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U.S. Small Farms: Decline *and* Persistence?

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Abstract

We use two comprehensive and representative USDA databases to assess the performance of small farms in the U.S. Farm production is shifting to much larger farms, and the number of small commercial farms is declining. Most large U.S. farms remain family-owned and operated enterprises, and most remain small businesses by U.S. standards. Small commercial farms tend to focus on three commodities: beef cattle, grains and oilseeds, and poultry. On average, large farm financial returns substantially exceed those on small farms, but the range of performance among small farms is quite wide. About one quarter of the nearly 800,000 small commercial farms show very good financial returns.

Key words: small farms, structural change, farm income

JEL Code: Q12

U.S. Small Farms: Decline *and* Persistence?

1 INTRODUCTION

U.S. farm production is shifting to much larger farms, and the number of small commercial farms is declining. However, most large U.S. farms remain family-owned and operated enterprises, and most are small businesses by U.S. standards. Moreover, there are still nearly 800,000 small commercial farms, and many remain quite viable.

We expand on these assertions in this paper. We use farm-level microdata from two large USDA databases to define the terms used above, to show how the size distribution of agricultural production in the U.S. is changing, and to show the financial pressures that continue to drive change. Farms in different size classes focus on much different commodity mixes, and those commodity mixes drive the distribution of direct government financial support offered to farms. We focus on small farms and show how the combination of off-farm work and agricultural production in selected commodities contributes to household incomes.

1.1 Data Sources

We rely on two USDA databases. The census of agriculture, a mandatory quinquennial effort, provides comprehensive production and sales data useful for long-term comparisons. With the recent release of the 2007 census, we offer whole-farm sales comparisons for 1982-2007 and production and acreage comparisons for specific commodities for 1987-2007.

We also rely on data from the Agricultural Resource Management Survey (ARMS), an annual survey of U.S. farms that is USDA's primary source of data on farm and farm household finances. ARMS, in use since 1995, does not allow for the long-term comparisons available with the census, and while the ARMS sample (20,000-22,000 respondents) is quite large, it is dwarfed by the census database. However, the detailed information in ARMS, including finances, production and production practices, and household characteristics, allows for analyses that are not possible with census data.¹

ARMS and the census are integrated: the ARMS sample is drawn from the census list frame, and during census years the ARMS questionnaire is an expanded census questionnaire, and thus serves as the census for respondents. But the census covers a slightly wider population and uses a different concept of sales than is used in ARMS reports, so we must carefully distinguish between the two at several points.

We sort farms into eight size classes, based on sales, and four larger aggregates, and use this framework for most of our analyses. We designate the two smallest classes (less than \$1,000, and \$1,000-\$9,999) as very small farms. The next three (\$10,000-\$49,999, \$50,000-\$99,000, and \$100,000-\$250,000) are "small commercial farms", a designation that allows us to keep the clear size classes used in government statistics while excluding

¹ USDA's National Agricultural Statistics Service provides more detail on the census of agriculture at <http://www.agcensus.usda.gov/> while ERS provides more detail on ARMS at <http://www.ers.usda.gov/Briefing/ARMS/>

the many farms with minimal agricultural production. We focus on this group in this report. We contrast it to the rapidly growing class of “very large farms” (\$1,000,000 or more). The two remaining classes (\$250,000-\$499,000 and \$500,000-\$999,999) are simply called “large farms”.

2. DECLINE

Production in the U.S. is shifting to very large farms, although most of those farms are family owned firms that are small businesses by most standards. The number of small commercial farms is declining, and their share of U.S. farm sales has declined substantially. We use census of agriculture data to detail the temporal changes.

2.1 Trends in U.S. Farm Numbers

In U.S. farm surveys, a farm is defined as a place that produces, or normally would produce, \$1,000 in farm commodities. That’s not a high threshold: at average 2007 prices, one could realize \$1,000 by selling 250 bushels of wheat (less than 2 acres production) or a single steer. Many U.S. farms do not even have \$1,000 in sales, but are defined to be farms because they have assets—generally, inventories of animals or holdings of cropland—that would normally produce at least \$1,000 in sales if the farm sold crops or animals (USDA/NASS, 2009; O’Donoghue, et al., 2009). These places account for a substantial share of all farms.

There were 2.2 million farms in the 2007 census, but the size distribution was highly skewed (table 1). Nearly 60 percent were very small, and more than half of those (31.2 percent of all farms) had less than \$1,000 in sales of agricultural commodities. In contrast, there were 55,512 very large U.S. farms--or 2.5 percent of the total.

