# HOW SUCCESSFUL WERE U.S. COTTON FARMS IN 1998?

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## Abstract

In 1998, many cotton farmers suffered a combination of both severe weather and depressed prices, but some growers were successful. Understanding what contributed to their success is important to both growers and policy makers. We found that the most successful farms were larger, had lower costs, less debt, fewer assets, higher gross income, higher government payments, and higher yields. The least successful farms had significantly higher chemical and maintenance costs, higher insurance and tax costs, higher machinery values, higher asset values and debt, and lower gross income and yield. Until expenses are lowered, incomes will likely remain negative for the least successful farms, and we will continue to find a high proportion in the vulnerable class.

## How We Measure Success

Success is a subjective term and both economists and accountants measure economic success differently. Accounting methods precisely measure expenditures and income, but do not account for opportunity costs. While most agree that positive income is critical to survival of any firm, use of net farm income as a sole indicator of farm business success does not accurately reflect performance or the relative use of the resources involved in agriculture among farms. Resources of interest here are not only the physical assets used in the production process, but operator labor and management skills as well.

In this poster, we measure success by using the ratio of net farm income (plus interest payments) to the estimated market value of assets on a farm. This measure indicates how well the operator used the resources at hand. We also develop a measure of operators' management income to reflect the opportunity cost of capital and return to nonoperator labor.

## Data and Methodology

This analysis uses data from the 1998 Agricultural Resource Management Study (ARMS). USDA's Economic Research Service and National Agricultural Statistics Service jointly conduct this annual survey. We identified cotton farms as those farms that harvested at least 1 acre of cotton in 1998. To analyze financial success we eliminated farms that had unusually poor financial results due to weather. We also omitted farms whose yield was less than half the average for 1993-97 for their county and did not have adequate crop coverage. Approximately 21,000 cotton farms were represented in 1998. To subdivide the remaining farms into success categories, we calculated the ratio of net farm income (plus interest payments) per dollar of asset value. We then formed a cumulative distribution of farms and production by this ratio. The most successful farms are the top 25 percent of farms and the least successful farms are the lowest 25 percent. To analyze traits of successful farms, we used a univariate approach comparing differences between the means of selected characteristics using a pairwise statistical test.

## Income Statements

The most successful farms have significantly higher gross cash income than the least successful and have significantly higher cash sales of corn, soybeans, and cotton. The most successful farms also have significantly higher government payments, lower cash expenses, and lower debt.

Cash sales were significantly higher, and contract sales values for cotton were also higher for the most successful farms than the least successful. The least successful farms derived about 70 percent of the value of cotton sales from contracts, but the most successful farms derived less than 50 percent from contracts.

Income statement for most and least successful cotton farms, 1998.

| Item | Most successful | Least successful | All farms |
|---|---|---|---|
| | **Dollars per farm** | | |
| Gross cash income | 647,721 | 396,084 | 451,326 |
| Livestock sales | 10,428 | 6,461 | 11,530 |
| Crop sales (incl. net CCC loans) | 480,865 | 242,014 | 308,070 |
| Cotton sales | 253,722 | 147,694 | 184,128 |
| Government payments | 53,234 | 31,819 | 36,875 |
| Other farm-related income | 103,194 | 115,790 | 94,851 |
| Less: | | | |
| Cash expenses | 395,578 | 432,402 | 350,198 |
| Equals: | | | |
| Net cash farm income | 252,143 | (36,319) | 101,128 |
| Less: | | | |
| Depreciation | 31,892 | 35,507 | 30,249 |
| Plus: | | | |
| Value of inventory change | 23,556 | (36,859) | (8,160) |
| Nonmoney income | 1,913 | 2,466 | 2,752 |
| Equals: | | | |
| Net farm income | 244,641 | (107,905) | 64,084 |
| Less: | | | |
| Opportunity cost of capital and return to nonoperator labor | 41,203 | 43,792 | 48,412 |
| Equals: | | | |
| Operators' management income | 203,438 | (151,697) | 15,672 |

### Income Solvency

Within each of the success groups there is a range of incomes, assets, and debts. We use four solvency classes to examine the relationship of farm income to assets and debts.

Nearly all of the most successful farms are in the favorable class, meaning positive income and low debt-to-asset ratio. In contrast, most of the least successful farms are in the marginal solvency class as they have high debt-to-asset ratios and positive income.

