

Chapter 1 Introduction

Over the last 25 years, crop production has become increasingly concentrated on large farms. Between 1982 and 2002, the number of farms with 1,000-10,000 acres increased by 14 percent, and total farmland operated by these large farms increased by 21 percent. In contrast, farms with between 50 and 1,000 acres declined in number and amount of farmland operated. While the number of farms with less than 50 acres actually increased in number and land operated, these very small operations still account for less than 2 percent of all farmland. Consequently, production increasingly occurs on farms with at least 1,000 acres.

Because large-scale operations grow a large portion of total output, they also receive a large share of commodity program payments. In 2002, farms with 1,000-10,000 acres represented 8 percent of all farms and received about half of all commodity program payments. The increasing concentration of agricultural production has resulted in an increasing share of commodity program payments going to large farms: between 1982 and 2002, the share of payments going to farms with 1,000-10,000 acres increased from 41 to 50 percent.

In recent years, some have expressed concern that payments provide an advantage to large operations. Some interest groups, politicians, and newspaper editorials have pointed toward commodity program payments as a factor contributing to the steady growth in average farm size and concentration of production. For example, the Environmental Working Group asserted:

“Large farming operations may have used the additional profits they received from Freedom to Farm to purchase more equipment and land, or to secure more capital from the private sector to expand their operations. Such capital investments may have allowed large farms to increase their competitive advantage over smaller producers, making it that much more difficult for small and medium-sized farmers to make a profit from their farming operations.”

(Williams-Derry and Cook, 2000)

The steady growth in the concentration of farmland and production on large farms and the strong association between farm size and payment levels would seem to support claims that commodity program payments benefit large farms. However, farm commodity programs often tie payment levels to current production or to a farm’s production history. Thus, regardless of how farms came to be larger, payments would have become increasingly concentrated with larger farms (MacDonald et al., 2005).

Expanding farm size could be driven by any number of factors other than the distribution of commodity program payments, such as technological change or changing factor prices. After all, expanding farm sizes and increasing concentration of production are 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. Farms producing fruits

and vegetables have also grown substantially larger in recent years. Economists see the trend toward larger farms mainly as a byproduct of the innovations that spurred vast economic growth and employment opportunities outside of agriculture, from factories a century ago to today's burgeoning service sectors. As agricultural labor has shifted to other sectors, farms have adopted bigger, faster, and more automated farm equipment; computerized information systems; and other capital inputs. By distributing the capital costs of these technological innovations over more production, farmers have been able to realize "economies of scale" in production. Technological change has encouraged farmers to operate much larger farms and allowed fewer farmers to produce more agricultural output.

This report examines a hypothesized link between commodity program payments and farm size by examining how past payments per acre correlate with (1) subsequent cropland concentration at the ZIP Code level and (2) subsequent size and survival of farms.¹ In the first case, the objective is to consider structural change on an aggregate level, to see how much of the pattern of increasing concentration might be attributed to program payments. In the second case, the objective is to see how variations in payment levels affect farm-level growth and survival.

Perspectives on the Issue

Each chapter of this report considers a different perspective of the analysis (see table 1 for an overview). Chapter 2 presents a brief overview of the literature on the determinants of farm structure and discusses some of the theoretical mechanisms through which commodity payments might affect farm size and farm business survival. Chapter 3 begins by presenting an overview of farm structure changes over the past 25 years, using several common measures of representative farm size. It then explains why the weighted-median farm size² is useful for measuring concentration change, particularly when the number of very small farms is large and growing and production is increasingly concentrated on relatively few large farms.

Chapter 4 presents summary statistics illustrating how cropland concentration varies across ZIP Codes, and how the distribution of concentration has shifted over time. The chapter then compares the change in cropland concentration over time for ZIP Codes with different initial levels of payments per acre. Payments per acre vary widely across ZIP Codes, and reflect differences in crop mix, crop yields, and past operator participation in government commodity programs. Statistical regression analyses are used to control for various factors—including location, initial sales per acre, and initial concentration—that might also explain changes in cropland concentration growth.

Chapter 5 examines how past payments relate to individual farm business survival and farm size growth. This chapter focuses on producers who specialize in program crops.³ Specifically, the study compares the lifespans of farm businesses having different levels of commodity program payments expressed as a share of farm sales. The chapter also presents growth and exit rates (the chance that a business will cease operating within a year) and the survival probabilities (the chance that a farm survives a particular length of time) of farms with different levels of payments as a share of sales.

