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AFPC POLICY RESEARCH REPORT

**COTTON MARKET RESPONSES TO
1985 FOOD SECURITY ACT,
DOLLAR DEVALUATION AND
U.S. WEATHER DISTURBANCES**

Department of Agricultural Economics
Texas Agricultural Experiment Station
Texas Agricultural Extension Service
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Carl G. Anderson**

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Abstract

The strong economic performance of the U.S. cotton industry during the past four years has been widely acclaimed as attributable to the 1985 Food Security Act (FSA85). Some observers have suggested that the recent market strength was also due to such factors as the drought-induced production cutback, lower dollar exchange rates, and a substantial increase in government program payments. As the 1985 farm bill approaches its end, it is crucial to review and evaluate its structure and performance to provide insights for policy deliberations in the upcoming 1990 legislation. This study is a quantitative assessment of the 1985 cotton program's performance based upon computer simulation experiments of a large-scale econometric model AGGIES/Cotton. Four major counterfactual scenarios were analyzed based upon assumptions of domestic price supports and dollar exchange rates at the 1985 levels, normal weather conditions and zero conservation reserve program (CRP) acreage retirement. Most significant market impacts were found on the macroeconomic policy of dollar devaluation and the FSA85 target price and loan rate reduction. Drought and CRP acreage impacts were also very strong, but the weather effects were largely spotty showing an offsetting pattern in the simulation period.

Key Words: cotton model, impact simulations, 1985 Food Security Act, implications to 1990 legislation.

Summary

During the four years under the 1985 Food Security Act market performance of the U.S. cotton industry has improved markedly. Domestic cotton use and export sales have posted sizable gains while carryover stocks have declined materially. A significant improvement has been in the competitive position of U.S. cotton in world trade as the U.S. market share improved with more competitive prices and the marketing loan provisions. Total government payments for cotton have declined from the previous four years period under the 1981 Act due to less payments on paid land division and payment-in-kind. Producers' gross income has remained fairly stable despite a small decline in direct government payments. The analysis investigated three major questions:

- What lessons have we learned from the cotton experience under the 1985 Food Security Act?
- What insights have we gained from the recent cotton market strength? and
- What are the implications for the 1990 farm legislation?

A fundamental question is how effective the FSA85 has been in achieving its policy goals for cotton. Of critical importance to the assessment is a methodological issue of measurement, the identification and evaluation of key contributing factors and their relative importance. A large-scale econometric model AGGIES/Cotton (AGricultural Globally Integrated Econometric System) was used for the analysis. Computer simulations of four counterfactual scenarios were conducted separately to determine the policy impacts of the FSA85 target price and loan rate reduction, lower dollar exchange rates and conservation reserve program (CRP) acreage retirement as well as the effects of U.S. drought conditions.

The results from the simulation study indicate that the 1985 Farm Act was a key contributing factor in recent cotton market upturn. Reductions in target price from 81 cents in 1985 to 72.9 cents per pound in 1989 and loan rate from 57.3 cents in 1985 to 50 cents per pound in 1989 resulted in higher export sales (up 18.9% or 1.1 million bales), sharply lower stocks (down 29.3% or 2.1 million bales), and higher market price (up 3.5% or 2 cents per pound) in the four years FSA85 program period. Cash receipts showed little change (down 0.5%) while direct government payments actually declined (down 15.7% or \$190 million per year). Without FSA85, government costs would have been much higher.

The macroeconomic policy that lead to devaluation of the dollar made an even stronger impact boosting export sales and supporting higher cotton prices and income. In the absence of devaluation, cotton exports would be 1.1 million bales lower and Memphis price would decline by 9 cents per pound. The CRP acreage retirement resulted in a small production cutback as less productive land was placed in the program. The impact of the CRP acreage reduction of 0.8 million acres was a 1.9 cents per pound increase in Memphis price, slightly below the effect of the reduced target price and loan rate.

Confirming the common expectation regarding the importance of drought adversely affecting cotton production since 1986, cotton yields in three of the four years were below trend projections. The severe U.S. drought condition in 1986 and 1989 showed a yield of more than 50 pounds per acre lower than trend yield. However, an unusually high 706 pounds yield harvested in 1987, 88 pounds above trend, offset most of the production cutback by adverse weather conditions. The price impact was strong during years of severe drought, up 6.6 cents per pound in 1986 and 4.0 cents in 1989. However, the overall price impact from adverse weather was mild as high yields tended to offset low yields.

