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A photograph of three green combine harvesters working in a vast, golden field. The harvesters are arranged in a line, moving from left to right across the frame. The field is filled with ripe grain, and the harvesters are leaving tracks behind them. The lighting is bright, suggesting a sunny day.

# Cropland Concentrating Faster Where Payments Are Higher

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- Both crop production and government commodity payments have become more concentrated on larger farms, raising questions about the role of payments in changes in concentration growth.
- Concentration of cropland since 1987 grew much more rapidly in areas with relatively high initial payments per acre.
- While causality is not established, the evidence suggests that higher initial payment levels are associated with greater concentration in the control of cropland as time passes.



Both crop production and the share of government payments have shifted over time toward the largest farms. The fact that these trends are occurring simultaneously is not surprising since most government agricultural payments are tied to the amount of land farmed or the land's production history. The concentration of production certainly leads to a concentration of payments, but the reverse may also be true.

Increasing concentration of production is observed in many areas of agriculture. Hog finishing operations today typically feed two to three times the number of hogs that they finished in the early 1990s. Broiler operations are typically twice as large as they were 20 years ago. Today, over 1,400 dairy herds comprise more than 1,000 cows. There were fewer than 600 such herds in 1992.

Cropland has become increasingly concentrated on large farms. The Census of Agriculture shows increasing numbers of small farms (less than 50 acres) and large farms (1,000 acres or more) but also sharp and ongoing declines in the number of medium-sized farms. The many small farms account for little acreage and output, but strongly affect measures of average farm size. Thus, while average farm size edged up from 431 acres in 1982 to 441 in 2002, this modest change belies a

large increase in the concentration of production—a much greater share of land is now farmed by large operations.

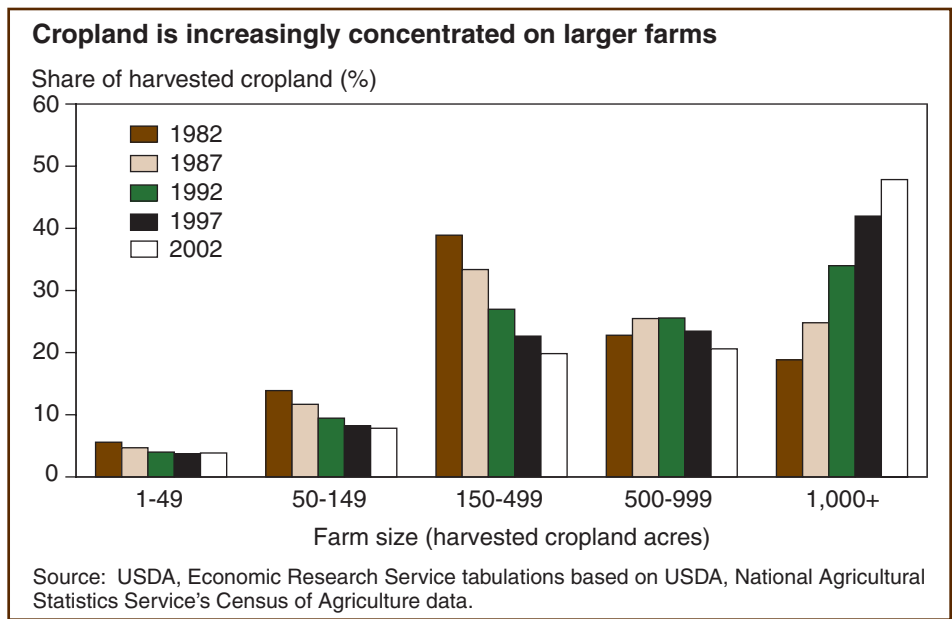
Economists see the trend toward larger farms as a byproduct of the innovations that have spurred vast economic growth and employment opportunities outside of agriculture, from factories a century ago to today's burgeoning service sectors. Farms have turned to bigger, faster, and more automated farm equipment, computerized information systems, and other capital as agricultural labor has shifted to other sectors of the economy. These substitutions have allowed fewer farmers to produce

more agricultural output and to operate much larger farms.

Technology may not be the only force driving changes in cropland concentration. Much public discussion of farm size and land concentration centers on the role of government policy and the degree to which program payments to farmers may be facilitating growth in the number of very large farms. In considering this issue, recent ERS research focuses on crop farms because most government agricultural policies are directed toward a handful of key crop commodities. These crops—corn, soybeans, wheat, cotton, and a few other grains—also account for the bulk of cropland in the United States. ERS examined whether areas that had received greater payments per cropland acre subsequently experienced faster or slower concentration of production than areas with lower or zero payments.