Table 1: Changes in the Size Distribution of U.S. Farms, 1982-2007

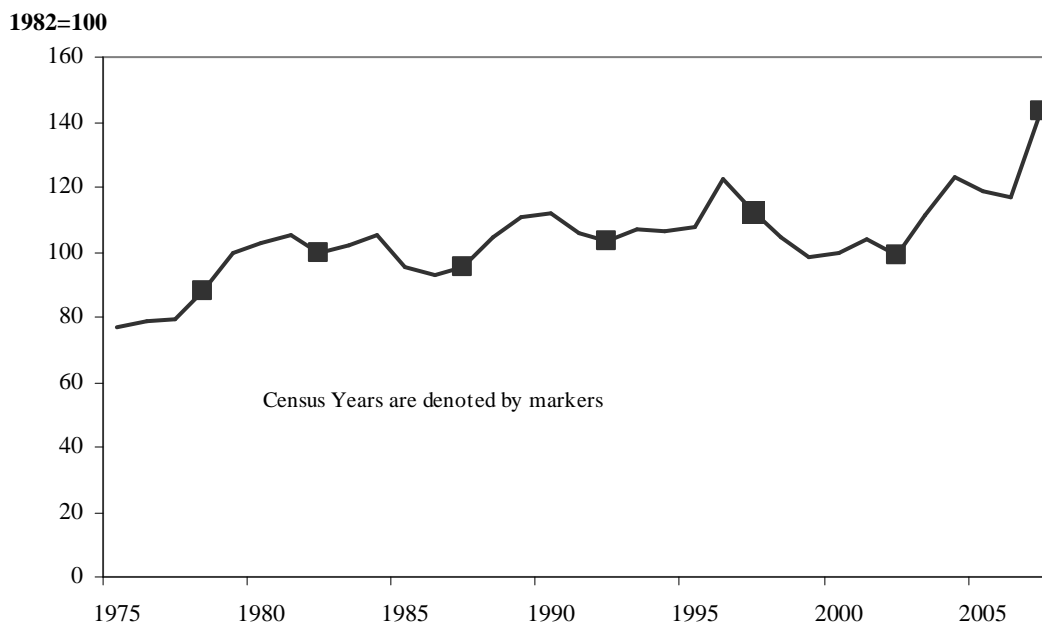
<i>Farm Sales Class</i> (2007\$)	<i>2007 Census</i>		<i>1982 Census</i>		1982-2007 change (%)
	Farms	Percent	Farms	Percent	
<1,000	688,834	31.2	254,097	11.3	+171.1
1,000-9,999	630,327	28.6	700,252	31.2	-10.0
10,000-49,999	403,214	18.3	601,840	26.8	-33.0
50,000-99,999	125,456	5.7	253,243	11.3	-50.5
100,000-249,999	147,500	6.7	282,809	12.6	-47.8
250,000-499,999	93,373	4.2	97,984	4.4	-4.7
500,000-999,999	60,777	2.8	34,650	1.5	+75.4
1,000,000 or more	55,512	2.5	16,191	0.7	+242.9
All farms	2,204,793	100.0	2,240,976	100.0	-1.6

Source: Census of agriculture, as adjusted by ERS for changes in agricultural prices using the Producer Price Index for Farm Products.

The present U.S. farm definition was introduced in 1975, and was not adjusted for inflation. Consequently, the definition included places in 2007 that would not have been defined as farms in 1975, because farm commodity prices are considerably higher than they were in 1975 (figure 1). Prices rose by 29 percent between 1975 and 1979, and then fluctuated within a range of 10 percent of the 1979 value for the next 24 years, so the

failure to adjust for inflation would have had little impact on farm counts in the 1980's and 1990's. But prices rose sharply again after 2003, and by 2007 were 85.7 percent above their 1975 level. As a result, one needs to adjust for changes in prices when comparing changes in the size distribution of farms between earlier years and 2007.

Figure 1: The Producer Price Index for Farm Products, 1975-2007



Source: US Bureau of Labor Statistics

We adjust all sales figures to 2007 dollars in tables 1 and 2, and use inflation-adjusted sales to show how the distribution of farm sizes changed between the 1982 and 2007. The aggregate number of U.S. farms fell by less than two percent, from 2.24 million to 2.20 million farms. But that seeming stability masked major changes within the distribution. The number of small commercial farms (\$10,000 to \$250,000) fell considerably. While there were still 676,160 such farms in the U.S. in 2007, that represented a decline of over 40 percent in 25 years (table 1). In turn, the number of very large farms grew by 242 percent, from 16,191 in 1982. In spite of the decline in small commercial farms, the aggregate farm count remained stable largely because of an increasing number of farms with less than \$1,000 in sales; by 2007 they constituted nearly a third of all U.S. farms.²

² Some of that increase was affected by inflation, since it took fewer animals or acres to qualify as a farm in 2007 than in 1982. Some also reflected USDA methodological changes designed to more effectively locate and identify such farms, and some probably reflects an actual increase in the number of such places (USDA/NASS, 2009, p. 31).

The shifts portend a major shift in production (table 2). In 2007, very large farms accounted for 59.2 percent of all U.S. farm sales, more than double the share (27.4 percent) held in 1982. Real agricultural sales among small commercial farms fell by nearly half between 1982 and 2007, and their share of total sales fell by nearly two-thirds.

Table 2: Changes in the Size Distribution of U.S. Farm Production, 1982-2007

<i>Farm Sales Class</i> (2007\$)	<i>2007 Census</i>		<i>1982 Census</i>		1982-2007 sales change (%)
	Sales 2007\$ (millions)	Percent	Sales 2007\$ (millions)	Percent	
<1,000	84	0.0	86	0.0	-3.3
1,000-9,999	2,621	0.9	3,282	1.7	-20.1
10,000-49,999	9,441	3.1	14,640	7.7	-35.5
50,000-99,999	8,961	3.0	18,256	9.7	-50.9
100,000-249,999	24,213	8.1	44,326	23.4	-45.4
250,000-499,999	33,410	11.2	33,431	17.7	-0.1
500,000-999,999	42,691	14.4	23,308	12.3	+83.1
1,000,000 or more	175,800	59.2	51,822	27.4	+239.2
All farms	297,220	100.0	189,151	100.0	+57.1

Source: Census of agriculture, as adjusted by ERS for changes in agricultural prices using the Producer Price Index for Farm Products

Shifts to larger operations occurred in almost all commodities, as we show by supplementing the data in tables 1 and 2 with physical data on commodity production in table 3. Here, we try to account for the skewed distribution of production in most commodities, which makes simple means and medians less informative. For example, 347,760 farms harvested 86.2 million acres of corn in 2007, for a mean harvested corn acreage of 248 acres among farms with corn. But that mean isn't particularly representative of farms or of production: 71 percent of corn producers harvested less than 248 acres, and 78 percent of harvested acres were on farms with more than 248 acres. We aim to track production in table 3, so we report the median of the distribution of harvested acreage by farm size, where half of all harvested acreage is on larger farms and half is on smaller farms. We refer to this as the locus of production.³

We report trends for 15 major field, vegetable, and tree crops between 1987 and 2007.⁴ The production locus increased markedly in each crop. The smallest, from 92 acres to

³ This is the acre-weighted median, and should be distinguished from the simple median farm size, where half of all *farms* have more acreage and half have less. The measure has been used in ERS studies (Hoppe, et al., 2007; Key and Roberts, 2007; MacDonald and McBride, 2009), and in industrial organization as far back as Florence (1933).

⁴ Here we are focusing on commodity enterprises rather than whole farms, which usually consist of several commodity enterprises. Our findings suggest that production is shifting to larger farms and to larger commodity enterprises.