This study confirms that the marketing loan has provided a vehicle to stimulate export sales. The cotton program is vital to protect producers' income from over production and depressed prices. Government cost has been reduced slightly by periods of higher cotton prices. However, policy actions are particularly vulnerable to price fluctuations related to uncertainty of weather and demand projections. Discretionary provisions need to be carefully evaluated to reduce risk of exceeding budget projections.

In determining the success of the 1985 Farm Act, this study confirms the importance of market-oriented policy programs to enhance international competition. Much of the gain in price and income was attributable to competitive prices in world trade. Although weather uncertainty may continue to be a critical factor affecting supply and price instability, policy provisions need to be designed with flexibility to foster the proper interplay of supply and demand that keeps stocks adequate and prices competitive.

COTTON MARKET RESPONSES TO 1985 FOOD SECURITY ACT, DOLLAR DEVALUATION AND U. S. WEATHER DISTURBANCES

Dean T. Chen and Carl G. Anderson*

Introduction

The U.S. cotton industry has been undergoing important changes in its market environment due to the 1985 Food Security Act, especially the new marketing loan provisions. Largely reflecting the market-oriented policy programs to enhance international competition, the industry has become increasingly sensitive to changes in world supply and demand conditions and government policy actions. The dynamic process in the transformation of the U.S. cotton industry into an open and competitive position in world trade has generated considerable momentum in recent years.

Since 1986, the industry has experienced several major market swings, rising in response to the 1985 farm act through the 1986/87 season, reaching a peak early in the 1987/88 crop year, falling under the harvest pressures of a large 1988/89 crop, and rebounding during the 1989/90 season against rising mill use and export sales, with stocks declining, and higher market prices.

As a result of the 1989 upturn, the U.S. cotton industry is currently in a fairly favorable financial condition. However, fundamental improvements in its market strength in the international arena and policy actions to discourage overproduction are needed. Otherwise,

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the cotton market will likely continue to be under the pressures of supply-demand imbalances and price and income instability.

Critical to the future of the U.S. cotton industry is a new agricultural legislation being drafted by the present Congress. In formulating the 1990 farm act, policy debates in this legislative session will likely be centered around the possibility of an extension or some modifications of the 1985 Food Security Act. These developments have strong implications for cotton producers, merchants, government agencies and legislators in planning and decision-making. A timely evaluation of the 1985 farm act will be extremely important for the legislative process of the new farm bill for cotton.

To assist preparation of policy debates, important questions have been raised by agricultural legislators regarding the quantitative evaluation of the recent improvement in the U.S. agricultural economy. In particular, how much of this improvement is attributable to policies of the 1985 farm bill and how much to the effects of changed macroeconomic conditions in the U.S. and worldwide (i.e. monetary exchange rates, lower interest rates, lower fuel cost)? How much of the increase in farm income can be attributed to the drought of 1988 that resulted in lower commodity stocks and higher prices? (de la Garza). These are important policy questions in need of careful assessment.

Critical to the assessment is a methodological issue of measurement, the identification and evaluation of key contributing factors and their relative importance. Technically speaking, these questions can be most effectively analyzed with the aid of a large scale econometric model. Evaluation of economic alternatives and simulation of policy impact have long been considered as the most important function of the economic model (Klein).

The econometric model AGGIES/Cotton used in this study is designed primarily for farm program evaluation and market uncertainties assessment. The model has been utilized for ongoing policy analysis since 1987 (Chen 1987; Chen and Anderson 1988, 1989). With a comprehensive set of policy instruments, the model is particularly useful for impact simulation analysis of the 1985 farm act. Moreover, the model for cotton is most appropriate for this evaluation purpose, because it is a commodity with the unique features of the marketing loan program.

This paper provides a quantitative assessment of the FSA85. The study explores the implications of the major underlying forces behind the recent market upturn. Four scenarios were identified for simulation analysis, and counterfactual assumptions were incorporated into the model for each scenario. The paper begins with a brief review of the cotton market performance over the four year period of 1986-89. An overview of the lessons learned from the 1985 farm act are summarized, followed by a comparative analysis of the impact simulation results. Lastly, the conclusion discusses the relative importance of the impacts, the implications for 1990 legislation, and suggestions for further studies.