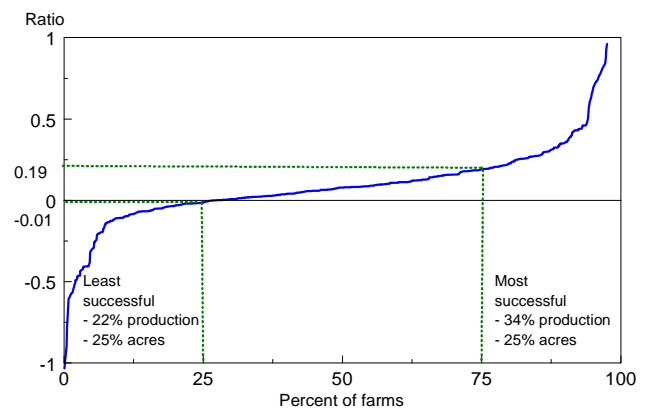| Income solvency classes | Most successful | Least successful |
|---|---|---|
| | **Percent of farms** | |
| Favorable: Positive income, debt/asset ratio less than 0.4 | 84 | 0 |
| Marginal solvency: Positive income, debt/asset ratio more than 0.4 | 0 | 78 |
| Marginal income: Negative income, debt/asset ratio less than 0.4 | 16 | 0 |
| Vulnerable: Negative income, debt/asset ratio more than 0.4 | 0 | 22 |

### Results of the Logistic Regression

We selected a logistic regression model primarily because normality is difficult to justify given the data. The dependent variable of the logit model is a binary variable equal to 1 if the farm was rated most successful and 0 otherwise. Results from the logistic regression show that the most successful cotton farmers had low input expenses and low machinery values per harvested acre. They also tended to specialize in crop production, devote more cropland to cotton, and were more likely to rent land than to own it. They also participated in government programs to a greater extent than did the least successful farms.

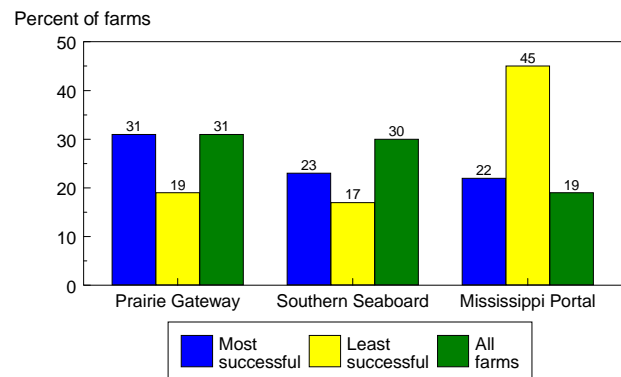| Variable | Parameter estimate | T-statistic |
|---|---|---|
| INTERCEPT | -5.04328 | -3.742 |
| Seed, fertilizer, chemical, and fuel expense per harvested acre | -.01159 | -5.46853 |
| Machine value per harvested acre | -.00299 | -3.91497 |
| Percent of cropland acres rented | .02098 | 3.69315 |
| Value of crop production per harvested acre | .00383 | 3.33924 |
| Percent of harvested acres in cotton | .01823 | 2.6369 |
| Cropland acres | .09873 | 2.60926 |
| Cropland acres squared | -.0014 | -2.29314 |
| Government payments per cropland acre | .01705 | 2.56419 |

Notes: $\chi^2 = 7,112.652$ with 14 df (p=0.0001)
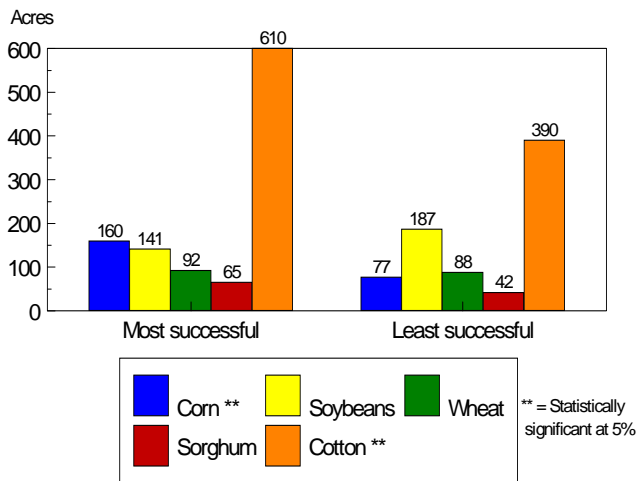McFadden $R^2 = 0.2982$

Although the following variables were not significant at the 10-percent level, we also tested: debt/asset ratio, location (TX, GA, MS, NC, AZ), labor hours per harvested acre, off-farm work, completion of high school, and sole proprietorships.
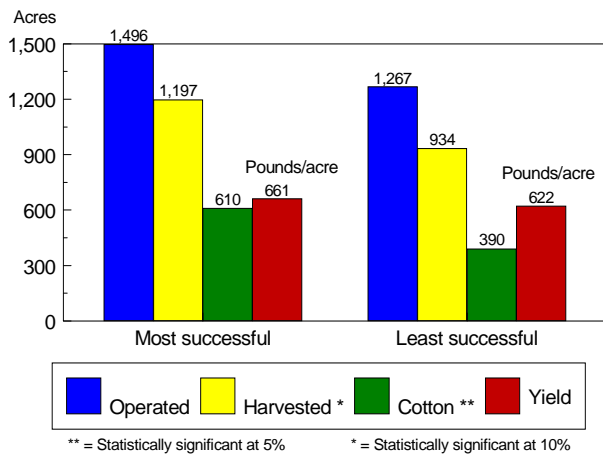


