

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 U.S. This article is the first to combine the U.S. 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 USDA 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.

U.S. 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 the previous year. At that time the typical farm grew 5 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 2 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 report highlights the persistent instability in agriculture and the subsequent difficulty of categorizing the variety of farms in the U.S. 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.

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

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

The Variety of U.S. Farm Operations

The U.S. Department of Agriculture (USDA) has developed the following typology to classify the wide variety of farming operations in the U.S. 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:
 - * Large family farms: Gross sales between \$250,000 and \$499,999.
 - * Very large family farms: Gross sales of \$500,000 or more
- Non-family 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 percent of the value of U.S. production came from large-scale family farms and non-family farms, which together made up only 12 percent of the farms.

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

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

Farm Type	Farms	Value of Production	Farm Assets
Percent of U.S. 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
Non-family farms	2.4	17.7	6.6

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

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

The dearth of data and ignorance of farm dynamics, however, is not insurmountable. 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.

Fig 1 represents the farm typology of 1,467,968 farms in 2006 and 2007.⁴ It illus-

⁴Fig 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).

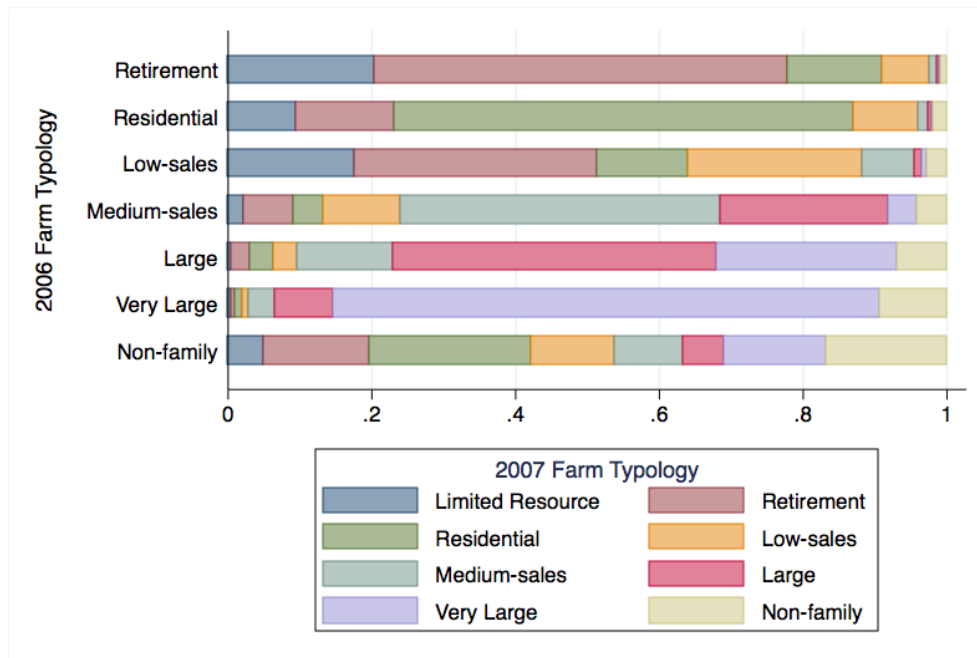


Figure 1: The Inherent Instability in Agriculture is Reflected in Changing Farm Typology Classification

Source: Author's calculations from USDA ERS/NASS, 2006 Agricultural Resource Management Survey. USDA NASS, 2007 Census of Agriculture. Note: The apparent volatility in the Non-family Farm category is due to differing definitions of a "Non-family Farm" in the Census and in ARMS. See Hoppe and Banker (2010) Appendix I for details.

trates the difficulty of classifying a farm based on a single year's sales. Farms classified as "Very-large" appear to be relatively stable; seventy-six percent 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 percent of the farms classified as Low-sales in 2006 were reclassified as Low-sales in 2007. Strikingly, about 45 percent 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 can-

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.

not 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 percent of small farms in 2006 crossed the \$250,000 sales-threshold and became large farms in 2007, and about 30 percent 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.”

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. 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 8 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 program. That fact has caused some to speculate that farms that participated in the subsidy program *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

Table 2: Distribution of Agricultural Subsidy Payments by Sales Class (2010)

	Less than \$10,000 (1)	\$10,000- \$249,999 (2)	\$250,000-\$999,999 (3)	\$1,000,000 or more (4)	Non- family (5)
	Percent				
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	3,839	20,918	56,962	6,703

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

so important for the small farmers that small farms get a bigger “bang for the buck” from subsidies.

Conclusion

Agricultural subsidies were initiated during World War I, and have persisted to address volatility in the agricultural sector. This article presents the first evidence of the extent to which farm incomes vary from year to year. Subsidies appear to be concentrated among the largest farms. As farms get smaller, however, subsidies become a larger share of farm income thereby providing smaller farms with a bigger “bang” for the subsidy “buck.”

References

- Hoppe, Robert A, and David E Banker. 2010. *Structure and Finances of U. S. Farms Family Farm Report, 2010 Edition*. Technical report 66. Washington, D.C.: U.S. Department of Agriculture, Economic Research Service, July.