### Cropland Is Concentrating on Larger Farms

Between 1982 and the most recent Census of Agriculture in 2002, the number of farms and the land in farms declined by less than 5 percent and the average number of acres per farm in 1982 was almost



equal to the average in 2002. Nonetheless, there was considerable structural change in the distribution of farm sizes.

The share of harvested cropland operated by smaller to midsized farms (50-499 acres of cropland) decreased, while the share operated by large farms (1,000+ acres) increased. By 2002, farms with at least 1,000 acres of cropland operated 48 percent of the total, up from about 19 percent 20 years earlier.

There was little change in the share of land operated by farms with 1-49 acres of cropland. While these small farms operated less than 4 percent of total cropland in 2002, they comprise a growing share of farms. In 2002, about 50 percent of the 1.36 million farms that harvested cropland harvested less than 50 acres. Many of these small operations were "residential/lifestyle" farms, and most of their household income came from off-farm sources. While some small farms operated as commercial enterprises growing high-valued crops on relatively little land, most did very little farming: three-fourths had sales below \$5,000, and many had no sales at all. The number of small farms has increased, in part, because USDA's definition of a farm (\$1,000 in actual or potential sales) has remained fixed for over 30 years, without adjusting for inflation.

### Cropland Concentration Grows Faster Where Payments Are Higher

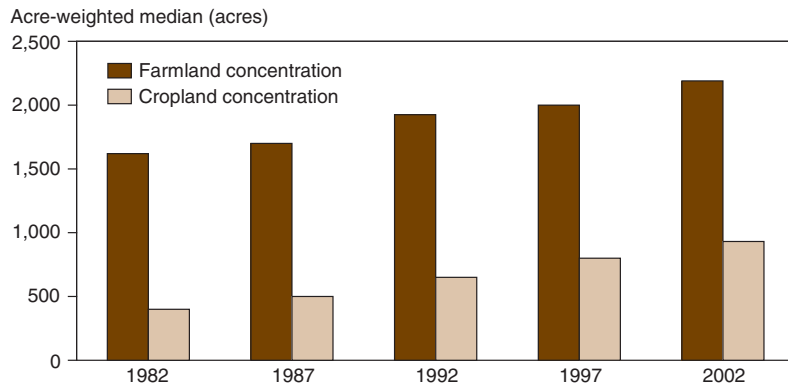
There is a strong statistical relationship between cropland concentration growth during 1987-2002 and payments received in 1987. To determine this, ERS measured changes in concentration for ZIP Codes that contained agricultural production and compared the information with the government payments per acre in the areas in the initial year, 1987 (see box, "Measuring Cropland Concentration and Government Payments"). Between 1987

## Measuring Cropland Concentration and Government Payments

Common farm size measures, such as the average and median, obscure the rapid concentration of cropland into larger farms (see "Measures of Trends in Farm Size Tell Differing Stories" on page 36 in this issue). ERS looked at the distribution of cropland acres across farms of different sizes, from those with thousands of acres down to those with just a few, and selected the farm size at the midpoint of the cropland distribution, that is, at the point where half of all cropland is in larger farms and half is in smaller farms. This measure of cropland concentration—an acre-weighted median of cropland acres—is the statistic ERS used in the analysis.

In 1982, the typical U.S. crop farm was 400 acres—half of all cropland was in larger farms and half in smaller farms. Twenty years later, the typical crop farm had grown by 133 percent to 932 acres as cropland became concentrated into larger operations.

**An alternative measure of farm size reflects the increase in the concentration of land**



Source: USDA, Economic Research Service tabulations based on USDA, National Agricultural Statistics Service's Census of Agriculture data.

Applying the farm-size measure to ZIP Codes provides a highly disaggregated geographic unit of analysis. In rural areas, ZIP Codes usually encompass townships and are substantially smaller than counties. Such areas vary markedly in size, with rural ZIP Codes generally larger than urban, and ZIP Codes in the West generally larger than those in the East. A clear advantage to using ZIP Code areas is that there are a lot of them, which allows researchers to see how cropland concentration is changing across a wide range of payments. ERS measured concentration and payments in each ZIP Code in each of four Censuses of Agriculture (1987, 1992, 1997, and 2002) having at least three farms in all four Census years—about 21,500 ZIP Codes that capture over 90 percent of farms in the Census and 97 percent of cropland.

