The Evolution of Structural Change in the U.S. Farm Sector

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Introduction

Changes in U.S. farm structure can have potentially wide-ranging impacts on the distribution of benefits from government programs and on the sector's responses to demand and supply shocks and to policy initiatives. While several major, long-term, and familiar trends have characterized structural change in farming since the 1930's, the last two decades have witnessed an important evolution in the nature of such change. We detail recent changes in farm structure in this paper, explain what's new, and tie the shifts to farm organization, commodity choices, and business practices.

Gardner (2002) identified several elements in a long term structural change that began in agriculture in the mid-1930's: a) sharp increases in farm productivity; b) declines in farm numbers and increases in average farm sizes; c) increases in farm household incomes to match those in the non-farm economy; and d) an expanding web of interactions between farm households and the surrounding non-farm community. Those interactions took the form of expanded off-farm work by farm households, as well as expanded materials purchases in place of on-farm input production, which led to greater on-farm specialization.

We emphasize a continuing evolution of the forces identified by Gardner. First, with regard to farm structure, while the decline in farm numbers and the increase in average farm sizes slowed after 1978, production is consolidating rapidly on larger farms. That consolidation is quite widespread across commodities and has occurred at surprising speed. Second, with regard to interactions among farms and the non-farm community, we emphasize the growth of contract production and the expansion of other means to acquire inputs and to spread the risks of fixed investments across a variety of farm and non-farm institutions. Contracts represent one way to obtain greater production of more differentiated farm and food products, based on attributes

tied to intrinsic product traits, production processes, or transaction commitments. Expanded contract use, along with various leasing arrangements, alliances, and service purchases to acquire inputs, also make it easier for farm operators to adjust farm sizes, and are thus linked to changes in farm structure.

We organize our analysis around changes in the farm size distribution, based on an economic measure of size, farm sales. We compare a simple classification across three years—1989, 1995, and 2002—with sales expressed in 2002 dollars using the Producer Price Index for farm products (in fact, farm prices changed very little during the period). Family farms are assigned to one of five size classes, with non-family farms are assigned to one separate class.[1] Farm size is closely associated with the use of a variety of business practices, such as contracting, equipment leasing, land rental, and the use of hired labor and custom services, and we assess those elements of structural change through their connection to farm size distributions.

Most of our data are drawn from USDA surveys. The Agricultural Resource and Management Survey (ARMS) provides data for 2002, while its predecessor, the Farm Costs and Returns Survey (FCRS) provides data for 1989 and 1995. ARMS and FCRS are large-scale annual farm surveys that provide considerable detail on farm enterprise production, costs, and business practices and farm household characteristics. We begin in 1989 because sales data in the 1989 FCRS and the 2002 ARMS are defined consistently.[2] We also use Census of Agriculture data to track several additional dimensions of farm structure.

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[1] ERS defines family farms as sole proprietorships, partnerships, and family corporations, which in turn are corporations in which related individuals hold at least half the stock. Nonfamily farms include farms operated by hired managers, as well as farms organized as cooperatives or as nonfamily corporations, including large publicly held corporations Most nonfamily farms are small. In 2002, 70 percent of nonfamily farms reported sales of less than $100,000, while 13.3 percent (about 5,000 farms) reported sales in excess of $500,000.

[2] The 1989 FCRS survey does not contain the information needed to form the ERS farm typology, which classifies farms according to organization, operator characteristics, and sales. Appendix A ties our simple size classification to the ERS typology in 2002.

Recent Changes in Farm Structure

For 40 to 50 years, it was easy to summarize changes in farm structure—a strong long-term decline in farm numbers which, when set against slow declines in the total amount of land devoted to farming, implied substantial long term increases in average (mean) farm size. The long-term trends are displayed in figure 1, a familiar chart that relies on data from successive agricultural censuses to display trends in farm numbers, mean farm size (in acres), and total U.S. farmland between 1850 and 2002.[3] Farm numbers peaked at 6.8 million farms in 1935; from then until 1974, they fell sharply at an annual rate of 2.7 percent. Farm numbers continued to decline until 2002, but at a much reduced rate of 0.6 percent per year, while average farm size stabilized.

But farm structure encompasses more than the number and average size of farms. While mean farm size in 2002 was 441 acres, few farms were actually anywhere near that size; most were instead widely dispersed away from it. Structural change since the 1970's encompasses large and systematic shifts in the size *distribution* of farms around a slowly changing mean. In table 1, we describe more recent structural change in farming, covering the period from 1989 through 2002, using sales instead of acreage as the measure of size.[4]

The table shows some striking shifts, in the context of little change in the total number of farms between 1989 and 2002. First, the distribution of farm sizes widened, in the sense that there were more very small farms (less than $10,000 in sales) and more very large farms (more than $500,000) at the end of the period than at the beginning. In particular, the absolute number of very large farms grew sharply, from 32,000 farms to 64,000. Second, the locus of production

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[3] The trends show a gap in 1974-78, reflecting changes in census methodology that shifted the lines without changing the trends.

