. Only averages for each size class are available. Total family income before taxes is divided into two sources: net farm income and off-farm income available from all sources earned by members of the family. The striking conclusion one can draw is that average family income is relatively constant among the first five size classes. Put another way, people living on farms need as much income as any other group to live. Off-farm income is supplemented modestly by income from farm operations by families who sell less than $5,000 of farm products. No doubt substantial variation exists around these averages. These two groups nevertheless account for nearly 47 percent of all the units included in the 1977 statistics as farm families. Net farm income accounted for less than 10 percent of family income in these cases.

Table 3. NET INCOME PER FARM OPERATOR FAMILY BY SOURCES
Averages by Size Class, United States, 1977

Gross farm sales	Number of farms	Net farm income	Off-farm income	Total family income
	(thousands)		(average per farm family)	
Under $2,500	958	$ 1,518	$15,077	$16,595
$2,500 - 4,999	304	1,508	14,559	16,067
$5,000 - 9,999	302	2,696	12,179	14,875
$10,000 - 19,999	311	4,987	9,466	14,453
$20,000 - 39,999	321	9,993	6,956	16,949
$40,000 - 99,999	348	18,502	6,011	24,513
$100,000 and over	162	38,310	9,636	47,946
All farms	2706	7,439	11,596	19,035

Source: ESCS, Farm Income Statistics, Statistical Bulletin 609, July 1978.

It is not until gross farm sales are in the range of $20,000-39,999 that net farm income exceeds off-farm income as a contributor to total family income on the average. It is also important to recognize that total family income was lowest on the average for the group with $10,000-19,999 of sales. While information is not available about the make up of farms in this category, one can speculate that a number of limited resource farms and farmers fall in this group including a number with very limited opportunities to obtain off-farm earnings. Included among the 311,000 in this group may also be a number of farm families nearing retirement or supplementing social security with small farm operations.

In each of the size classes, off-farm income is important. Even on the largest farms wives may work to supplement incomes and help meet mortgage payments. Off-farm income makes up 41 percent of total family income for units with sales of $20,000-39,999 and 20 percent of those with $100,000 or more.

Further perspective on the importance of off-farm income to the well being of farm operators is provided in table 4. During the last seven years off-farm sources have been both more important and more stable than net farm income in

the aggregate. Only in 1973 did net income from farming exceed other sources. The relative importance of second sources of income to farmers goes back to the beginnings of agriculture in this country. This was particularly true in the Northeast where most skilled artisans had a small farm, or most farmers or their wives or both worked part time off the farm either for neighbors, in the school or in town.

Table 4. FARM OPERATOR FAMILY INCOME
United States, 1972-1978

Year	Aggregate income			Income per family		
	Net farm	Off-farm	Total	Net farm	Off-farm	Total
	billions					
1972	$18.7	$20.6	$39.3	$ 6,500	$ 7,200	$13,700
1973	33.3	23.8	57.1	11,800	8,400	20,200
1974	26.1	26.5	52.6	9,300	9,500	18,800
1975	24.5	27.4	51.9	8,800	9,900	18,700
1976	18.8	30.4	49.2	6,800	11,100	17,900
1977	20.6	31.4	52.0	7,600	11,600	19,200
1978*	28.8	34.0	62.8	10,800	12,700	23,500

*Preliminary estimates.
Source: ESCS, Farm Income Statistics, Statistical Bulletin 609, July 1978.

Importance of Off-Farm Income

Because off-farm earnings are so important to the well being of farm families of all sizes, more effort needs to be given to improve the quality and detail in these statistics. Even amongst farm units where more than one full year of labor is employed, one or more members of the family often bring in significant outside income. These earnings may provide the primary source of income stability or diversification to a highly specialized farming unit. A job in town may be better than crop insurance and the best way to insure that mortgage payments are met.

A recent article in the Wall Street Journal calls attention to increasing numbers of 'sundown farmers'.

> Working nights and weekends and taking vacation time during planting and harvest seasons, thousands of such men manage to combine farming with a full time job off the farm. . . . Far from being transients, sundown farmers are a steadying force in agriculture. Because they make the bulk of their income from nonfarm work, they can easily weather the bad times and stay in farming for the long pull. (Cox)

Some of these individuals are working to the end of making farming their principal business. Others like the present combination. Our knowledge of the importance of outside sources of income and capital to farm operations should be increased if the processes leading to changes in the structure of agriculture are to be understood more fully.

Average Net Farm Income in the Northeast

A size distribution of farms by states and accompanying income statistics for farm families are not assembled and published annually. Back in 1850 about 40 percent of the nation's people and 35 percent of the farms were located in the 12 Northeastern States. As the country expanded, agricultural production moved west. About 25 percent of the people still live in the Northeast but only 5-6 percent of the farms and agricultural production remain. The process of adjustment to changing competitive conditions and combining of part-time farming with other sources of income has gone on for a long time. Farm numbers in this region reached a peak in 1880 as did land in farms. Now there are less than 20 percent of that number of farms as counted by the Census in the region, perhaps a harbinger of things to come nationally.

Average net income from farming per family for the individual states in this region is presented in table 5. Three year averages are presented to reduce the impact of single year price or yield fluctuations on the totals. For the region as a whole, net income per farm is similar to the national average. In 1965-67 eight of the 12 states were above the national average. In 1975-77 there were six above and six below.