120, occurred in peaches. But production shifted to much larger operations in most crops. It tripled in corn, from 200 to 600 acres, and more than doubled in the four other major field crops. Most vegetable and tree crops listed display a similar story, with the production locus doubling or tripling in 20 years.

Table 3: Production is Shifting to Larger Enterprises

Selected Commodities	1987	1997	2007
	Acre-weighted median, harvested acreage		
Field crops			
Corn	200	350	600
Soybeans	243	380	490
Wheat	404	693	910
Cotton	450	800	1090
Rice	295	494	700
Vegetables			
Asparagus	160	200	240
Lettuce	949	1461	1815
Peppers, Bell	88	180	300
Potatoes	350	556	990
Sweet Corn	100	173	250
Tomatoes	400	589	820
Tree Crops			
Apples	83	122	146
Almonds	203	292	450
Oranges	450	769	1113
Peaches	92	100	120
Livestock	Animal-weighted median, sales/removals		
Broilers	300,000	480,000	681,600
Hogs	1,200	11,000	30,000
Fattened Cattle	17,532	38,000	35,000
Cattle, <500 lbs	50	65	128
	Cow-weighted median, milking herds		
Dairy Cows	80	140	570

Source: ERS calculations, from Census of Agriculture microdata.

Note on weighted medians: For crops, we use medians for the distribution of acreage by enterprise size: half of all harvested acreage of a commodity is in farms that harvested more than the median, and half is in farms that harvested less. For broilers, beef cattle, and hogs, we use the median of the distribution of sales/removals by enterprise size: half of all sales/removals are from farms that sold more than the median, and half are from farms producing less. For dairy, we use cow inventories: half of all U.S. dairy cows were in herds larger than the median, and half were in smaller herds.

For cattle, hogs, and broilers, we tracked the number of animals sold, with the median of the distribution of sales by farm size (such that half of all sales were from larger farms, and half from smaller). These changes are quite striking. The production locus more than doubled in broilers and fed cattle; those industries underwent dramatic structural changes

prior to 1987, but the data suggest that there were important ongoing shifts of production to larger operations in the last two decades. The hog and dairy industries underwent major changes during the period (MacDonald and McBride, 2009). The dairy herd size locus increased from 80 to 570 cows in 20 years, while in hogs the production locus went from 1,200 removals 1987, to 11,000 in 1997, to 30,000 in 2007.⁵

3 PERSISTENCE

There were still 676,170 small commercial farms in the 2007 census data. While their numbers, and their share of U.S. agricultural sales, fell sharply between 1982 and 2007, they still represent a substantial amount of production. Total sales among the group amounted to \$42.6 billion, well in excess of total agricultural production in California (at \$33.9 billion the top producing U.S. State) and equal to the combined sales from the major adjoining Corn Belt States of Illinois, Indiana, and Iowa (ranked 6th, 10th, and 3rd, respectively, for agricultural production among the fifty U.S. states). We look more closely at these farms in this section. We use ARMS data, which also allows us to use a different measure of sales.

3.1 Measures of Farm Size

The primary measure of agricultural sales used in the census is the market value of agricultural products sold (MVS). We use census data to provide us with consistent comparisons of changes over time, but MVS has several weaknesses as a measure of the gross income accruing to particular farms, and we prefer to use to gross cash farm income (GCFI) as a measure of a farm's gross income. GCFI includes income from livestock and crop cash and marketing contract sales; fee income received from production contracts; income from land rented to others; government agricultural payments; and income from farm-related activities, such as custom work or machine hire.⁶

GCFI differs from MVS, and two differences matter for analyses of small farms. First, GCFI includes payments from government agricultural programs as well as payments for farm-related activities, such as custom harvesting or land and equipment rentals, while MVS does not. The inclusion raises GCFI compared to MVS, and shifts some farms into higher sales classes. Second, in the case of farms with production contracts, MVS records the market value of the commodity as removed from the farm while GCFI records the fees that farmers actually receive under their contracts. In livestock production contracts,

⁵ The hog numbers reflect a reorganization of the industry, as well as shifts to larger operations. In 1987, most production was on farrow to finish operations, and so most hog sales/removals were of market hogs. By 2007, production was specialized into stages, and specialized farrowing operations that produced 50,000 nursery pigs in a year were quite common. Those pigs would be removed to finishing operations, and the production locus among specialized finishing operations was 12,000 hogs per year.

⁶ In the ERS farm income accounts, gross farm income (GFI) adds three noncash elements to GCFI: the value of any change in inventories or accounts receivable; the gross imputed rental value of the farm operator's dwelling; and the value of farm products used or consumed on the farm.

farmers provide housing and labor services, while integrators (who own the livestock) provide feed and young livestock. Contract fees paid to farmers for their “growers services” are a fraction of the market value of the livestock. Consequently, GCFI will be substantially lower than MVS for some operations with production contracts. This affects hog, poultry, and fed cattle operations, but it is particularly important for broilers (chickens produced for meat).

Typical fees paid in broiler production amount to about 25 cents for a 5 pound broiler, so a farmer who produces 500,000 broilers in a year would receive about \$100,000 in contract fees (MacDonald, 2008). If fees amount 10 percent of the market value of a bird, then the MVS associated with that production would amount to \$1 million. U.S. poultry farms aren’t very diversified—they do not usually have substantial crop operations and most have a GCFI in the range of \$50,000-\$250,000 (small commercial farms), and an MVS in excess of \$1 million, so the sales measure matters. Many broiler operations appear to be very large farms using MVS, but are small commercial farms using GCFI.⁷

When we replaces MVS with GCFI as the measure of farm sales, the farm size distribution shifts to the middle from the extremes (figure 2). The share of the smallest class (<\$1,000) falls by nearly a third, from 32 to 20 percent, although it is still striking that one fifth of all farms generate less than \$1,000 in gross income, even when one adds government payments, land rentals, and grazing fees to product sales. The number of the largest farms also falls, from 55,000 to 40,000. In the 2007 census, 15,548 hog and poultry farms, and 2,193 cattle feedlots, had an MVS of \$1-5 million, so this change is consistent with most of them moving to a smaller GCFI sales class.⁸

⁷ The effect on hog operations is weaker. Hog farms are more likely to fall from the very large to the large class, because they usually also have large cropping operations, with crops that generate government payments, and because hog contract fees tend to be a larger share of MVS.