[4] Acreage measures are useful for showing long term shifts, because they are unaffected by inflation. But they suffer from composition problems because some acres are more productive than others and because land is just one input to production. Sales measures capture the economic value of output; comparisons across time require proper price indexes, an issue that is less crucial in our analysis because of the stability of farm prices in the period.

shifted emphatically. The largest size class of family farms accounted for 44 percent of the value of production in 2002, up from 29 percent just thirteen years earlier. That shift was almost precisely mirrored by the decline in the share of production held by farms with between $10,000 and $250,000 in sales, from 44 percent of production in 1989 to 29 percent in 2002. Note that operators in the smaller groups are getting decidedly older—the proportion that were 65 or older rose sharply in those size classes, while showing little change elsewhere (table 1, third panel)—a development that suggests that we'll see continued shifts of production away from smaller family farms as those operators retire.

Our surveys ask farmers to list their major occupation, as either "farm or ranch work", "retired", or "other". It may seem surprising to find that a farm operator whose off-farm earnings exceeded his farm sales would describe farming as his major occupation. Nevertheless about one-sixth of farm operators whose sales were less than $10,000 in 2002 reported farm work as their major occupation (table 1, fourth panel). Since occupation is self-selected in these surveys, an operator may consider himself to be a farmer even though most or all of his income derives from off-farm sources.

What's striking, however, is the sharp *decline* in farmer identification among small-farm operators: among those with sales below $10,000, the proportion choosing "farm or ranch work" fell from 30 to 16 percent between 1989 and 2002, and from 74 to 50 percent among those in the next smallest size class ($10,000-$99,999). The decline is sharp enough to indicate that there may be some important broad shifts in small farm operators' self perception, and a coincident greater identification with off-farm activities.

Discussions of structural change in farming often focus on livestock operations, and particularly on industrialization in poultry, hog, and dairy production. But the shift of production

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toward larger farms is occurring across most commodity categories. In table 2, we report greater detail on shifts in the distribution of farm production in 1989 and 2002. Specifically, for each commodity reported in the table, we report the share of commodity production value held by each of four size classes of farms (to save space, we omitted non-family farms and family farms with less than $10,000 in sales). Adjoining rows compare 1989 and 2002 data for a commodity.

We can clearly see the expected dramatic shifts in several livestock commodities, such as the rapid transformation of the hog industry, where the two smaller size classes' share of production fell from 56 percent to 11 percent in thirteen years. Dairy production also shows the major changes we would expect, as farms in the largest size class expanded their share of dairy production from one quarter to over a half. Poultry showed a continuation of a long shift of production toward farms in the largest size class.

But crop production also shows a decided, although more gradual, shift to larger farms, with increases of 8 to 15 percentage points between 1989 and 2002 in the largest farms' share. Cotton and tobacco showed particularly striking shifts, in percentage terms, toward the largest farms. By 2002, smaller family farms (those with less than $250,000 in production) retained at least 40 percent of output in only three broad commodity categories—cattle, cash grains and soybeans, and tobacco—and the small farm share of cash grains and soybeans had fallen sharply.

The Unexpected Pace of Consolidation

Twenty years ago, Stanton (1984) asserted that "One of the more certain trends in a generally uncertain world is that the proportion of output produced on large, family-operated farms will continue to increase in the United States." Informed economists expected farm consolidation to continue after 1980, and several teams analyzed changes in farm structure in the

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and provided forecasts to 2000. We compare those projections to the actual size distribution of farms in 2000, in table 3.

We make comparisons not to test analysts' prediction skills, but to frame a reasonable answer to the question implied in the title of this section—what's unexpected about recent shifts in farm structure? Projections made by well-informed and technically sophisticated analysts provide a useful basis for considering the issue, particularly since the teams showed considerable consensus in one dimension: they all predicted continued shifts of production to large farms, but each actually underestimated the magnitude of the subsequent shifts.

We consider two projections in table 3. The top panel uses data from Lin, Coffman and Penn (1980), or LCP, who relied on data through the 1974 Census of Agriculture to predict farm size distributions in 2000. We use acres as the measure of size. In the second panel, we use projections of the farm sales distribution prepared by the Congressional Office of Technology Assessment (1986), or OTA.[5]

Each study forecast a growing number of farms in the largest size class, but each projection fell below the actual 2000 figure, by 20 percent for the OTA sales-based measure and by 12 percent for the LCP land-based measure. Each study also projected nearly a halving of farm numbers in the smallest size category, a substantial overstatement of the actual decline. In short, the shift in the farm size distribution is neither new nor unexpected, but the magnitude of the shift is—very large farms are substantially more important today than informed analysts expected them to be, and very small operations are far more prevalent than analysts predicted.

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[5] LCP also included a projection using farm sales, but comparisons would require a long and complex adjustment for their inflation assumptions, so we only consider their land-based projections. The OTA projected forward using 1982 dollars; since the farm prices received index in 2000 was only 0.5% below the 1982 index, we simply use nominal 1982 and 2000 dollars in the table.

The strong long term trend decline in very small farms ended in the 1970's. Edwards, Smith, and Peterson (1985) recognized that turnaround and incorporated into their forecast of total farms (2.23 million), which was much closer to the mark. But they also missed the extent of the shift to large farms, with predictions that were 12-15,000 farms too low in the 2,000 acre and above category, and 4-7,000 too low in the 1,000-1,999 acre category.