The Censuses of Agriculture also provide data on government payments received by farm operators, including disaster payments, but excluding Conservation Reserve Payments and subsidies paid under the Federal Crop Insurance Program. The data also exclude payments to individuals not involved with the operation of farms, notably landlords. Payments per acre were calculated based on all cropland acres, not just those that were the basis for payments. ERS focused on payments per acre rather than total payments in an area because some ZIP Codes have much more cropland than other ZIP Codes.

and 2002, concentration declined in the 10 percent of ZIP Code areas with no payments in 1987. ZIP Code areas with payments in 1987 show a positive relationship between cropland concentration growth and payment levels. Concentration increased more in areas with high payments than in areas with lower payments. At the high end, concentration grew by more than 60 percent in ZIP Codes with payments exceeding \$37.67 per acre; at the low end, concentration increased by about 15 percent in those ZIP Codes with payments less than \$5.31 per acre.

The same pattern holds across and within regions of the country. Within each region, cropland concentration increased more rapidly in ZIP Code areas with the highest initial payments per cropland acre, and the relationship between concentration and payments is persistent, steadily increasing as payments increase. Concentration increased noticeably faster in the Heartland, Northern Great Plains, and Mississippi Portal—those regions that tend to specialize in program crops that have higher payments. Moreover, the differences in concentration growth across regions are substantial.

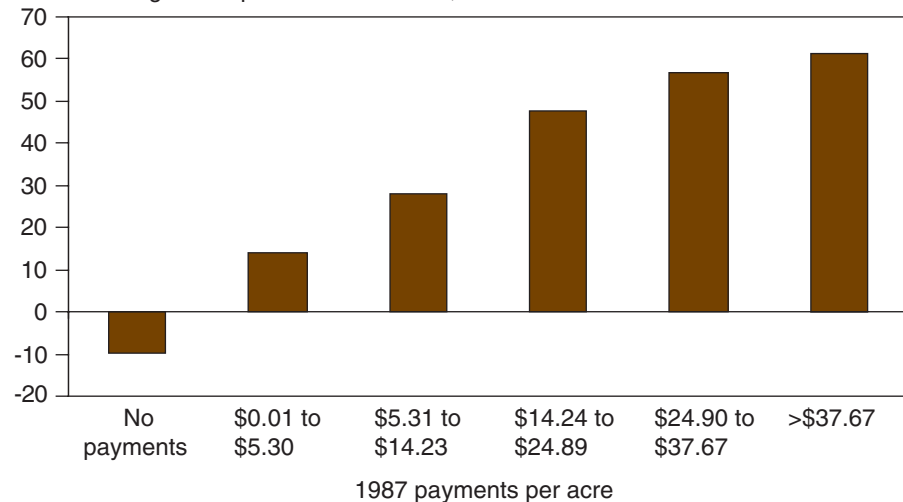
### What Might Explain the Association Between Cropland Concentration and Payments?

Association between two variables does not demonstrate causality. While it cannot be concluded that the observed association between cropland concentration and government agricultural payments proves that payments cause concentration or that payments help keep smaller farms in production, the evidence does uncover a specific set of noteworthy patterns. There are several possible explanations for the patterns observed.

Government payments may accelerate the shift in cropland toward larger farms if payments enhance farmers' liquidity and borrowing leverage, allowing payment recipients to expand more easily to larger and more efficient sizes. In this context, government payments—which provide cash, some degree of insurance (due to links with commodity prices), and, perhaps, also a means to leverage greater resources from lending institutions—might allow payment recipients to transition more quickly to a large and efficient scale. While government payments may have accelerated the expected trend for larger and more profitable farms to expand at the expense of smaller farms, this trend is evident in sectors with and without government payments.