⁸ Major cattle feedlots, and major egg operations and pig nursery operations, tend to have at least \$1 million in MVS and GCFI.

Figure 2: Using GCFI Shifts the Size Distribution of Farms

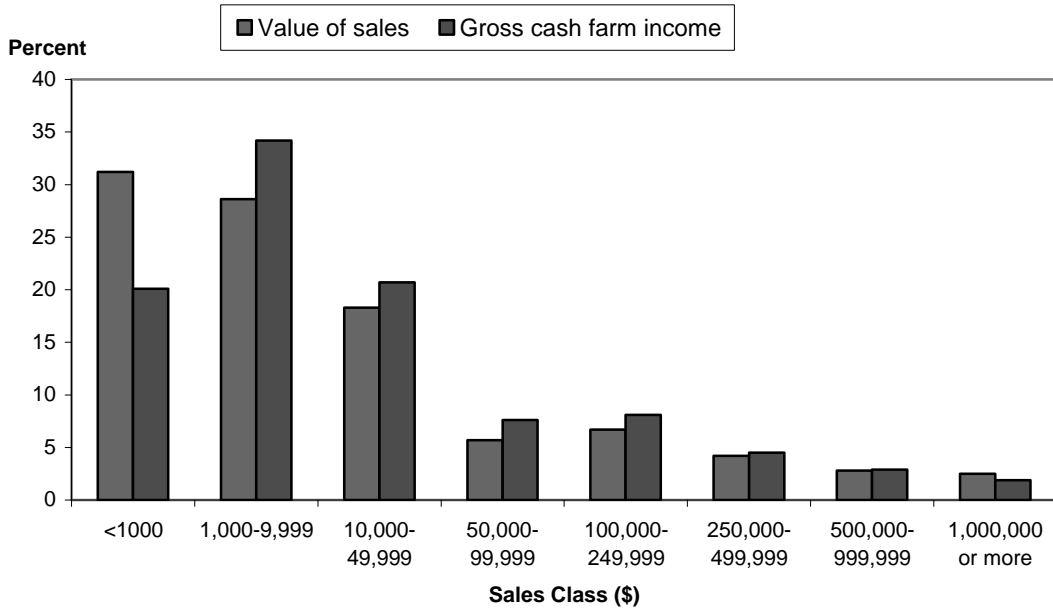


Figure 3: Using GCFI Affects the Size Distribution of Production

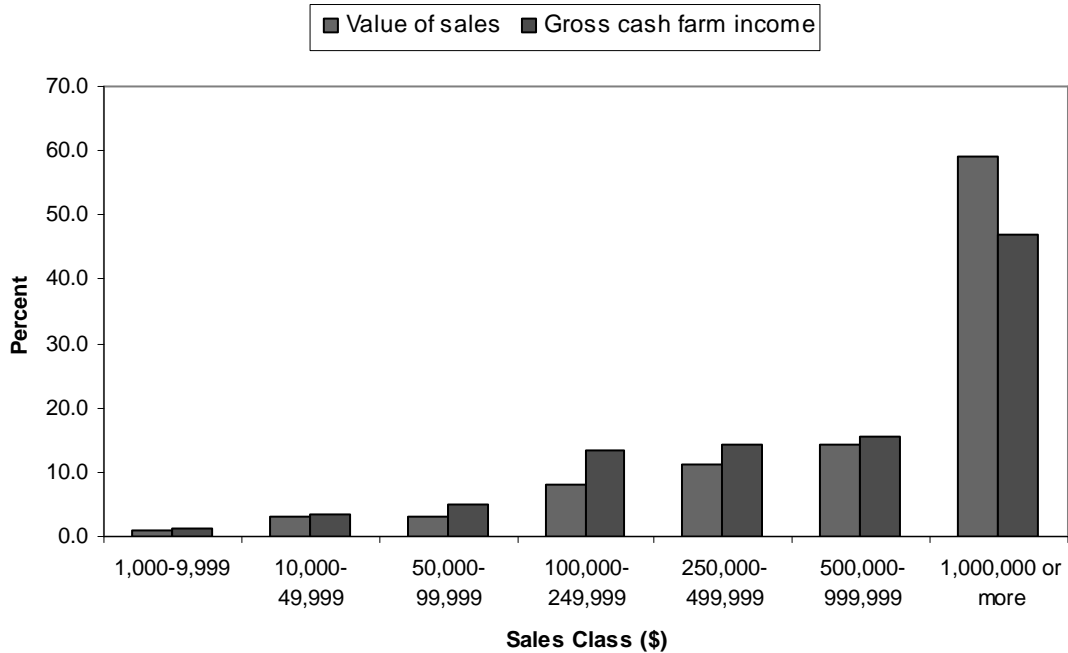


Figure 3 shows how the size distribution of production changes. Using GCFI, farms with \$1 million or more in sales account for 47 percent of all agricultural production, compared to 59 percent when MVS is used, as farms with production contracts in poultry,

hogs, and cattle shift into smaller sales classes. The largest net gain occurs in the \$100,000-\$249,999 class, which include many poultry farms.

More farms and more production fall into the class of small commercial farms when we use GCFI as a measure of sales instead of MVS.⁹ But the substitution doesn't change our understanding of the temporal shift of production to larger farms. We don't have farm-level GCFI going back to 1982, but we can compare changes between 1997 and 2007. The share of the total value of production held by small commercial farms fell by 8.7 percentage points using ARMS and GCFI to measure sales, while it fell by 8.0 percentage points using census and MVS. The share held by very large farms rose by 12.2 percentage points with ARMS data and sales measured by GCFI, while it rose by 13.2 percentage points using census data and MVS. With each sales measure, production is shifting sharply to larger farms.