Table 5. AVERAGE NET INCOME PER FARM* BY STATES
USDA Estimates 1965-67 and 1975-77

State	1965-67 Rank	1965-67 Net income (per farm)	1975-77 Rank	1975-77 Net income (per farm)
United States	---	$ 3,845	---	$ 7,589
Current Top States:				
Arizona	1	16,640	1	41,971
California	2	13,197	2	34,325
Florida	4	8,634	3	23,631
Hawaii	3	11,121	5	23,173
Washington	14	5,408	6	16,309
Northeast:				
Delaware	8	6,197	4	23,531
Maine	9	5,942	7	12,486
Connecticut	5	7,179	12	10,217
Rhode Island	16	5,155	13	10,216
Maryland	31	3,550	18	8,978
Vermont	18	4,628	19	8,792
Massachusetts	12	5,622	29	6,850
New Jersey	6	7,064	32	6,639
New Hampshire	28	3,702	40	5,107
Pennsylvania	37	2,925	42	4,666
New York	17	4,715	43	4,331
West Virginia	50	596	50	465

*Per farm net income before inventory adjustments.
Source: ESCS, State Farm Income Statistics, Supplement to USDA Statistical Bulletin 609, September 1978.

Farms in the Northeast are able to compete effectively in national and international markets. They must if they are to survive. Even though most of the individual states in the Northeast are "small" in terms of agricultural production or aggregate net income from farming compared to other states in the country, they compare more favorably on an individual farm basis. Average net income from Delaware farms has been equal to that for Florida and Hawaii recently, among the top five in the country. If Northeastern states have proportionately more part-time farmers than do other states in the totals used to divide farms into aggregate farm income to get these averages, then the relative net income position of the remaining farms which rely on farming for most of their livelihood is further improved.

One of the significant problems in discussing size and income statistics for farms nationally and the individual states is lack of knowledge about variability within each of the classes or distributions. One can only speculate about size distributions within states using census data. It would be useful to know more about the variation around the averages particularly for net income from both farm and off-farm sources.

Summary Observations

This review of published national statistics on numbers of farms, their size distribution and net incomes of farm operator families has sought to draw attention to some problems of interpretation inherent in the data and the ways in which they are assembled.

1. Nationally, the political realities of trying to count as many units as possible that can be described as farms may confuse both those who count and those who make policy using these numbers.
2. Gross farm sales as the basic measure of farm size has some serious limitations. In a period of rapidly rising prices, comparisons over time are difficult to make. It is not easy to go back and reclassify farms on the basis of constant dollars of farm sales. But direct comparisons over time should not be made.
3. The number of commercial farming operations in the United States has remained remarkably stable since 1960, somewhere between 800,000 and 900,000 units. This is based on defining commercial units as those selling more than $20,000 of products annually in 1977 and estimating numbers of units in earlier periods that were of the same size or larger corrected for changes in price level.

4. An alternative measure of size to gross farm sales is the amount of labor employed in agricultural operations on each farm. This physical measure would allow comparisons over time and among different types of farms. It is easily understood and should be relatively easy to obtain.
5. Off-farm sources of income are more important in the aggregate to "farm families" than earnings from farm operations. Greater efforts should be expended to improve the quality and detail in these statistics for all types of farms regardless of size.
6. A basic separation of farms into two general categories should help in thinking about structure issues. Naming the two groups may lead to problems. Large and small are not satisfactory. One sector should include all the farms where the principal business of the manager or operator is farming. The other must include all the rest, largely part-time operations both commercial and otherwise.
7. There is substantial concern about concentration of power and control of American agriculture in the hands of a few. In comparison with nearly all other sectors of the economy, this concentration so far is "small". Monitoring this concentration should be encouraged using measures of size like labor, capital, and cropland as well as gross output figures.

One might well wonder at the end of this presentation why the title was not simply, "Some Arithmetic About Large and Small Farms". Perhaps that would have been more honest. In my view, it is important to recognize and discuss the political realities of these basic numbers and what they mean to different groups. The old farm bloc is more nearly a collection of commodity splinters these days, glued together at times by self-interest.

The back to the land movement which helped to foster the 1978 Yearbook of Agriculture is also a diverse group with widely differing objectives, but politically wise and very active. Rural communities and people in the countryside will benefit if these quite divergent interest groups recognize some of the many ways they complement each other rather than to emphasize where they compete. Classifying farms into two basic divisions would help us better understand what is happening in each sector and improve our potential for analysis. The debate on structure and concentration in the commercial sector would have a firmer basis on the facts available. Part-time farms would be seen as the important component of rural America that they are.

Appendix Table 1. NET FARM INCOME BEFORE INVENTORY ADJUSTMENT
Northeastern States, 1975-1977

State	1975	1976	1977
Connecticut	39.1	45.0	41.5
Delaware	96.3	94.7	70.8
Maine	69.3	128.7	86.8
Maryland	189.2	160.9	123.2
Massachusetts	35.3	41.5	34.2
New Hampshire	15.2	17.4	13.3
New Jersey	58.5	58.7	49.5
New York	229.0	297.4	227.2
Pennsylvania	293.9	339.8	374.1
Rhode Island	8.7	8.1	5.8
Vermont	51.1	64.2	61.5
West Virginia	15.7	10.0	11.0
Total	1101.3	1266.4	1098.9
United States	21075	21115	20131
Northeast as % of U.S.	5.2%	6.0%	5.5%

Source: ESCS, Farm Income Statistics, Statistical Bulletin 609, July 1978.

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