The continued survival of very small farms does not appear to be based on their financial performance. Figure 2 reports mean operating profit margins by sales class in 1989 and 2002. Small farms consistently lose money; margins were negative, and quite large, across size classes below $50,000 in 1989. By 2002, all classes below $250,000 in sales reported substantial losses. In each year, larger classes report positive margins that grow with size. Another element in the figure stands out: margins fell in each size class between 1989 and 2002. The decline may reflect the choice of endpoints—2002 was a poor year, financially. In contrast, the mean operating profit margin for the largest size class of family farms was 16.4 percent in 2001, well above the 2002 figure. Figure 2 provides continuing support for Stanton's (1984) assertion: there are strong economic pressures for a continuing shift of production to larger family farms in the near future. But the figure also points up a mystery—very small farms continue to operate despite very poor financial performance.

Economists have been interested in changes in farm structure for a long time. Prior research identified strong continuing pressures for consolidation into larger family farms, based on profit incentives arising from technological change that eroded managerial diseconomies of size as well as enhanced production and marketing economies. More recent innovations, many based on advances in biological or information technology, may have provided even stronger advantages to size, thus accelerating shifts of production to larger family farms. At the same

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time, an unexpectedly large number of households have continued to operate very small farms, often on a part-time basis, while making use of expanded off-farm earnings opportunities.

From Farm Structure to the Business Organization of Farms

Large farms are not simply expanded versions of small farms; rather, large and small farms produce distinctly different product mixes. Two commodities—cattle and hay—account for more than two-thirds of the total value of production among the smallest farms, those with less than $10,000 in sales. That information is contained in table 4, which reports the five most important commodities (ordered by value of production) within each size class, together with the commodity's share of all production in the class. At the bottom row of the table, non-family farms are similarly specialized in the aggregate, with cattle (feedlots) and high-value crops accounting for over 70 percent of production at those farms. Each of those groups are highly specialized, and the degree of specialization has increased over time.

The largest family farms tend to specialize in livestock production (cattle feedlots, large dairy operations, and confined poultry and hog feeding enterprises), and in high value crops. Mid-sized family farms, as a class, tend to be much more diversified than very large or very small farms. Cash grains and soybeans are important revenue sources for those operations, and have grown steadily more important over time, as livestock production (particularly dairy, poultry, and hogs) moves to the largest farms.

Farm size and commodity mix have strong impacts on how farm operators organize their enterprises, and changes in farm structure are hence linked to important changes in farm business practices. Consider table 5, in which we provide details on methods used to market farm products and acquire farm inputs.

Production and Marketing Contracts

The top panel summarizes the use of contracts to govern the production and transfer of farm products. Farmers can agree to a *marketing* contract before harvest to establish a marketing outlet and a price or pricing formula (tied to product qualities and quantity); they can also agree to a *production* contract which establishes production guidelines, input provision, fees and investments prior to commencing production. Contracting is closely tied to farm size, and governed 50 percent of production among the largest farms (table 5). As production has consolidated among large farms, contracting has become more prevalent. Marketing and production contracts governed 37 percent of the aggregate value of production in 2002, up from 29 percent in 1991 FCRS data and 12 percent in 1969 Census of Agriculture data.

Contract production has been growing for a long time, and over that time has been closely tied to farm size. But the seemingly steady long run aggregate growth alluded to above hides the quite sudden and dramatic recent expansion in several commodities. Contracts introduced in 1999 covered virtually all tobacco production in 2002, while contract coverage in hog production expanded from one third of production in 1996 to two thirds in 2001. Noticeable sharp recent increases have also occurred in fed cattle, cotton, and rice. Contracts can be used to ensure the delivery of products with particular attributes, such as inherent product traits (such as high oil corn), production methods (organics), or transaction characteristics (committed volumes, delivery times, and weight ranges for hogs). Contracts may aid in better matching farm production to consumer demands, but they are also controversial because they may hasten farm consolidation and because they can be structured to exploit processor market power in concentrated markets.

In recent ERS research with ARMS data, Key (2004) finds that, controlling for operator net worth, contract operations take on more debt per dollar of net worth than independent producers of the same commodity and that they then grow larger. He argues that contracts can lower the costs of debt capital by reducing the risks that lenders face from asymmetric information. His findings suggest that the association between contracting and farm size might reflect a causal link running from contracting to farm size, instead of the reverse.

Input Acquisition

Farm operators make a variety of choices when acquiring inputs. They can provide their own labor, or hire workers; they can purchase land and equipment, or they can lease those inputs; they can perform all on-farm operations, or they can hire specialized service firms to provide custom work; and they can produce agricultural inputs like feed and young livestock, or acquire them through purchase or transfer from contractors. Actual operator choices are closely linked to farm size and product mix. We detail the links to farm size in table 5.

