Farm Household Wealth: Where Does it Come From?

by

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This article examines the relationship between agricultural profits and farm household wealth across locations and farm sizes in U.S. agriculture. Farmland has out-performed non-farm investments over the past decade. Thus, households may want to keep their farmland to build wealth, even if it requires them to earn off-farm income.

Normally, the survival of a firm depends on its profitability, both in absolute and relative terms. To remain viable, a firm must offer returns that are both sufficient to cover the owner's financial obligations and competitive with returns from alternative investments. If a firm is profitable, the wealth of its owners can increase over time. An unprofitable firm, on the other hand, reduces owners' wealth. Yet, American agriculture is full of firms that routinely earn low or negative returns on equity from production operations. This surprising fact suggests that a better understanding of the relationship between farm profits and owner wealth is needed to explain the financial performance of the production agricultural sector. This article addresses that relationship.

To begin, assessing farm owner-operator wealth involves understanding that farmers are making production decisions based on total household wealth, not just on farm production profitability. In other words, the economic objective of "maximizing profits" needs to be replaced with "maximizing wealth" as the goal of each farm owner-operator. Previous research has shown that a household's ability to raise wealth is influenced by the size of the farm, the commodities being produced, the farm's proximity to urban development, and opportunities for off-farm employment for household members. This topic is important because differences in income and wealth among households across American agriculture lead to differences in farm exit rates which, in the worst cases, put some locations at risk of losing their agricultural industries as individuals leave agricultural production for more profitable investments.

The objectives of this study are to examine the relationship between agricultural profits and farm-household wealth across locations in U.S. agriculture, and to highlight some policy implications. Therefore, we study wealth patterns across regions and across farm sizes to gain insights into the future prospects for American agriculture.

The Relationship Between Income and Wealth

Total wealth (W) is usually expressed as equity or total net worth at time t. Over time, wealth changes such that $W_t = W_{t-1} + \Delta W_t$. Three types of economic gains contribute to wealth: profits from farm output, off-farm income, and capital gains on assets. Therefore, to understand the dynamics of wealth, we focus on wealth changes (ΔW) during a time period, which equals farm income plus off-farm income plus capital gains minus consumption for the period. The four components of wealth changes are themselves functions of other factors. Unfortunately, national data are not available for many of the factors in the accounting definitions of wealth changes and income. As a result, we estimate a recursive system of equations using national survey data for variables proxying for some key income factors and a household's wealth, as explained below.

In this study, farm income is derived from pre-tax revenues from farmers' and ranchers' sales of production output, plus government payments received by household members, minus production and ownership costs. Production costs are the variable expenses incurred when producing an output. The data used are for purchased inputs only, as reported by households. Ownership costs are the fixed and other expenses incurred. Data for depreciation are used here as a proxy for ownership costs. Government transfers are included as an explanatory variable to enable an assessment of the true sustainability of farm production as an income source. To many farm households, government payments may be significant. It is expected that most government payments to agricultural producers come from business activities concerning the household's ownership and/or operation of a farm or ranch.

Off-farm income has represented over 90 percent of average farm-household income in recent years. Our model states that off-farm income consists of the sum of off-farm salary or wages earned and non-farm investment or "unearned" income.

Table 1. Regression Results for Change in Wealth and Farmland Value Equations by Region, 1996-2004

Variable	North-east	Lake States	Corn Belt	Appala-chia	South-east	Delta	Southern Plains	Northern Plains	Mountain	Pacific
Change in Wealth Equation										
Farm income	0.2485	0.0404	0.0787	0.0859	0.1347	-0.0137	-0.0442	-0.0187	-3.2371	0.2862[1]
Non-farm income	0.7110	0.0737	0.1343[1]	0.1025	0.1088	0.0818	-0.0402	0.3879[3]	5.1212	0.7461[2]
Change in Farm Capital	0.9077[3]	0.9785[3]	0.7354[3]	1.0084[3]	0.9736[3]	0.9169[3]	1.0402[3]	0.9994[3]	0.3039	0.2014[2]
Change in Non-Farm Capital	0.0785	0.2065[3]	0.0460	0.2488[3]	0.1495[3]	0.2569[2]	0.5285[3]	0.0114	0.1521	0.2654[3]
Consumption	-0.0450	0.2625	0.1484[1]	-0.1495[3]	0.3070	0.2219	-0.0892	-0.0583	2.2035	-0.2659
Farmland Value Equation										
Revenue Per Acre	0.1654	-0.0199	0.2248[2]	0.0050	0.0015	0.1548[1]	-0.0566	0.2980	3.0217	0.1359
Government Payments/Acre	-7.5977	4.2571	34.0459	-1.4195	0.5947	-2.6671[3]	-12.2190	2.2098	-3.2247	0.5927
Cost of Capital	-0.0017	-0.0001	-0.0001	0.0001	-0.0001	-0.0000	0.0001	-0.0004	-0.0004[2]	0.0002
Productivity	0.0380	0.0339	-0.0536	0.0308	0.2114[3]	-0.1489[1]	0.0665	-0.2292	-2.8185	-0.1107
Population Density	0.0091[3]	0.0050[3]	0.0059[3]	0.0076[2]	0.0105[3]	0.0052[3]	0.0041[1]	0.0081[3]	0.0325[3]	0.0290[3]

