


U.S. farm dynamics and the distribution of U.S. agricultural subsidies

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ABSTRACT

The persistent instability of the agricultural sector is the fundamental premise of most agricultural policy. Yet no research has ever quantified the aggregate dynamics of individual farms in the US. This article is the first to combine the US Census of Agriculture with the Agricultural Resource Management Survey to observe the dynamics of nearly 1.5 million farms. The data reveal substantial variation in farm size expansion and contraction. Most of this variation is unobservable in the sector totals reported by the US Department of Agriculture each year. The distribution of agricultural subsidies suggests that subsidies become more important as farms get smaller and may play a role in slowing farm size contraction.

KEYWORDS

Agricultural subsidies; farm dynamics; agricultural policy; subsidy distribution; farm growth

JEL CLASSIFICATION

Q12; Q18; L11

US agricultural policy effectively began during World War I when Herbert Hoover, then the national Food Administrator, fixed the domestic price of wheat at nearly twice the price it had been in the previous year. At that time, the typical farm grew five different crops and had 20 head of livestock.¹ A policy targeting one widely grown crop, such as wheat, benefited most farms.

Today things are different; farms are much more specialized. Farms usually specialize in either crops or livestock. Crop farms typically grow just two different crops, and cattle farms have an average of 130 head of livestock.² Policies that once benefited most farms now benefit just a few.

This article investigates the differences in the way the variety of modern farms benefit from agricultural subsidies. The article highlights the persistent instability in agriculture and the subsequent difficulty of categorizing the variety of farms in the US. We find that agricultural subsidies primarily benefit small tenant farms. Although the vast majority of subsidy dollars accrues to large farms, small farms appear to receive the biggest ‘bang’ for the subsidy dollar.

I. The variety of US farm operations

The US Department of Agriculture (USDA) has developed the following typology to classify the wide variety of farming operations in the US today.

Typology

- Small family farms (gross sales less than \$250 000).³
 - Rural-residence family farms:
 - * Retirement farms: small farms whose operators report they are retired.
 - * Residential/lifestyle farms: small farms whose operators report a major occupation other than farming.
 - Intermediate family farms:
 - * Farming-occupation farms: small family farms whose operators report farming as their major occupation.
 - Low-sales farms: gross sales less than \$100 000.
 - Medium-sales farms: gross sales between \$100 000 and \$249 999.
- Large-scale family farms (gross sales of \$250 000 or more).
 - Commercial family farms:

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¹Author’s calculation from the 1920 US Census of Agriculture.

²Author’s calculation from the 2007 US Census of Agriculture.

³The National Commission on Small Farms selected \$250 000 in gross sales as the cut-off between small- and large-scale farms.

- Large family farms: gross sales between \$250 000 and \$499 999.
- Very large family farms: gross sales of \$500 000 or more
- Nonfamily farms: Any farm not classified as a family farm, that is, any farm for which the majority of the farm business is not owned by individuals related by blood, marriage or adoption.

Table 1, adapted from Hoppe and Banker (2010), reports the relative sizes of each farm type. The table reveals that agricultural production is highly concentrated; in 2007, 84% of the value of US production came from large-scale family farms and nonfamily farms, which together made up only 12% of the farms.

Dynamics

The persistent instability of the agricultural sector is the fundamental premise of most agricultural policy. It should be no surprise then that a farm's 'type' changes from year to year. A farm grows when it is fortunate enough to face good weather and favourable markets. But when it is unlucky, it becomes smaller. As useful as the farm typology is, it only provides a snapshot of the structure of agriculture at a point in time. Understanding farm growth and failure requires us to observe the same farm over time. Unfortunately, few data sources capture farm dynamics by tracking farms

Table 1. Distribution of farms, total production and assets by farm type (2007).

Farm type	Farms	Value	
		of production	Farm assets
Per cent of US total			
Small family farms			
Retirement	18.4	1.6	12.9
Residential/lifestyle	45.1	4.2	26.0
Farming-occupation			
Low-sales	19.8	4.0	17.3
Medium-sales	5.1	6.6	7.9
Large-scale family farms			
Large family farms	4.3	12.2	9.3
Very large family farms	5.0	53.7	20.1
Nonfamily farms	2.4	17.7	6.6

Source: Robert A Hoppe and David E Banker (2010). Structure and Finances of US Farms Family Farm Report, 2010 Edition. Technical report 66. Washington, D.C.: US Department of Agriculture, Economic Research Service, July

over time. Consequently, our understanding of the dynamics of agriculture is limited.

The dearth of data and ignorance of farm dynamics, however, is not in-surmountable. By combining the Agricultural Resource Management Survey (ARMS), a detailed survey of a representative cross-section of farmers, with the Census of Agriculture, one begins to see the importance of agricultural instability. Observing a farm over a two-year period reveals the year-to-year change in its farm-typology classification.