The largest farms stand out in two dimensions: they are far more likely to lease machinery and equipment than smaller farms, and far more likely to use hired labor. Non-operator hours (primarily hired labor) account for 75 percent of all labor hours among the largest farms, in the third panel of table 5, a share that varies across the wide range of farm sizes in that class.[6] We used a regression analysis of 2002 ARMS data to explore the issue in more detail. Not surprisingly, operator hours offset hired hours. But beyond a certain commitment of operator hours, we found that 1,000 more hired labor hours are added, on average, for every additional $78,000 in gross sales. Given typical ranges for operator labor hours, the model would predict

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that a farm with $500,000 in gross sales would employ two hired workers at 2,000 hours a worker, and that a farm with $1 million in gross sales would employ five. Given sales, high value crop farms would use decidedly more hired labor hours, and hog and poultry farms less.

Farms with more than $100,000 in sales are generally quite likely to rent land and to acquire custom services—over 80 percent of farms with sales between $100,000 and $500,000 rent at least some of their land, and 70 percent of the largest farms do so. Differences in commodity mix probably account for the differences between the largest farms and the next smaller classes. Farms with field crops are likely rent land and use custom services such as harvesting and field preparation, and many of the largest farms specialize in livestock.

Because of opportunities to rent land (or lease it out), lease equipment, hire labor, and obtain custom services, farm operators can change the size of their enterprises quite quickly. As a result, there's a good deal of mobility within farm size distributions. Because of the entry of new farm businesses, the exit of old, and the expansion and shrinkage of continuing businesses, only about half (48.6 percent) of the 176,000 farm businesses operating at least 1,000 acres in 1997 were also operating at least 1,000 acres in 1992.[7] Moreover, a considerable number of farms experience dramatic acreage shifts: indeed, more than 8,600 farms that operated fewer than 500 acres in 1992 grew to operate over 1,000 acres in 1997, and 1,333 of those farms operated less than 50 acres in 1992. Conversely, more than 8,700 farms shrank from over 1,000 acres to less than 500, and 1,341 of those operated less than 50 acres in 1997. While most farm

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[6] The ARMS survey does not directly ask for hired labor hours. We estimated hired hours in the following way: we obtained annual cash wages paid to other (non-household) hired labor from the ARMS survey, and then divided that figure by state-level average farm labor wages.

[7] We used Census of Agriculture longitudinal data for these comparisons. We find greater mobility than that found by Edwards, Smith, and Peterson (1985) in their analysis of 1974-78 transitions, but the intercensal time period was also one year longer.

size adjustments were considerably less dramatic, the evidence indicates widespread fluidity of movement within farm size distributions.

Farm growth decisions may be closely linked to the goals and age structure of operator households. The bottom panel of table 5 shows that large farms often have multiple operators. Past surveys constrained respondents to list a single primary operator, but the 2002 ARMS elicited information for multiple operators, which could include spouses, multiple generations of a family, or unrelated business partners. More than half of the largest farms reported having more than a single operator, and one sixth reported three or more operators. With multiple operators who wish to continue in the farm business, farms may have strong incentives to grow; similarly, farms with aging single operators and no family succession planned can shrink or exit quickly. Moreover, off-farm employment opportunities (detailed below) may allow multi-generation operator families to more easily adjust their provision of operator hours to farm work as the farm business expands or contracts.

Government Payments

Farm product mixes and volumes drive the patterns of government payments to farm operators (table 6). Among farms with less than $10,000 in sales, government payments amount to nearly 10 percent of gross cash farm income (GCFI); payments account for declining shares of GCFI across farms in other sales classes, reaching 3.5 percent in the largest sales class.

The reasons for this pattern follow from the nature of government programs and farm participation in them. Only a few of the smallest farms receive any government commodity payments (14 percent of farms in table 5), which largely go to field crop producers; but they receive a large share of conservation payments—27 percent of Conservation Reserve Program

(CRP) and Wetlands Reserve Program (WRP) payments go to the smallest farms, and nearly 48 percent go to farms with between $10,000 and $100,000 in sales. Many of those farms have retired their land in the programs, and hence report no commodity production and no cash farm income. As a result, conservation programs likely boost reported small farm numbers, since participants continue to be counted as farms, yet produce less than $10,000 in sales.

In contrast, many of the largest farms (more than $500,000 in sales) produce commodities that do not receive commodity support, and as a result a smaller share of those farms enroll in commodity programs, compared to farms in the middle size classes, and they receive a share of government payments that is substantially smaller than their share of production.[8]

How Farm Households Earn Their Incomes

Although small farms handle a shrinking share of production, and although they generally report negative margins, small farm operators are not, in general, poor. Figure 3 summarizes farm operators' household incomes among farms in different size classes. Mean farm household incomes match or exceed the mean for the U.S. population in every size class. Medians fall well below corresponding means, because incomes tend to be skewed—a few very high incomes raise the mean, but don't affect the median. When we consider medians, that among farmers in the second smallest size class ($10,000-$100,000) is slightly below the all-household median, but medians in all other size classes are well above the U.S. median. As a group, farm household incomes compare favorably to U.S. average household incomes.

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[8] Because of the shift of crop production to larger farms the share of government commodity payments received by large farms has been growing. In 1989, farms with at least $500,000 in sales received 11.7% of commodity payments; by 2002, that share had risen to 27.4%.