3.2 What Do Small Commercial Farms Do?

Table 4 displays the commodity mix of farms in the U.S., using GCFI and seven of the eight sales classes specified earlier.¹⁰ For each size class, and for the U.S. as a whole, the total value of production is sorted across 11 commodity categories. The mix of commodities varies considerably across sales classes.

Table 4: How the mix of commodities varies across sales classes.

Commodity	Gross Cash Farm Income (\$1,000)							All farms
	1-9	10-49	50-99	100-249	250-499	500-999	>999	
	Share (%) of value of production in size class							
Grains and soybeans	11.3	22.5	26.1	28.7	40.5	43.3	13.7	25.1
Hay	22.1	12.0	5.6	2.6	2.0	2.0	1.4	2.6
Cotton	0.1	0.2	0.6	0.6	1.7	2.8	1.6	1.6
Tobacco	0.7	0.8	0.7	0.4	0.5	0.4	0.3	0.4
High value crops	5.5	8.1	8.4	6.2	7.1	11.2	25.7	16.4
Other crops	0.4	0.9	0.8	0.9	3.0	3.6	5.0	3.5
Beef	47.9	42.1	21.7	15.3	12.4	13.3	23.6	20.1
Hogs	1.5	1.4	4.3	4.7	6.7	8.7	5.6	5.8
Dairy	0.0	1.1	4.9	6.8	9.8	9.2	18.1	12.6
Poultry	0.7	5.2	24.3	32.3	14.5	3.8	4.3	10.5
Other livestock	9.8	5.6	2.9	1.5	1.7	1.5	0.7	1.5
All	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Source: 2007 Agricultural Resource Management Survey (ARMS).

⁹ Earlier, we noted that U.S. small farm production, when measured by MVS, was equivalent to total agricultural production in the Corn Belt States of Illinois, Indiana, and Iowa. Measured with GCFI, small farm production is equivalent to those states, plus the largest U.S. agricultural state, California.

¹⁰ We omit farms with less than \$1,000 in GCFI. Most (62 percent) list other livestock, which includes horses, as their commodity specialization (the U.S. farm definition counts a place as a farm if it has four or more horses). Such places have few sales.

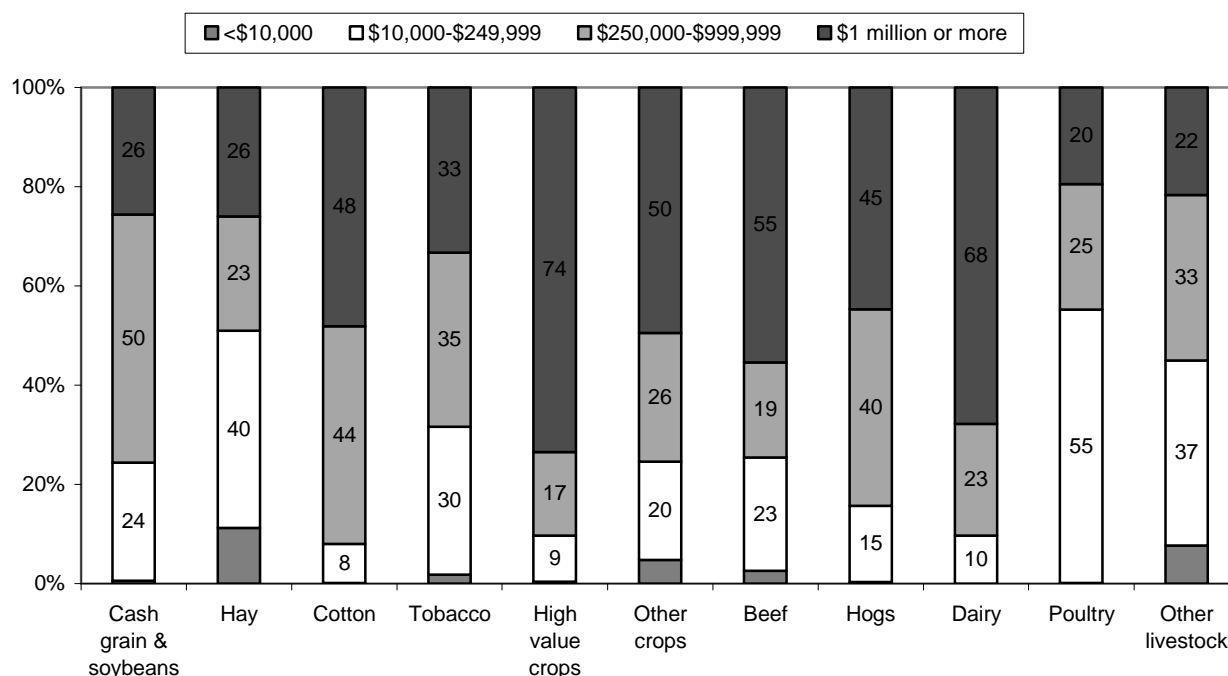
Beef cattle and hay account for 70 percent of the value of production among very small farms (less than \$10,000 in GCFI). Small commercial farms focus on three commodities: beef cattle, poultry, and grains and soybeans together account for 70 percent of production in each of the three classes in that category. To put this in perspective, grain farms in the \$10,000-\$49,000 GCFI range reported a mean harvested acreage of 111 acres, compared to 255 acres and 530 acres for the next two classes. To choose another example, a broiler operation with two modern houses could generate \$62,500 in fees in a year, while four houses could generate \$125,000 in fees, at 125,000 birds removed per house, and 25 cents a bird in fees, for operator who report that they and their spouse, (usually) together commit 25-35 hours per week to the farm. These activities do not require a full-time commitment of hours, and operators of small broiler, cattle, and grain farms can combine off-farm employment with a part-time cash-generating farm business.

Larger farm commodity mixes change noticeably. Cash grains and soybeans are important for farms in the two large classes, with over 40 percent of production in each. Cotton, hog, and dairy production are each more important here than in other classes, while beef and poultry production assume less importance.

Very large farms (\$1 million or more in GCFI) accounts for 47 percent of all agricultural production, and they have a distinctive commodity mix. Beef, dairy, and high value crops combine to account for over two-thirds of production in this class. High value crops--fruits, vegetables, and nursery crops—account for a quarter of class production. The beef operations in this class are usually feedlots that fatten cattle for slaughter, as distinct from the cow-calf and stocker operations that appear in smaller size classes.