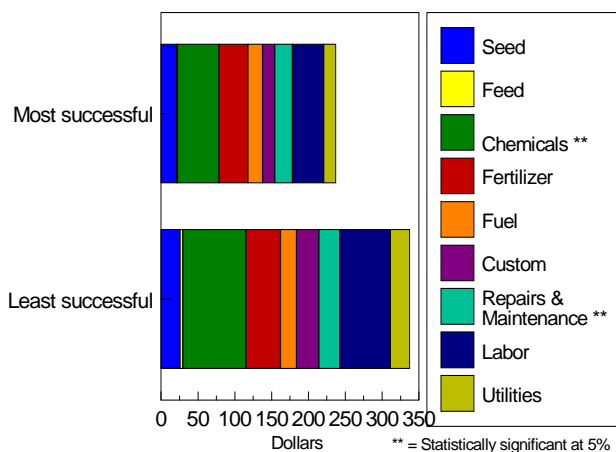Distribution of cotton farms by ratio of net farm income to asset value, 1998.



Regional shares of cotton farms, 1998.

**Acres**



Spending for chemicals and repairs and maintenance were significantly higher for the least successful farms.



** = Statistically significant at 5%          * = Statistically significant at 10%
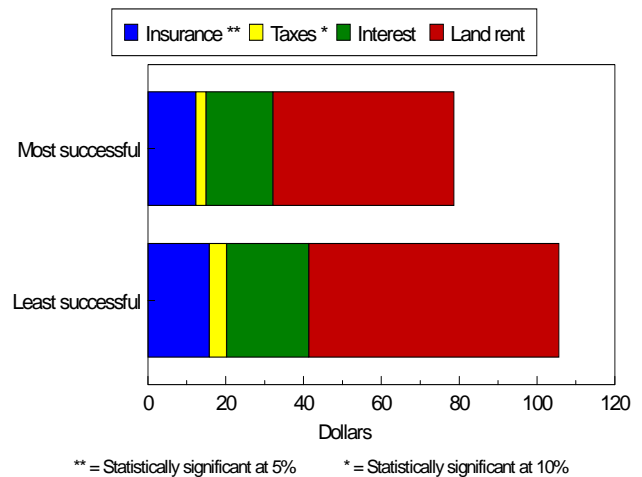
Mean acres harvested per cotton farm show that the most successful cotton farms harvested significantly more cotton and corn than did the least successful farms.
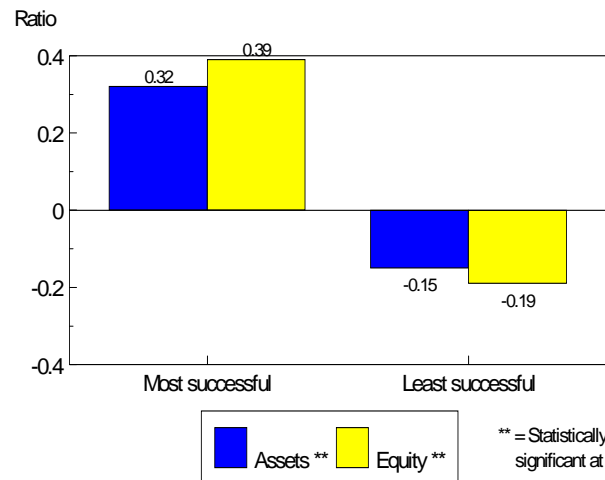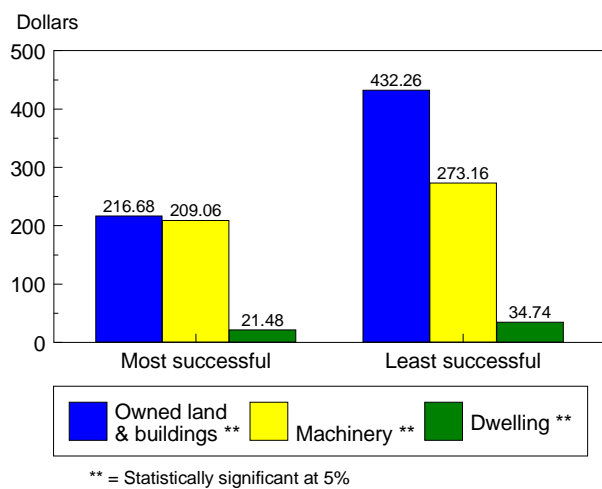
Although all fixed expenses were greater for the least successful farms, land rent differences were not statistically significant.





The most successful cotton farms start out bigger, harvest more acreage, more cotton, have higher yields.

The most successful farms had considerably higher rates of return for both assets and equity.

Dollars



** = Statistically significant at 5%

The least successful farms had significantly higher average asset values per harvested acre.