Household mean incomes are decomposed, in table 7, into mean farm-related and off-farm incomes for each size class, and off-farm incomes are further decomposed into earned and unearned incomes. Mean off-farm earned income combines positive earnings by households who work off-farm with zero earnings by those who don't, and hence the figures in table 7 will understate typical incomes among those who work off-farm. If we restrict our attention to households who work off-farm, mean off-farm earned income rises considerably, and ranges from $69,000 for households in the smallest size class of farms, to $60,000 for households in the next two classes, $45,000 in the second largest class, and $52,000 in the largest class.

Small farm households derive almost all of their income from off-farm work and from unearned income from pensions and financial investments (table 7). Almost 80 percent of the smallest farms report negative incomes from farming, but those losses are generally offset by substantial off-farm incomes that keep most at or above national averages.[9] Recall, from table 1, that only one in six operators in the smallest size class reports farm work as their major occupation, and that this class accounts for more than half of all farms. Gardner's expanding web of interactions with the non-farm community—in this case, in the form of off-farm earnings opportunities combined with farm residences—allow many of these households to maintain a limited farm operation as a lifestyle.

Many other households run small but still significant farming operations (with annual sales up to $250,000), and they frequently combine a profitable farm business with off-farm employment to generate household incomes that match or exceed national averages. In those cases, expanding off-farm employment options provide an opportunity cost to continued farm

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[9] Note that approximately 24 percent of operators in the smallest size class report no off-farm earned income (table 7). Approximately 73 percent of those operators are retired, and many of them have retired their land into CRP and WRP programs, receiving income from those sources as well as pensions or financial investments.

work, but also may allow for the operation of networks of part-time or small but profitable while limiting the pace of consolidation.

Off-farm employment is less important for households that operate the largest farms, as nearly half (46 percent) of those households do not work off the farm, and they account for a large and growing share of farm production. But off-farm earnings options still influence those households' choices, because they signal the opportunity costs of on-farm work. Moreover, they provide small and large farm households with the flexibility to more finely tailor operator household farm labor to the needs of the farm business.

Farm Structure and Farm Adjustment

Ongoing trends, as well as demographic and profit data, suggest that we will see a continued shift of farm production toward large, family operated farms. Farms can change size and production rather quickly in part because contemporary institutions create resource mobility at the farm level. Cropland can be rented in, to grow, or out, to shrink. Machinery and equipment can be leased, or custom services can be hired, thus limiting the long-term exposure to the risks of a large investment in physical capital. Off-farm employment opportunities allow farm households to adjust their hours committed to farm work, and provide a cushion against fluctuations in farm income. Production contracts can reduce short-term credit needs through the provision of contractor-supplied inputs, and can ease the acquisition of long-term credit through the contractor's volume commitments.

Eased resource mobility at the level of individual farms suggests that farm structure can adjust more rapidly to changes in technology, demand, and policy. That opens the possibility that policies aimed at conservation, food safety, and commodity support can affect farm structure, a

possibility that finds support in the dramatic structural changes in hog production over the last decade and the more gradual adjustments in dairy, poultry, and fed cattle production..

However, eased resource mobility also provides more separation between farm asset ownership and farm operation. While government farm payments are directed in the first instance to farm operators, competition in markets for inputs means that payments may affect input prices and hence ultimately benefit non-operator owners of land and other inputs. Moreover, as production shifts to larger farms, policies designed to provide assistance to all farms based on production will increasingly benefit larger farm operators, whose incomes substantially exceed U.S. averages.

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Appendix A: Linking a Sales Class Sorting to the ERS Typology

ERS developed a farm typology to account for differences among farms in farm ownership, farm size, operator occupation, and owner wealth. Table A-1 below links the typology to the sales class grouping that we've used in this paper, by showing how farm counts fall into different typology groups and sales classes. The typology first sorts farms into family and non-family farms. Family farms with $250,000 or more in sales are then assigned to large (less than $500,000) and very large typology classes. Among family farms with less than $250,000 in sales, the typology then sorts into 5 groups. Limited resource farms have sales below $100,000, annual income below $20,000, and assets below $150,000. Operators who report that they are retired are grouped in the "retirement" category, while those who report "farmer" as their principal occupation are grouped into one of two groups according to sales ($100,000 or more; and less than that). Finally, operators who do not report farming or retired as their principal occupation are grouped into the Residential/Lifestyle group.

Non-family farms are assigned to a single group in the typology and in the sales class groupings. Table A-1 does show the sales distribution among non-family farms, and 70 percent report sales of less than $100,000. Also, note in the table that very small farms (less than $10,000 in sales), which account for more than half of all family farms, fall in substantial numbers into four different typology groups; similarly, farms in the next size class ($10,000-$99,999) fall broadly into four typology groups.

Table A-1: Number of Farms, by Sales Class and ERS Typology

ERS Typology Grouping	Farms, by Sales Class ($000)					
	All	Under 10	10-99	100-249	250-499	500+
Limited Resources	106,048	86,602	19,455	-	-	-
Retirement	395,635	281,069	107,235	7,331	-	-
Residential/lifestyle	851,190	648,875	186,314	16,001	-	-
Farm occupation/ lower-sales	450,891	171,575	279,316	-	-	-
Farm occupation/ higher-sales	160,433	-	-	160,433	-	-
Large	86,300	-	-	-	86,300	-
Very Large	64,328	-	-	-	-	64,328
All Family Farms	2,114,824	1,188,121	592,310	183,764	86,300	64,328
Non Family (any size)	37,588	a	26,424	3,782	2,369	5,013
All Farms	2,152,412	a	618,734	187,546	88,669	69,341

a: All non-family farms with sales below $100,000 are grouped in the $10,000-$99,999 category.