Small commercial farms are important producers of some commodities. Figure 4 uses four broad aggregates—very small, small commercial, large (\$250,000-\$999,999), and very large farms. Small commercial farms account for over 55 percent of poultry production and 40 percent of hay production. They account over twenty percent of cash grains and soybeans, tobacco, and beef, but handle 10 percent or less of cotton, high value crops, and dairy production. Large farms, with 30 percent of all production, have large shares of cash grains and soybeans (50 percent), cotton (44 percent) and hogs (40 percent), but hold relatively small shares of hay, high value crops, beef, and dairy. Very large farms dominate the production of two commodities, accounting for 74 percent of all high value crop production and 68 percent of dairy production.

Figure 4: Shares of commodity production, by farm sales class



3.3 Commodities and Direct Government Payments

The U.S. government provides direct payments to farms through conservation and commodity-related programs. Conservation programs include land retirement programs like the Conservation Reserve Program (CRP) as well as working land programs like the Environmental Quality Incentives Program (EQIP). Commodity-related programs, such as direct and counter-cyclical payments, marketing assistance loans, and emergency and ad hoc payments, tend to be related to production of specific commodities, most commonly certain field crops.

Most farms with at least \$50,000 in sales receive government payments (table 5), but the distribution of payments across size classes varies with the program. Many farmers place their entire operation in the CRP; in consequence, over 80 percent of land retirement payments go to small farms with less than \$250,000 in sales. Commodity-related program payments closely mirror the distribution of program crop production, so very large farms, while they account for 47 percent of all production, receive 29 percent of commodity-related payments, close to their 28 percent share of program commodity production.¹¹

¹¹ The comparison shares for production are in the bottom panel of table 5. Program crops include barley, corn, cotton, oats, oilseeds including soybeans, peanuts, sorghum, sugar, and wheat.

Table 5: Government Payments, by Farm Sales Class

Item	Gross Cash Farm Income (\$1,000)						
	1-9	10-49	50-99	100-249	250-499	500-999	>999
Farms receiving:	--Percent of all farms--						
Any payments	28.6	45.8	65.4	70.1	80.6	82.1	70.1
Conservation payments	15.7	26.1	25.6	19.8	27.3	31.8	25.5
Commodity payments	15.5	40.6	58.8	66.1	78.8	78.5	68.3
Share of payments:	--Share (%) of total program payments--						
All	5.0	11.3	9.4	13.3	17.7	19.5	23.7
Conservation	16.0	29.6	14.3	10.8	11.2	10.3	7.0
Land retirement	19.9	32.2	17.0	11.2	7.0	8.0	3.8
Working land	1.6	20.2	4.5	9.6	26.5	18.8	18.7
Commodity-related	1.5	5.5	7.8	14.1	19.8	22.4	29.0
Share of:	--Share (%) of production or acreage--						
Value of all production	1.1	3.4	5.1	13.5	14.3	15.6	47.0
Program crop production	0.4	2.8	5.1	14.6	21.4	27.0	28.3
Retired acres	18.4	29.0	19.1	13.1	8.0	7.1	3.6

Source: 2007 Agricultural Resource Management Survey (ARMS).

Large farms (\$250,000-\$999,999) account for nearly half of program crop production and they received over 40 percent of all payments. Small commercial farms received 27.4 percent of commodity-related payments.

Table 6: Farm Operator Characteristics, by Farm Sales Class

Item	Gross Cash Farm Income (\$1,000)						
	1-9	10-49	50-99	100-249	250-499	500-999	>999
Age:							
Mean age (years)	57	59	58	54	54	53	53
Percent 65 or older	29	37	32	21	18	15	15
Occupational choice:	--Percent of Primary Operators--						
Retired	23	19	16	6	6	4	2
Off-farm occupation	59	46	27	17	10	5	4
Education:							
High school or less	52	50	55	51	50	41	39
College graduate	23	27	23	25	23	27	34

Source: 2007 Agricultural Resource Management Survey (ARMS).

3.4 Farm Operator Characteristics

Operators of small commercial farms tend to be noticeably older than operators of other farms (table 6). ARMS provides demographic information for up to three operators—day-to-day decisionmakers—on each farm, but we focus here on the primary operator. High fractions of operators in the \$10,000 to \$100,000 GCFI classes report that they are

65 or older (37 percent of those in the \$10,000-49,000 class, compared to 15 percent in the largest classes). And far more of them report that they are retired--19 and 16 percent in the smallest commercial classes, compared to 2-4 percent in the largest.¹² When we add in occupational choice, we see that most operators in the smallest classes report that they are retired or that their principal occupation is off the farm. Many small farms are in transition; while some may be aiming to transition to a larger operation, others are run by older farmers who are cutting back their activity and transitioning to retirement.

Educational profiles also differ. More than half of the farm operators in all sales classes below \$500,000 in sales have no more than a high school education, compared to about 40 percent of operators in larger classes. And noticeably more operators in the largest sales class have a college degree.

3.5 Farm Financial Performance

Farm size is strongly related to farm financial performance, and this linkage is a major driver of structural change in the industry. We present evidence on farm financial performance in 2007 in table 7.

Table 7: Farm Financial Performance, by Farm Sales Class

Item	Gross Cash Farm Income (\$1,000)						
	1-9	10-49	50-99	100-249	250-499	500-999	>999
Farms with positive:	--Percent of farms--						
Net cash farm income	28.6	55.8	75.5	80.3	84.7	84.2	86.7
Net farm income	59.1	68.1	77.1	80.1	84.2	84.3	86.2
Operating profits	25.8	30.7	47.1	60.3	74.2	80.5	85.4
Mean within size class:	--Mean percent return--						
Rate of return on equity	-3.7	-2.6	-1.4	0.2	3.4	6.5	15.1
Operating profit margin	-112.6	-51.3	-11.5	6.3	18.6	23.6	27.5

Source: 2007 Agricultural Resource Management Survey (ARMS).