Cotton Market Performance

A proper evaluation of the 1985 Food Security Act must begin with the economic background of U.S. agricultural sector for which the legislative debates were focused and policy actions were taken. During the legislative process of the 1985 farm act, farm financial stress had attracted most of the attention. In the cotton sector, for example, the market condition was beset by sluggish domestic mill use, a sharp decline in export sales, large accumulation of burdensome stocks, and depressed market prices for cotton. Policy

actions were designed primarily to provide financial relief to producers and to stimulate an economic recovery of the U.S. cotton industry.

1985 FSA Policy Goals

With the U.S. agriculture at a crossroads, the 1985 farm bill was designed to achieve five major policy goals:

- enhance international competition,
- reduce burdensome stocks,
- provide safety net protection of farm income,
- control budget costs and
- protect land resources.

Selected Performance Indicators

Market performance of the cotton industry has been fairly impressive in improving the cotton industry's position in meeting the five major policy goals outlined above. A quantitative assessment of the FSA85 program's performance can best be accomplished with the aid of a reference period of comparison and some selected performance indicators.

In this study, two four-year program periods, 1982-1985 for the 1981 farm bill and 1986-1989 for the 1985 farm bill are utilized for such a comparison purpose. To reflect the general health of the industry with respect to the stated objectives of the 1985 act, three groups of selected market performance indicators were chosen. These include (1) the U.S. cotton domestic market performance indicators of domestic mill use, export sales, and ending cotton stocks; (2) the U.S. cotton competitive positions indicators including world export market share, relative prices between U.S. farm price and world market price of "A" Index, and relative performance of the stocks/use ratio in the U.S. and world; and (3) the U.S. cotton producers' income indicators such as cash receipts from farm marketings, government payments, and gross farm income (Figure 1, 2 and 3 and Table 1).

An Overview of Accomplishments

Table 1 and Figures 1-3 provide a sketch of the major performance indicators for two program periods of the 1981 and 1985 farm acts with respect to the improvement in the U.S. competitive position, reducing stock levels, maintaining farm income, controlling budget costs and in protecting land resources.

Exports during the new program (1986-89) have posted a strong increase of a third over the preceding four years (1982-85) under the 1981 program (Figure 1 and Table 1). Exports, however, remain on the low side when compared to the excess of 8 to 9 million bales in foreign consumption above production and large exportable supplies in the U.S. Meanwhile, U.S. exports have averaged only 6.7 million bales.

Domestic mill use has expanded by almost a third. Cotton prices have been very competitive with synthetics and the demand for cotton textiles strong. Still there is an opportunity to increase domestic raw cotton consumption substantially as the raw fiber equivalent of textile imports is near 4.6 million bales with total consumption around 12 million bales.

Even though ending stocks have posted a modest decline of 12 percent, they remained well above the 4 million bale target set in the 1985 Bill. However, that target may not be realistic due to growing demand. The stock/use ratio dropped sharply from 61 to 37 percent as usage rose against the smaller stock level (Figure 2).

Exportable supplies of U.S. cotton need to be adequate to fully meet the rest of world's gap in consumption over production. This suggests strong advantages of using a target level of stocks/use instead of an actual level. Further study needs to be directed toward establishing an optimal stocks/use ratio for the industry to target.

Table 1. Cotton Market Performance Indicators: 1982-85 and 1986-89 Comparison

	86/87	87/88	88/89	89/90	82-85	86-89
Trade	-----Million Bales-----					
Exports	6.7	6.6	6.2	7.5	5.0	6.7
Mkt. Share %	25.8	28.3	24.4	31.3	25.6	27.5
Domestic Use	7.4	7.6	7.8	8.2	5.8	7.8
Stocks						
Ending Stocks	5.0	5.8	7.1	3.6	6.0	5.3
Stocks/Use %	36	41	51	23	61	37
Income	-----Million Dollars-----					
Cash Receipts	\$3,605	\$4,087	\$4,668	\$4,517	\$3,881	\$4,219
Deficiency Payment	1,258	951	1,177	693	724	1,020
Total	\$4,863	\$5,038	\$5,845	\$5,209	\$4,605	\$5,239