Table 1: Selected Structural Characteristics of U.S. Farms, 1989-2002

Item, by Sales Class of Farm	1989	1995	2002
Number of farms	2,148,740	2,068,000	2,152,412
Distribution of farms		-Percent-	
Less than $10,000	51.2	50.6	55.2
$10,000-$99,999	33.8	33.0	27.5
$100,000-$249,999	8.9	9.8	8.5
$250,000-$499,999	3.4	3.1	4.0
$500,000 or more	1.5	1.9	3.0
Distribution of value of production		-Percent-	
Less than $10,000	2.4	2.2	1.9
$10,000-$99,999	21.3	17.0	11.9
$100,000-$249,999	22.2	20.7	17.0
$250,000-$499,999	19.0	14.6	16.8
$500,000 or more	28.9	31.0	43.9
Operator 65 years old or more		-Percent-	
All	24.4	25.1	27.4
Less than $10,000	29.1	29.2	29.9
$10,000-$99,999	23.7	26.6	30.2
$100,000-$249,999	9.5	8.5	16.9
Operator reports a farm occupation		-Percent-	
All	54.4	44.9	38.0
Less than $10,000	29.5	19.3	16.3
$10,000-$99,999	74.0	60.8	49.7
$100,000-$249,999	95.3	92.0	87.3

Note: To conserve space, we omitted non-family farms from each panel (their shares can be deduced in the first two, since shares add to 100), and the two largest family farm classes from the last two panels, since there was little change in their estimates over time.
Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS), and 1989 and 1995 Farm Costs and Returns Survey (FCRS).

Table 2: Production Shifted to Larger Farms Between 1989 and 2002

Commodity and Year	Farm Size in Sales ($000)			
	10-99	100-249	250-499	500+
	Share of Value of Production (%)			
Cash Grain, Soybeans				
1989	27.9	35.7	22.0	10.9
2002	17.2	28.7	26.6	24.4
Cotton				
1989	6.3	18.9	25.1	40.7
2002	7.6	8.1	24.5	55.5
Peanuts				
1989	28.9	34.7	16.3	17.9
2002	13.5	16.2	24.0	30.5
Sugar Beets & Cane				
1989	9.1	10.9	35.5	39.3
2002	4.4	17.6	23.8	48.8
Tobacco				
1989	37.1	28.8	12.1	12.2
2002	33.5	27.7	14.4	20.0
Fruits, Veg., Nursery				
1989	11.1	10.3	14.2	45.3
2002	6.6	6.6	10.1	57.3
Cattle				
1989	25.7	14.6	10.6	36.8
2002	22.2	18.0	15.3	27.2
Hogs				
1989	23.7	32.4	24.6	14.0
2002	2.8	7.7	12.0	64.2
Dairy				
1989	24.1	32.7	14.7	25.7
2002	6.0	22.0	15.0	54.0
Poultry				
1989	2.8	8.5	42.6	40.2
2002	2.0	10.4	13.3	67.7

Note: the table omits two farm classes, family farms with sales below $10,000 and non-family farms.
Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS), and 1989 Farm Costs and Returns Survey (FCRS).

Table 3: Projected and Actual Farm Size Distributions, 1974 and 2000

Study and Size Measure	1974 (actual)	1982 (actual)	2000 (projected)	2000 (actual)
LCP (Acres)		-Number of Farms (000)-		
1-219	2,007		1,129	1,454
220-999	713		447	521
1,000-1,999	93		102	110
2,000 and over	<u>62</u>		<u>71</u>	<u>81</u>
All farms	2,875		1,749	2,166
OTA (Sales)				
Less than $100,000		1,937	1,000	1,819
$100,000-$499,999		275	200	285
$500,000 or more		<u>28</u>	<u>50</u>	<u>62</u>
All farms		2,239	1,250	2,166

Sources: LCP is Lin, Coffman, and Penn (1980) for 1974 and 2000 (projected) acreage; OTA is U.S. Congress, Office of Technology Assessment (1986) for sales; the 2000 Agricultural Resource Management Survey (ARMS) underlies estimates of actual 2000 acreage and sales.

Table 4: What Small and Large Farms Produced in 2002

Size Class (sales)	Commodities, ordered by rank in size class				
	1	2	3	4	5
Less than $10,000	Cattle (46.9)	Hay (21.3)	Other livestock (9.3)	High value crops (7.9)	Soybeans (3.2)
$10,000-$99,999	Cattle (31.5)	Corn (12.3)	High value crops (11.8)	Soybeans (11.2)	Hay (7.1)
$100,000-$249,999	Cattle (17.9)	Corn (16.0)	Dairy (14.5)	Soybeans (12.7)	High value crops (8.1)
$250,000-$499,999	Cattle (15.4)	Corn (15.1)	High value crops (12.8)	Soybeans (11.8)	Dairy (10.0)
$500,000 or more	High value crops (27.6)	Poultry (14.6)	Dairy (13.8)	Cattle (10.5)	Hogs (8.6)
Non-family (any size)	High value crops (46.4)	Cattle (23.9)	Hogs (8.6)	Poultry (7.0)	Dairy (4.0)

Notes: numbers in parentheses are the percent of total value of production of farms in a size class that is accounted for by the commodity. "High value crops" include fruits, vegetables, nursery, and greenhouse crops.
Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS).