The top panel of table 7 reports the share of farms in each size class who report positive returns, by three measures: net cash farm income, net farm income, and operating profits. In the top row, most very small farms show negative net cash incomes, but most farms in every larger sales class show positive net cash incomes (the difference between gross cash income, and cash expenses for purchased intermediate inputs, paid labor, cash rents, taxes and interest). The fraction increases with farm size, but flattens quickly—there's no obvious large advantage for the largest farms over other commercial farms.

¹² How can you be retired and run a business with a million dollars in gross income? Many large farms have multiple operators, and multiple generations involved in operating the farm business. Large farm operators who say they are retired usually have a younger partner.

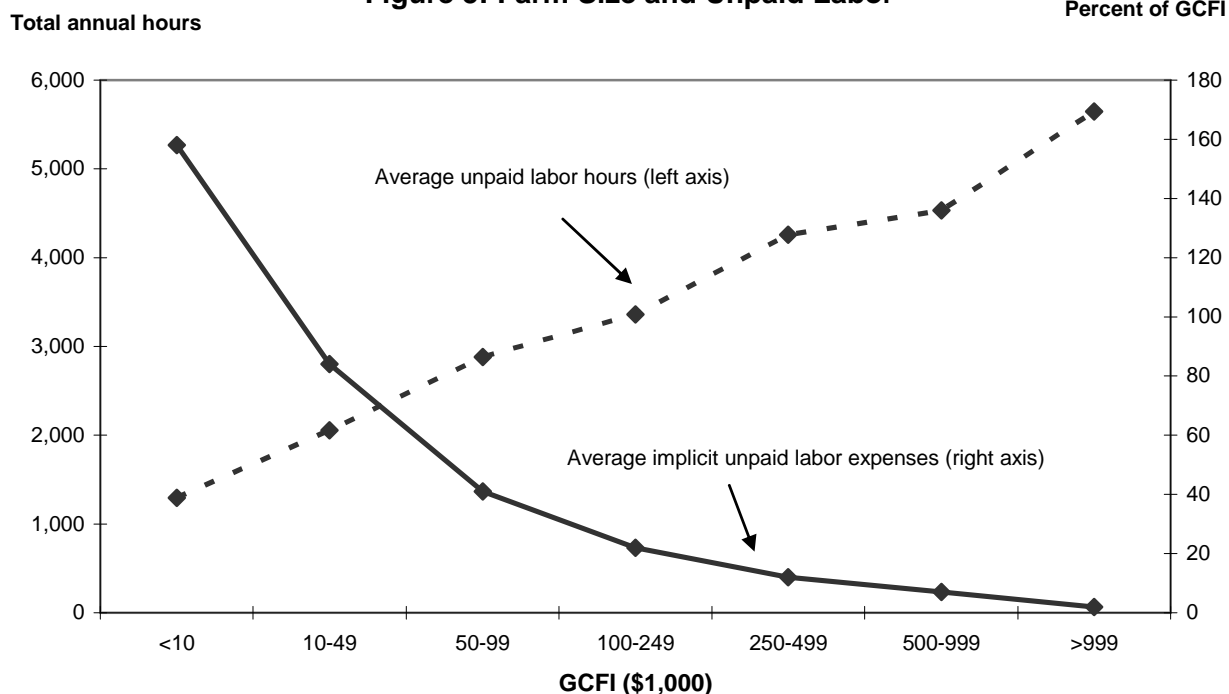
In the second row, we report the share of farms with positive net farm incomes. Net farm income differs from net cash income in three primary ways. It adds the value of changes in inventory and accounts receivables, as well as the imputed rental value of the operator's dwelling, to gross cash income. It also adds depreciation expenses to cash expenses. Changes in inventory and accounts receivable may be positive or negative for individual farms, but the imputed dwelling value shifts turns many of the smallest farms from negative net cash incomes to positive net farm incomes (table 7). Tax rules allow farms to incur accelerated depreciation on purchases of structures and equipment; that allows some farms to shelter income from taxes, and some with substantial net cash income may have negative net farm income because of large depreciation expenses. But because there's no obvious connection to farm size, the largest farms still don't have a large and clear advantage over midsize farms. Most farms in all classes have positive net farm income.

Operating profits present a much different picture. Less than half of farms with sales below \$100,000 have positive operating profits, and operating profits appear to be strongly linked to farm size. The key is that operating profits aim to take account of the opportunity cost of unpaid labor provided by farm operators. Operating profits add interest expense to net farm income, but deduct charges for operator management and unpaid labor. ERS estimates those implicit charges. The charge for management is a fraction of gross income for most farms, and does not have a large impact on returns by farm size. The charge for unpaid labor hours does have a large effect: hours are reported on the ARMS survey, and ERS follows a conservative approach of valuing those hours at the hourly wage rate for hired farm labor--\$9-\$11 an hour, depending on location.¹³

Figure 5 reports on unpaid labor hours. Average annual hours increase steadily with farm size, from about 1,200 among very small farms to nearly 6,000 among very large farms (unpaid labor may be provided by multiple operators, their spouses, their children, and others). But hours do not increase proportionately with sales, and implicit unpaid labor expenses, relative to GCFI, fall sharply with farm size. They amount to 84 percent of GCFI among farms with \$10,000-\$49,999 in sales, and 41 percent among the next largest class, moving most farms in these classes from positive net farm incomes to negative operating margins. Many small commercial farms generate sales that are quite low, given the hours that operators commit to the enterprise. Once one takes account of the opportunity costs of the unpaid labor provided by farm operator and their spouses, a strong relation between farm size and financial performance appears.

¹³ This is conservative. Farm operators who work off the farm tend to earn hourly wages that are about double the hired labor wage rate.

Figure 5: Farm Size and Unpaid Labor



We report two standard summary measures of financial performance in the bottom panel of table 7—the rate of return on equity and the operating profits margin. The rate of return on owner’s equity subtracts interest payments from operating profits, and expresses the result as a ratio to the farm operation’s net worth. The operating profit margin reports the ratio of operating profits to gross farm income. Each is strongly related to farm size, and very large farms’ average returns on equity compare favorably to the rest of the U.S. economy.