The value in each box is the variable's regression coefficient and its t-statistic is statistically significant at the 99 percent, 95 percent, or 90 percent confidence levels, respectively, when denoted [3], [2], or [1].

Off-farm employment is the primary source of non-farm income for a majority of farm and ranch households. Non-farm investment includes income sources such as interest income on savings, Social Security and other retirement benefits, and interest and dividends on non-farm assets such as stocks and bonds.

Capital gains are simply the change in value of a farmer's capital from one period to the next. The capital variable in our model is the sum of the market values for all assets held by the household, as reported by the farmer. Farmland has historically represented about 75 percent of assets held by farm households.

Farmland values vary much more than do other agricultural assets because they are a function of numerous variables. Thus, we estimate a simple equation for the price of farmland: the (average) value per acre of farmland and buildings is a function of the (average) cash flow per acre from agricultural production of the farm, plus government payments received per acre, minus the effects of the average cost of capital, plus a farm-level estimate of productivity per acre, plus the effects of population density (people per square mile) in the county.

Farm household consumption data used are the annual expenditures reported by the household. Consumption decisions affect change in wealth levels directly because all income (from farm and non-farm sources) not consumed become savings, which are held in some form as capital, thus contributing to capital gains.

Procedure

We evaluate the inter-linkages between farm-household wealth and income in ten production regions covering the continental 48 states. Our data are annual farm-level observations from the U.S. Department of Agriculture's Agricultural Resource Management Survey from 1996 through 2004, giving us a total of 95,517 observations.

In our analysis across farm sizes, we use three size categories. These three categories follow the USDA's topology for farm types. Farm Size 1 corresponds to "limited resource," "retirement," and "residential" farms. Farm Size 2 corresponds to "farm/lower sales" and "farm/higher sales." Farm Size 3 is "large family farms" and "very large farms."

We deflated the nominal values of the monetary variables by the GDP implicit price deflator such that values presented in the tables are in year 2000 dollars. Also, we used two alternative measures of productivity: one for crop farms and one for livestock farms.

Empirical Results

As expected, we find a diverse pattern of relationships linking farm income, land value, and farm-household wealth over time. We also find patterns when accounting for differences in locations and farm sizes.

Change in Wealth. Wealth consists of both farm and non-farm capital. As shown in the top section of Table 1, both components were significant in six of the 10 regions: the Lake States, Appalachia, Southeast, Delta, Southern Plains, and Pacific. Clearly, changes in farm capital are important in wealth-building. That variable was significant in every area except the Mountain region. Also, income from either farm or non-farm sources generally was not significant. The only region to have significant farm income was the highly profitable Pacific: California, Oregon, and Washington. However, households in that region got a much larger contribution to wealth, on average, from off-farm income, as indicated by the relative size of the two regression coefficients. In general, the wealth results mean that income, in absolute amounts, was small compared to capital gains. Thus, wealth comes from capital gains, not income, in all parts of the country's agricultural industry.

Table 2. Regression Results for Equations by Farm Size, Across Ten Regions, 1996-2004

	----------Farm Size----------		
Explanatory Variable	1	2	3
Change in Wealth Equation			
Farm Income	-2.9673	0.1048	-0.0183
Non-farm income	0.8052[2]	0.3119	0.9166[2]
Change in Farm Capital	0.2595	0.8308[3]	0.9292[3]
Change in Non-farm Capital	0.0908	0.0103	0.1365[3]
Consumption	0.4472	0.2259	0.2541[1]
Farmland Value Equation			
Revenue per acre	-0.6476	0.6089[3]	0.0152
Government Payments per acre	-3.2415	0.8957	0.1846
Cost of Capital	-0.0000	-0.0001	-0.0000
Productivity	0.0535	-0.0061	0.0114
Population Density	0.0086[3]	0.0118[3]	0.0208[3]

[3], [2], and [1] denote statistical significance at the 99%, 95%, and 90% confidence levels, respectively. These regressions use state dummy variables for fixed effects.