Table 5: Farm Business Strategies in 2002

	Farm Size in Sales ($000)				
	Under 10	10-99	100-249	250-499	500+
Contracting:					
Farms with a contract (%)	1.7	12.8	32.5	43.2	62.8
Production under contract (%)	6.1	13.5	27.8	30.8	49.6
Input acquisition--farms that:					
Hire labor (%)	11.4	29.3	48.9	64.6	75.6
Hire custom work (%)	24.7	46.0	63.5	60.3	57.6
Lease equipment (%)	2.6	8.9	19.6	24.6	31.7
Rent land (%)	24.3	53.1	80.1	81.6	69.5
Input shares (%)					
Rented land/operated land	20.6	42.1	52.5	59.0	56.1
Non-operator hours/total hours	12.9	16.2	24.4	36.2	75.1
Farms with multiple operators (%)					
Two operators	27.8	28.4	34.5	33.3	39.6
Three or more operators	1.5	3.1	5.7	9.9	15.8

Note: the table omits non-family farms.
Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS).

Table 6: Government Payments, 2002

	Farm Size in Sales ($000)				
	Under 10	10-99	100-249	250-499	500+
	-Percent of Gross Cash Farm Income-				
Share of government payments	9.8	9.6	8.2	7.3	3.5
Percent of farms receiving:	-Percent of Farms in Sales Class, by Payment Type-				
Any government payments	25.3	61.7	79.9	80.1	64.9
Commodity-related payments	13.6	52.3	76.7	76.8	60.6
CRP or WRP payments	9.7	12.4	14.3	18.8	13.5
Distribution of payments	-Percent of Payments, by Sales Class-				
All government payments	5.3	22.6	24.6	21.0	23.9
Commodity-related payments	1.6	17.7	27.2	23.4	27.4
CRP or WRP payments	27.0	47.5	9.6	9.6	3.8

Note: the table omits non-family farms.
Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS).

Table 7: Farm Household Income, 2002

| Item | Farm Size in Sales ($000) | | | | |
	Under 10	10-99	100-249	250-499	500+
Mean household income			-Dollars-		
Total	63,102	58,508	64,634	75,439	171,779
Farm related	-5,761	-726	15,539	39,829	129,424
Off-farm	68,863	59,234	49,095	35,611	42,355
Off-farm earned	52,575	41,535	38,676	27,679	28,304
Unearned	16,288	17,699	10,419	7,932	14,051
		-Percent of Operator Households-			
Negative farm-related income	79.8	49.9	31.4	25.5	27.7
No off-farm earned income	23.7	30.7	35.9	38.9	45.5

Source: Data derived from USDA 2002 Agricultural Resource and Management Survey (ARMS).

Figure 1

Farms, land in farms, and average acres per farm, 1850-2002

Most of the decline in farms occurred between 1935 and 1974
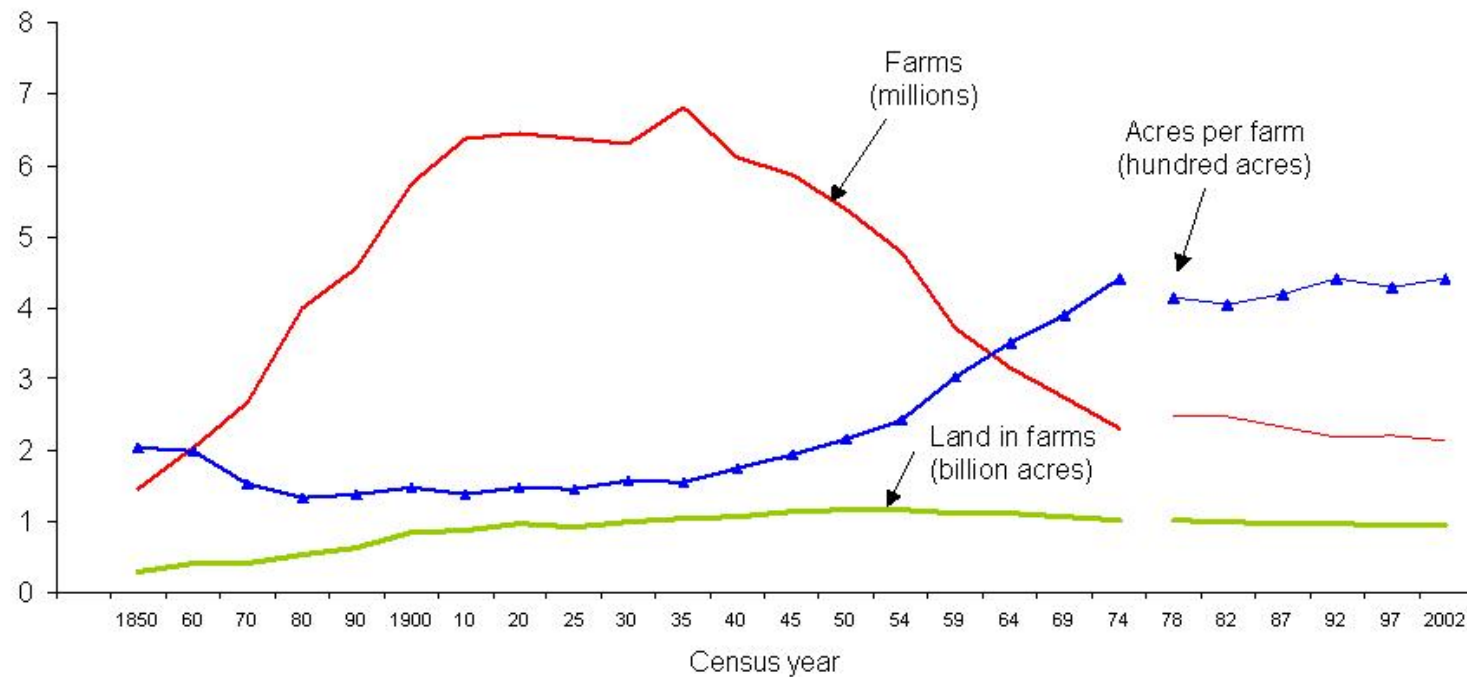
Note: The break in the lines after 1974 reflects the introduction of an adjustment to estimates of the farm count and land in farms. Beginning in 1978, the data are adjusted to compensate for undercoverage by the census of agriculture.

