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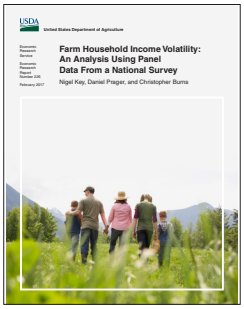

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Farm Household Income Volatility: An Analysis Using Panel Data From a National Survey

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What Is the Issue?

Farm income is highly variable, with earnings subject to wide fluctuations in yields and prices. Income variability affects key farm decisions—how much labor to use on-farm versus off-farm, how much income to save as a cushion for bad years, how much to invest in machinery or land, which crops to plant or types of livestock to produce, and how much to spend on risk-reducing inputs such as pesticides or irrigation. Because household income variability influences these decisions, it can affect agricultural production and household welfare. Also, by influencing land, water, and agrochemical decisions, it can affect environmental quality.

Federal agricultural policies have long sought to shelter farmers from income fluctuations using price supports, direct income support, disaster assistance programs, and yield and revenue insurance programs. Recently, the 2014 Farm Act shifted spending priorities to programs designed to reduce income risk—eliminating direct payments and creating new programs with payments linked to annual or multi-year fluctuations in prices, yields, or revenues.

There has long been information tracking farm income at the national level, yet little information exists about income variability of individual farm households. How much does farm household income vary from year to year for different types of farms? How does this variation depend on farm and operator characteristics? How has farm income variability changed over time? To what extent is farm household income variability driven by variation in different sources of household income? To what extent do Federal programs mitigate household income fluctuations and how much is this worth to farmers? This research seeks to answer these questions.

What Did the Study Find?

This report focuses on larger scale commercial farms, the type responsible for about 80 percent of U.S. agricultural output. For these commercial farm households, total household income is much more volatile than that of typical nonfarm households. The median change in total income between years was about eight times larger than for nonfarm households.

Farm household income varies so widely mainly because farm income, which constitutes the majority of household income for these commercial farms, varies much more than off-farm income (income from work unrelated to farming). For individual farm households, the median change in farm income between years was about 180 percent of the median farm income. In contrast, the median change between years in off-farm income was only about half the median off-farm income. However, the volatility of farm income is similar in magnitude to the volatility of nonfarm self-employment income.

Differences *among* farm households, too, correlate to differences in income volatility. Variations in farm size (farm asset value), commodities raised, operator characteristics, and extent of reliance on Federal programs all play roles:

Total household income is more volatile on larger farms than on smaller farms. Farm households with more than $3 million in farm assets have a 34-percent chance of having negative household income at least once every 2 years, compared with a 17-percent chance for farm households with less than $750,000 in farm assets. Income volatility likely increases with farm size, because on larger farms, a bigger share of household income comes from the farm and the operators have more volatile off-farm income.

Crop farms, on average, have more volatile household income than livestock farms. This is mainly because crop farms tend to be larger and derive more of their total income from farm sources. However, *farm* income was also found to be more volatile on crop farms, which could be explained by the vulnerability of crops yields to weather and pests and the fact that a large share of livestock is produced under production or marketing contracts, which reduce income risks for farmers.

Farm household income varies more when the principal operator has less education, does not have a spouse, or considers farming to be his or her primary occupation. Less educated workers face higher rates of unemployment during economic downturns. A spouse often provides an off-farm income source, which can smooth household income variation. Full-time farmers face greater household income risk because farm income is much more volatile than off-farm income.

Between 1996 and 2013, the volatility of farm household income declined by about 20 percent or 1.2 percent per year. The simultaneous decline in the volatility of farm income (about 10 percent or 0.7 percent per year) might be explained by an increased reliance on production contracts, changes in the organization of farm businesses, or an expansion of the Federal crop insurance program.

Farm income contributes 77 percent of total income variation for the average farm household (90 percent for large farms with at least $3 million in farm assets, and about 60 percent for small farms with less than $750,000 in assets). Off-farm wage income and off-farm non-wage income each contribute about 10 percent to total income variation. On average, for all farms, farm program payments comprise about 17 percent of total income but contribute only about 3 percent to total income variation, reflecting the role of program payments in smoothing farm income fluctuations.

All categories of farm program payments (direct, counter-cyclical, conservation, crop insurance, and other) were found to reduce household income volatility. Because program payments reduce risk, each dollar of payments is worth more than one dollar to a risk-averse farmer—an economic term for a farmer who is willing to pay a premium to reduce income variability. By making assumptions about how much a farmer dislikes income variation, ERS researchers estimated the value of risk-reducing farm program payments. For a "moderately" risk-averse farmer, each net dollar of crop insurance payments was estimated to be worth $1.38, of counter-cyclical payments (repealed by the 2014 Farm Bill)—$1.09, and of direct payments (likewise repealed by the 2014 Farm Bill), which were essentially fixed—$1.01. In comparison, the expected (average) dollar from farming is worth only $0.70 to a moderately risk-averse farmer, because of farm income variablity.

How Was the Study Conducted?

This study uses data from 18 years of USDA's Agricultural Resource Management Survey (ARMS) and a sample of over 27,000 farms that were surveyed at least twice between 1996 and 2013. While not representative of all U.S. farms, these farms have characteristics that resemble, on average, the commercial farms responsible for the bulk of U.S. agricultural production. Unlike aggregate or cross-sectional data, these panel data allow observations of how farm income, off-farm income, and farm program payments changed over time for the same farms.