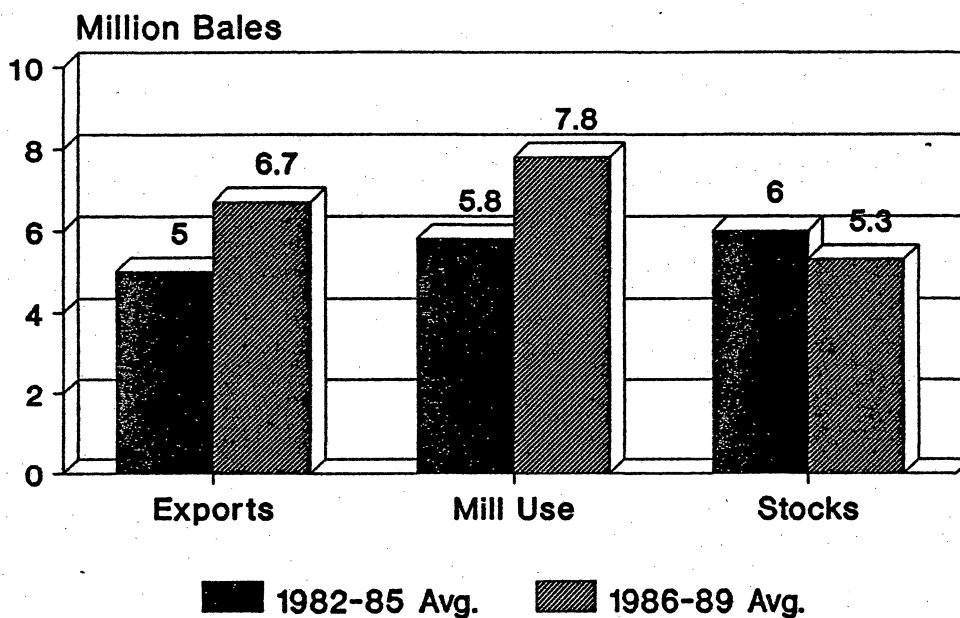


Figure 1. U.S. Cotton Market Performance: 1982-85 vs 1986-89

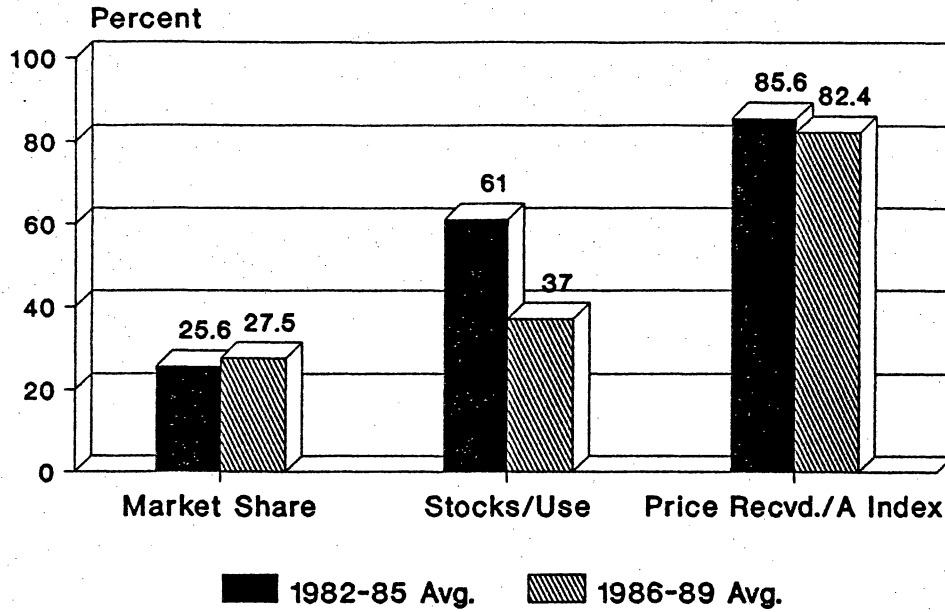


Figure 2. U.S. Cotton Competitive Position: 1982-85 vs 1986-89

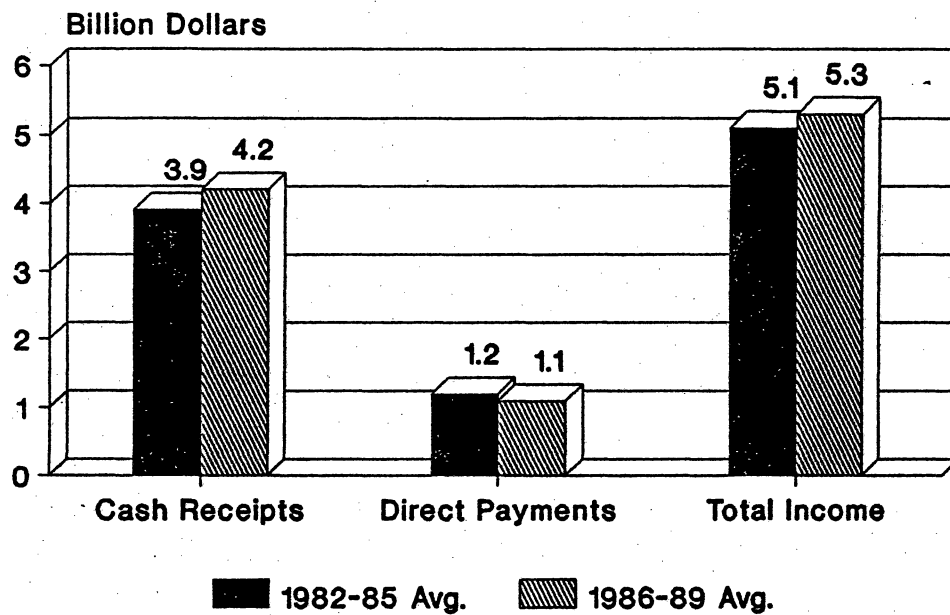


Figure 3. U.S. Cotton Income and Government Payment: 1982-85 vs 1986-89

The market price level response is correlated to the stocks/use ratio. A high level around 50 percent in the past has been associated with price near the loan rate. Nevertheless, expectations of supply and demand also play an important role in the level of market price versus the stocks/use ratio.

The U.S. share of world trade has edged only slightly higher from about 25.6 to 27.5 percent. The share needs to increase for the U.S. cotton industry to maintain strong production and an economically viable agribusiness support industry. The strong dollar in the early 1980's encouraged foreign countries to expand production and gain a larger share of world cotton trade. Of course, the strong dollar also made American cotton relatively more expensive for many countries importing fiber.

The impact on trade from China has been erratic. They went from a major importer of American cotton in 1979 and following years to a big exporter in the mid-80's. Currently, their acreage has been reduced and China is a net importer of raw cotton. A competitive U.S. export program can benefit from the China switch from exporter to importer.

The U.S. cotton price received by farmers as a ratio of the "A" Index is a proxy measurement of international price competitiveness. The ratio declined slightly under the 1985 program, indicating a move toward more competitive prices. The ratio is also impacted by changing transportation costs, cotton quality, location and relative price level. During the 1988 price decline, the effectiveness of the marketing loan was hampered by the calculation procedure of the U.S. adjusted world price (AWP) being too high to fully compete internationally and by the sheltering provisions of a potential 18 month free loan program at the time.