Source: Compiled by ERS from Census of Agriculture data.

Figure 2

Operating profit margin by sales class, 1989 and 2002

Operating profit margin increases with size and fell between 1989 and 2002

Sales class, 2002 dollars

Operating profit margin = 100% X (net farm income + interest -charge for unpaid operators' labor and management)/gross farm income.

*The standard error exceeds 25 percent of the estimate, but is no more than 50 percent of the estimate.
**The standard error exceeds 125 percent of the estimate, but is no more than 150 percent of the estimate.
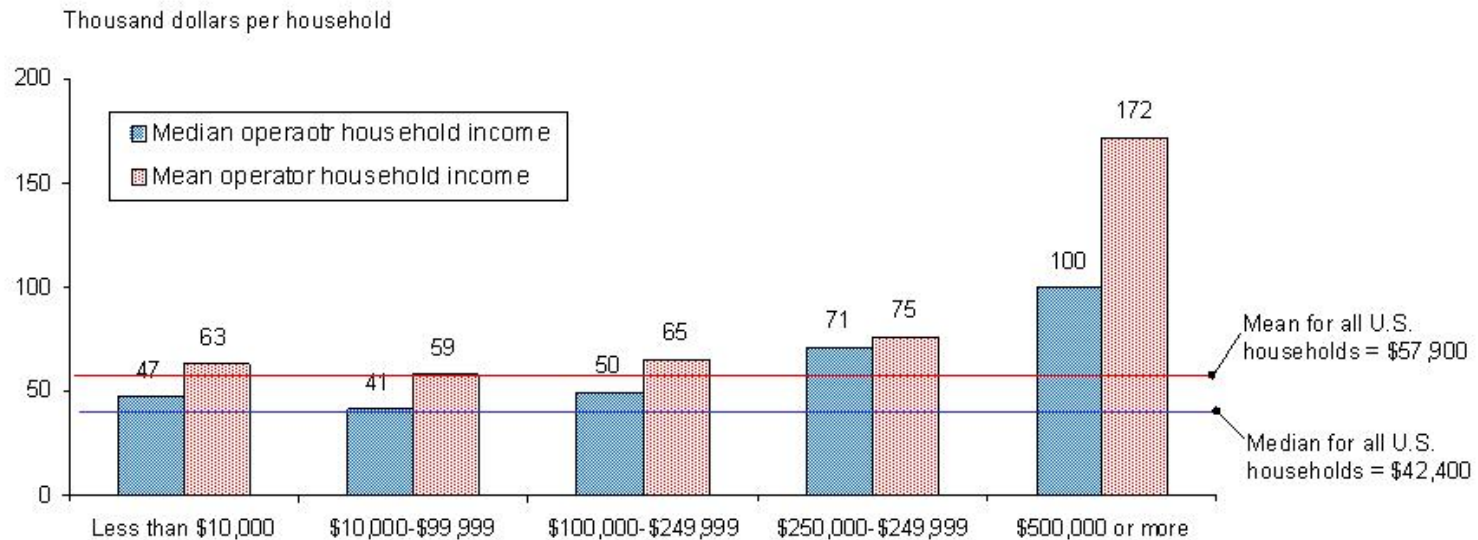***The standard error exceeds 300 percent of the estimate.

Source: Compiled by ERS from the 1989 Farm Costs and Returns Survey (FRCS) and the 2002 Agricultural Resource Management Survey (ARMS).

Figure 3
Median and mean operator household income, 2002
Farm households have income near or above the U.S. median and mean

Source: Compiled by ERS from the 2002 Agricultural Resource Management Survey (ARMS) for operator households and from the Current Population Survey (CPS) for all U.S. households.