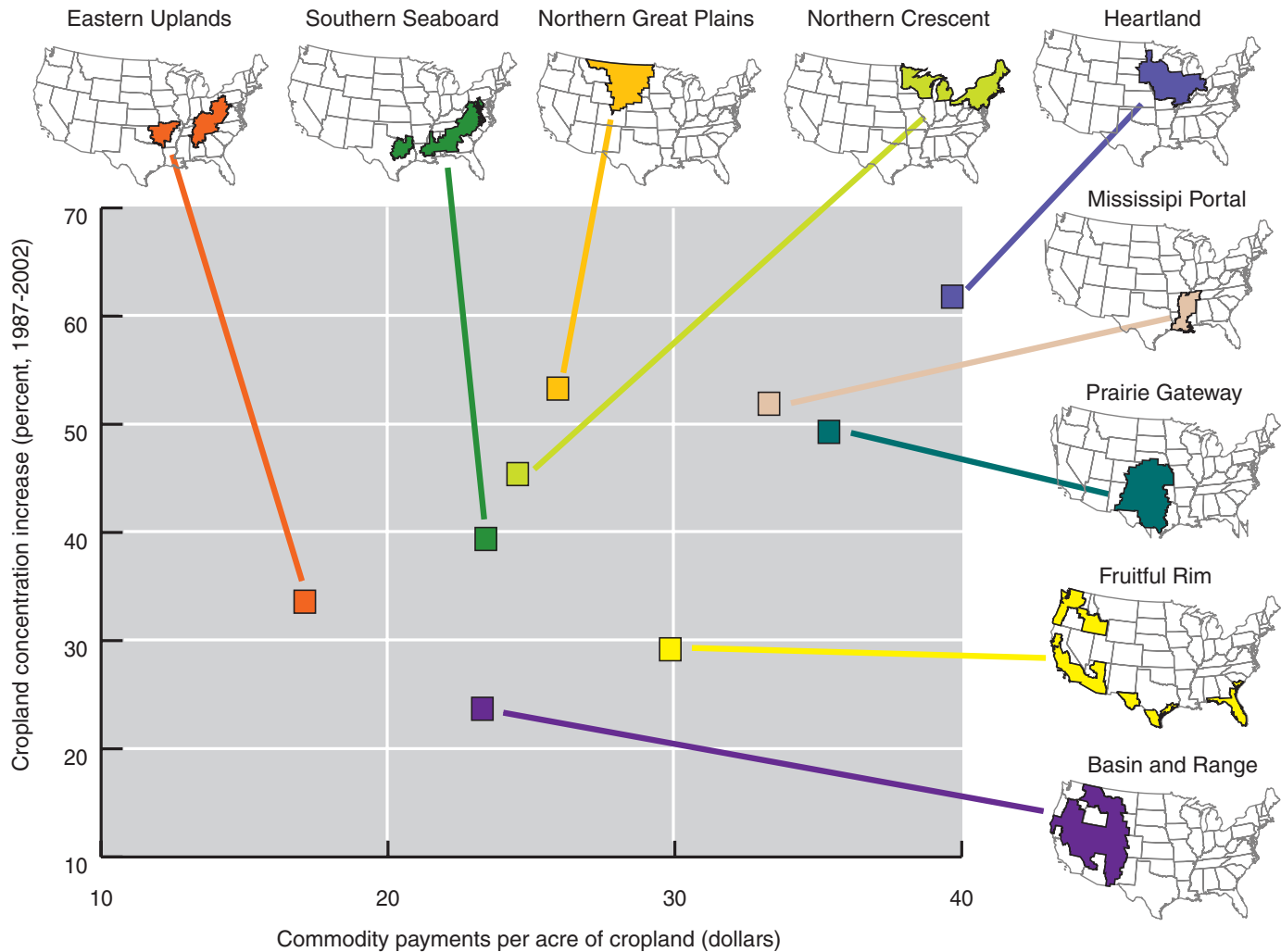
**Cropland concentration grew faster in areas with higher payments**

Percent change in cropland concentration, 1987-2002



Source: USDA, Economic Research Service tabulations based on USDA, National Agricultural Statistics Service's Census of Agriculture data.

The same association between concentration and payments exists across regions



Alternatively, factors other than government payments could have caused the observed link between payments and the subsequent pattern of concentration growth. For example, new technologies might have caused concentration to increase more in regions with better land quality. Per acre payments tend to be higher in areas with greater land quality and yields. Those areas also may feature

flatter and more contiguous cropland (that is, fields near each other and not separated by hills and woods). Some new technologies, such as bigger and faster pieces of equipment, may be better suited to areas with better land quality and higher payments, so payments are higher in regions that experience more rapid technological change.  $\forall$

This article is drawn from ...

ERS Data on Farmland and Cropland Concentration Measures, [www.ers.usda.gov/data/croplandconcentration/](http://www.ers.usda.gov/data/croplandconcentration/)

You may also be interested in ...

"Government Payments and Farm Business Survival," by Nigel Key and Michael J. Roberts. In *American Journal of Agricultural Economics*. 88(2) (May 2006): 382-392.

"Do Government Payments Influence Farm Size and Survival," by Nigel Key and Michael J. Roberts, in *Journal of Agricultural and Resource Economics*, Vol. 32, No. 2 (August 2007) pp. 330-348.