There is a wide range of performance around the averages. In particular, 229,000 small commercial farms (30 percent of the total) keep their implicit unpaid labor expenses to less than 20 percent of GCFI; nearly for out of five of those farms earn operating profits, and their average return on equity matches that among very large farms. But an equivalent number have implicit unpaid labor expenses in excess of 60 percent of GCFI, and just 3 percent of those farms earn operating profits. Some of these may have suffered unexpected reverses, while others may be investing for the future with only limited current sales. But many likely view the farm operation as a consumption activity.

3.6 Household Finances

Even though many farms appear to have negative profits, small farm operators aren’t generally poor. Table 8 reports on household incomes for the principal operator households of U.S. farms, sorted again by size class. We report means, because they can be easily decomposed into components for farm earnings and off-farm incomes. But we also report median incomes, because incomes tend to be skewed. In evaluating these

numbers, one should recall that median U.S.-wide household income in 2007 was \$50,233, while the U.S. mean was \$67,609.

Table 8: Farm Household Income, by Farm Sales Class

Item	Gross Cash Farm Income (\$1,000)						
	1-9	10-49	50-99	100-249	250-499	500-999	>999
	--Dollars per household--						
Mean household income	73,410	79,247	100,634	82,971	123,924	166,015	567,237
Farm earnings	-7,116	-6,394	5,101	23,389	74,026	125,224	519,984
Off-farm income	80,526	85,641	95,533	59,581	49,898	40,790	47,253
Earned	61,906	61,630	75,225	43,650	36,314	26,937	29,249
Unearned	18,619	24,011	20,308	15,932	13,584	13,583	18,004
Median household income	47,812	48,852	53,789	68,214	108,791	155,900	318,600
Median farm earnings	-3,695	-1,822	12,030	27,850	72,153	122,050	274,200
Median off-farm income	55,000	51,750	43,500	32,500	27,500	23,719	23,719

Source: 2007 Agricultural Resource Management Survey (ARMS).

Mean and median household incomes rose with farm size (table 8). Mean incomes exceeded the U.S. mean in every sales class, while median incomes in the two smallest classes fell below the U.S. median, by 5 percent in the smallest class and 2.7 percent in the \$10,000-\$49,999 class. But note that median off-farm income in each of those classes exceeded the U.S. median, and that negative farm earnings pulled their total household incomes down. Many of these households with the smallest farm operations may farm as a consumption activity—farming is how they spend their money.

Some small commercial farm operators are retired, and draw on unearned off-farm income from pensions and savings, as well as payments from government land retirement programs, to help support themselves. But many small commercial operators combine off-farm employment with part-time farm operations that provide some diversified earnings to the household, and many spouses of large farm operators work off the farm to provide health benefits or a diversified flow of income to the household.

Households that operate large farms earn incomes that are well above nationwide averages, whether we use means or medians (table 8). While the primary operators of very large farms rarely work off the farm, their spouses usually do, so even those households usually have some off-farm earned income.

4 CONCLUSIONS

What does the future hold for U.S. farm structure? USDA farm definitions assure that we will continue to count many very small farms, who do very little farming. They currently account for over half of all U.S. farms, and their numbers may even continue to grow, as long as there is a growing demand for a rural lifestyle (and for the riding horses that often go with it).

In the middle, among small commercial farms, many can continue to combine off-farm work with viable farm businesses. Most production on small commercial farms comes from three commodities—beef cow-calf and stocker enterprises, grain and oilseed production, and poultry (primarily broilers). As currently performed, each commodity allows farmers to participate in agriculture without making a full-time commitment of hours, although production in each is shifting to larger operations. Absent significant technological changes, we expect these commodities to continue to be the focus of small farm production in the U.S. However, only a fraction of such farms provide returns commensurate with what operators could earn in off-farm employment, so we expect continued gradual attrition in this area.

There are strong financial incentives for production to continue to shift to large farms. The favorable financial returns for large farms have persisted through time, and show no sign of eroding. Most of these farms are still relatively small and family-owned businesses. They are relatively small in the sense that there are over a million non-agricultural businesses in the U.S. with gross incomes of at least \$1 million or more, or about 1 for every 80 households in the country. Thus businesses with around \$1 million in gross income are quite common, and really large businesses have gross incomes much larger than that. ERS statistics show that most of those farms continue to be owned and operated by a single family, and most of those that aren't are owned and operated by small groups of unrelated partners. Family farms still dominate U.S. agriculture, but production is shifting to different kinds of family farms.

References

Florence, P. Sargent. *The Logic of Industrial Organization*. London: Keegan, Paul, Trench and Trubner, 1933.

Hoppe, Robert A., Penni Korb, Erik J. O'Donoghue, and David E. Banker. *Structure and Finances of U.S. Farms: Family Farm Report, 2007 Edition* U.S. Department of Agriculture, Economic Research Service. Economic Information Bulletin No. 24. June, 2007).

Key, Nigel, and Michael J. Roberts. *Commodity Payments, Farm Business Survival, and Farm Size Growth*. U.S. Department of Agriculture, Economic Research Service. Economic Research Report No. 51. November 2007.

MacDonald, James M. *The Economic Organization of U.S. Broiler Production*. U.S. Department of Agriculture, Economic Research Service. Economic Information Bulletin No. 38. June, 2008.

MacDonald, James M., and William D. McBride. *The Transformation of U.S. Livestock Agriculture: Scale, Efficiency and Risks*. U.S. Department of Agriculture, Economic Research Service. Economic Information Bulletin No. 43. January, 2009.

O'Donoghue, Erik J., Robert A. Hoppe, David E. Banker, and Penni Korb. *Exploring Alternative Farm Definitions: Implications for Agricultural Statistics and Programs*. U.S. Department of Agriculture, Economic Research Service. Economic Information Bulletin No. 49. March 2009.

U.S. Department of Agriculture. National Agricultural Statistics Service. *Farms, Land in Farms, and Livestock Operations*. February, 2009.

U.S. Census Bureau. *Statistical Abstract of the United States: 2008*. Washington, DC, 2009.