Figure 1 represents the farm typology of 1 467 968 farms in 2006 and 2007.⁴ It illustrates the difficulty of classifying a farm based on a single year's sales. Farms classified as 'Very-large' appear to be relatively stable; 76% of farms classified as Very-large in 2006 maintained the same classification in 2007. In contrast, 'Low-sales' farms illustrate the instability in agriculture – only 24.6% of the farms classified as Low-sales in 2006 were reclassified as Low-sales in 2007. Strikingly, about 45% of the 2006 Low-sales farm operators quit full-time farming, either through retirement or by changing their primary occupation. Unfortunately, we don't know why these farmers quit. Were these farmers forced out of farming by yet another bad harvest, or was the transition part of a long-term plan? Without better data, we cannot

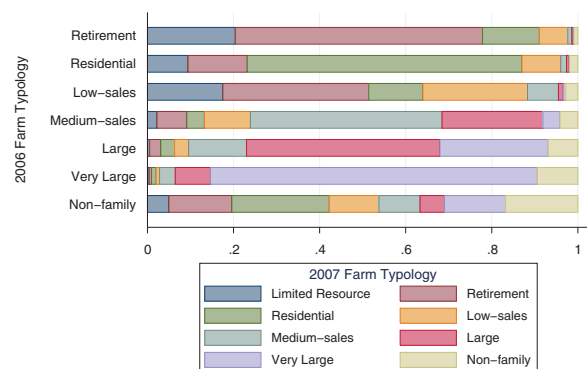


Figure 1. The inherent instability in agriculture is reflected in changing farm typology classification. Source: Author's calculations from USDA ERS/NASS, 2006 Agricultural Resource Management Survey. USDA NASS, 2007 Census of Agriculture.

Notes: The apparent volatility in the Nonfamily Farm category is due to differing definitions of a 'Nonfamily Farm' in the Census and in ARMS. See Appendix I in Hoppe and Banker (2010) for details.

⁴Figure 1 includes 'Limited Resource' farms, which the Census of Agriculture defines as 'farms with sales less than \$100,000 and operator household income less than \$20,000' (Hoppe and Banker 2010). This category is somewhat inconsistent with the rest of the typology because it ignores the farm operator's primary occupation. Consequently, the USDA-ERS has eliminated the Limited Resource category from the farm typology.

Table 2. Distribution of agricultural subsidy payments by sales class (2010).

	Less than \$10 000	\$10 000-\$249 999	\$250 000 \$999 999	\$1 000 000 or more	Nonfamily
	(1)	(2)	(3)	(4)	(5)
	Per cent				
All farms	55.1	33.5	7.4	1.7	2.3
All <i>subsidized</i> farms	28.5	48.3	17.0	3.8	2.4
Total government payments	5.8	30.6	37.1	22.9	3.6
Subsidized within sales class	18.2	50.7	80.4	79.4	36.7
Subsidies' share of gross income	16.2	6.0	4.2	2.1	0.9
Subsidies' share of net income	NA	32.6	14.9	8.0	3.3
Average payments (\$)	439	3839	20 918	56 962	6703

Source: Author's calculations from the 2010 Agricultural Resource Management Survey.

know the circumstances surrounding their transition out of farming, and, consequently, we cannot know whether better policy is needed, let alone what that policy would look like.

Even definitively classifying a farm as a small farm or a large farm is difficult. About 30% of small farms in 2006 crossed the \$250 000 sales-threshold and became large farms in 2007, and about 30% of the large farms fell below the threshold and were reclassified as small farms. Such symmetry is the most nefarious kind of dynamic because it portrays a false sense of stability when one looks at unconnected 'snap shots.'

II. The distribution of subsidies by sales class

It is widely known that large farms receive the bulk of subsidy payments. Table 2 illustrates that fact by providing information on the distribution of farms by sales class. The first row reports that over half (55%) of all farms had less than \$10 000 in sales in 2010, while only 1.7% had over \$1 000 000 in sales. Not all farms, however, are subsidized, as reported by row two. Among subsidized farms, only 28.5% had less than \$10 000 in sales in 2010. Nearly half (48.3%) of subsidized farms had sales between \$10 000 and \$249 999. About 3.8% of subsidized farms had over \$1 000 000 in sales. Row three reveals a starkly different pattern when we look at the distribution of subsidies. Only 5.8% of total subsidies go to farms with less than \$10 000 in sales. The largest 1.7% of farms (those with over \$1 000 000 in sales) received 22.9% of all government subsidies.

The reason subsidies are concentrated among the largest farms is that subsidies are determined by a formula that only considers either the amount of land a farmer operates or the amount of eight grains and cotton the farmer produces. By definition, large farms operate more land and produce more output, so they mechanically receive more subsidies.

But size isn't the only reason subsidies are concentrated among large farms; it is also the case that large farms are much more likely to receive *any* subsidy. Row four reveals that while nearly 80% of farms with sales over \$250 000 receive subsidies, only 18.2% of farms in the smallest sales class receive any subsidy. In other words, small farms are much less likely to participate in the subsidy programme. That fact has caused some to speculate that farms that participated in the subsidy programme *became* large and those that did not became small. In other words, farm subsidies *caused* farms to get bigger. Future research is needed to tease apart the direction of causation, but in the mean time rows five and six should give one pause before reaching any conclusions. Rows five and six report that subsidies are a much higher share of income for small farms than for large farms. In other words, one might expect that since subsidies are so important for the small farmers that small farms get a bigger 'bang for the buck' from subsidies.

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No potential conflict of interest was reported by the author.

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