¹ Because the census of agriculture does not distinguish among all farm programs, the measure of commodity program payments equals total payments net of Conservation Reserve and Wetland Reserve Program payments. It therefore includes disaster payments and payment for other minor programs along with commodity program payments (see box, "Defining Commodity Program Payments," p. 14, for more information).

² The weighted-median farm size is the size (in acres) for which half the land in a ZIP Code is operated by larger farms and half is operated by smaller farms. For example, if a ZIP Code's weighted-median farm size is 850 acres, then half of the cropland in that ZIP Code is operated by farms with more than 850 acres, and half is operated by farms with less than 850 acres.

³ The individual farm analyses focus on those farms specializing in the production of wheat, rice, corn, soybeans, cash grains, or cotton. For some of the analyses, rice and cotton producers were excluded because there were too few observations to perform crop-specific regressions.

Table 1

Overview of empirical analyses

	Farm size/ concentration measures (Ch. 2)	Cropland concentration (Ch. 3)	Farm survival (Ch. 4)	Farm size and exit rate (Ch. 5)
Variable of analysis	Mean, median, weighted median, weighted mean, size class, and crop-specific measures	Weighted-median cropland acres	Farm business lifespan, instantaneous business survival rate, duration of farm survival	Average farmland acres
Unit of analysis	U.S.	ZIP Code	Farm business	Farm business
Commodity payments variable	(Not applicable)	Payments per cropland acre (quintiles)	Payments per dollar of sales (quartiles and continuous)	Payments per farmland acre
Sample	All U.S. farms	ZIP Codes with at least three farms reporting in all censuses	Farms with at least 10 acres of land and \$10,000 in sales in 1987, and SIC codes indicating they were primarily producers of wheat, rice, corn, soybeans, cotton, or "cash grains."	Farms with at least 10 acres of land in 1987, with SIC codes indicating they were primarily producers of wheat, corn, soybeans, or "cash grains."
Years covered ¹	1982-2002	1987-2002	1987-1997	1987-2002
Controls	Not applicable	ZIP Code location (longitude and latitude), beginning-year cropland concentration, ratio of cropland to ZIP Code area, crop sales per acre of cropland	SIC code, year, size of operation (sales), operator age, year the farm began operating, farm's organizational structure, debt-to-asset ratio, location (State)	SIC code, year, size of operation (farmland), operator age, farm's organizational structure, land tenure status, location (State)
Reference			Key and Roberts (2006)	Key and Roberts (2007)

¹ All analyses of commodity payments begin in 1987 because that is the first year the Census of Agriculture collected data on commodity program payments.

Separate comparisons are made for farms producing different kinds of program crops, controlling for farm and operator characteristics that might affect farm survival and growth. The study then estimates the change in average farm size that might be expected if past commodity program payments for each farm had been lower than those historically received. Because commodity program payments might influence farm size by altering both the probability of surviving in farming and the scale of the farms that survive, both effects are considered simultaneously.

A New Approach

This study is the first to use data from five agricultural censuses (1982, 1987, 1992, 1997, and 2002) to examine the link between farm commodity program payments and structural change in agriculture. Because these data include most U.S. farms, it is possible to measure cropland concentration on a small geographic scale. The large number of observations narrows comparisons to farms or small regions that are similar in many respects besides payment levels. The data also allow the linking of operations across censuses, permitting a comparison of the survival and growth rates of similar farms having different initial levels of commodity program payments.

While the findings of this report are consistent with the hypothesis that farm commodity program payments influence structural change in agriculture, it is not possible to rule out other explanations for the observed associations. Despite efforts to control for factors that might cause spurious associations between program payments and structural change, it is impossible to know whether factors remain that have not been accounted for. This is a standard caveat to non-experimental studies that employ data observed in the natural world as opposed to data from a carefully controlled experiment.⁴

⁴ In a carefully controlled experiment, government payments would be randomly assigned to some farmers in some regions and not to others in other regions (the control group). One could then attribute an association between payment levels and concentration growth as the influence of payments, because other factors affecting concentration growth would not be associated with payments, given they were randomly assigned. Such an experiment is clearly impossible in this case.