Farm Size 1 corresponds to limited resource, retirement, and residential farms.
Farm Size 2 corresponds to farm/lower sales and farm/higher sales.
Farm Size 3 are large family farms and very large farms.

Both farm and non-farm capital were significant in most regions but had differential impacts on wealth. For example, a $1,000 increase in farm capital in the Lake States would raise wealth by about $979, compared to $201 in the Pacific. Also, a $1,000 increase in non-farm capital would raise wealth by about $207 in the Lake States and $265 in the Pacific. In all regions except the Pacific, the lower regression coefficients for changes in non-farm capital, compared to coefficients for farm capital, imply that there are few economic opportunities for shifting resources out of agriculture and into non-agricultural uses. In general, these results show that holding farmland (which represents about three-quarters of farm capital) has been a much more profitable investment over the past decade than have non-farm investment alternatives, on average.

Farmland Value. Economic theory suggests that the price of farmland reflects either its value as an input in agricultural production, or the non-farm demand for land. The key result here is that the proxy variable for the non-farm demand for farmland (county population density by year) was significant in all of the 10 regions (bottom section of Table 1). This is consistent with the growing realization that non-farm demand for farmland is increasingly affecting farmland values, even in areas such as the Corn Belt and Northern Plains whose economies were dominated by production agriculture in the last century. The population density variable swamped the effects of the four other explanatory variables in our equation. This appears to be inconsistent with the traditional theory that farmland value is determined primarily by its ability to generate agricultural revenues. However, this result is consistent with the "urban influence" on farmland prices found in recent studies. Thus, the proximity of a farmland parcel relative to non-agricultural development is a key factor in pricing. This implies that no commodity can generate enough revenue to adequately compete with expanding urban development, meaning that land-use ordinances may be needed to preserve farmland in urbanizing areas.

Farm Size Results. Results in Table 2 show how American farms of different sizes from all 10 regions have performed over the last decade. As expected, the

size of a farm has significant effects on its financial performance.

In the *change in wealth equation* results, it is clear that Size 1 households are better off focusing their activities off the farm. Non-farm income was the only significant source of wealth for small-sized farms. Medium-sized farms derive wealth only from gains on their farm capital, which is most likely their land. Large farms benefit from capital gains on all assets, plus from their off-farm income.

The *farmland value equation* results have significant implications for land-pricing theory. The revenue per acre generated by farming has no effect on small- and large-sized farms, contrary to traditional theory. Medium-sized farms do get a significant effect from production revenues per acre. All three farm sizes have significant population density effects, but the regression coefficient increases with farm size. This implies that a farm's proximity to urban areas is key to its farmland values, as noted by recent studies, and that large parcels may have higher development value per acre.

Implications of the Results

These results generally agree with recent studies of farm financial performance. We suggest three implications of our results.

First, the finding that changes in both farm and non-farm capital are significant in explaining changes in wealth in most regions suggests that non-farm capital is a substitute for farm capital. This indicates that farm households have diversified their portfolios.

Second, changes in farm and non-farm capital have differential impacts on farm wealth across farm locations. In general, the fact that changes in non-farm capital have smaller impacts than do changes in farm capital across all regions except the Pacific implies that there are few profitable opportunities to shift resources out of agriculture in most of the country. However, this may also reflect the asset fixity problem faced by most farm households. Or it may indicate simply that urban pressures pushing farmland values up are creating the best investment alternative available to agricultural producers. In other words, farmland has out-performed non-farm investments over the past decade.

Third, farm size affects household wealth in unexpected ways. In Table 2, three of the four income sources were significant in increasing the wealth of large farms, and the scale of their effects were greater for large farms than for small or medium-size farms. Capital gains from farm assets were significant for medium and large farms, but the coefficient was higher for large farms. Capital gains from non-farm assets were significant for only large farms. Finally, off-farm income was significant for small and large farms, but the coefficient was highest for large operations. Therefore, large farms not only generate more dollars due to their larger scale of operations, but a higher portion of each dollar of income from each source is captured as wealth.

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These results support the long-expressed notion that large-scale farms are more competitive in today's global commodity markets and, therefore, have a higher probability of surviving. The results are also consistent with the "big fish eat little fish" story of consolidation long visible in American agriculture. Therefore, the pattern of financial performance observed in our household data indicates that existing trends of decline in small- and medium-sized farms are likely to continue for some time. The unknown is the pace of consolidation because it will depend on how long the "little fish" choose to hang on to their farmland. Our analysis implies that choice will be made based on farm-household wealth factors having little to do with agriculture.

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