Cash receipts continued as a major contributor to farm income, showing a small increase in the latest period (Figure 3). While direct government payments remained substantial and extremely important to grower income, they did reflect a moderate decrease. Thus, the decrease in price supports were favorable yet the total of receipts and payments registered an increase. In the 1986-1989 program period, total deficiency payments, on the other hand, increased slightly from the previous program period.

Major Policy Instruments and Other Critical Factors

A review of the current legislation indicates that the 1985 farm act was drafted when the cotton industry was under severe financial stress due mainly to a deterioration of the U.S. competitive position in the world market. During the period of policy debate, the U.S. cotton market was beset by declining mill use and exports, increasing surplus stocks, growing textile imports, and depressed prices. Foreign production had expanded rapidly to a world record 88 million bale crop that exceeded consumption by about 18 million bales. The result was record world stocks and a sharp drop in world prices.

Major Changes in Program Provisions

The 1985 farm act set in motion a strong policy action of the marketing loan to expand exports and reduce stocks by removing the export-inhibiting characteristics of the Commodity Credit Corporation (CCC) loan program. It provided a loan repayment plan to be used when the basic loan rate was not competitive on world markets. When world cotton prices were below the loan rate, loan redemption could be made at a calculated U.S. world price. As a result, the effectiveness of the loan program to establish a price floor was reduced.

The new program kept many features of the past (Stults, et al). These included acreage limitations, nonrecourse loans and target prices. But, the Act allowed the Secretary of Agriculture more discretionary authority to administer annual provisions. The program was more market-oriented and more flexible. Target prices were specified to decline from the 81 cent level in 1986 to 72.9 cents in 1990. The base loan rate remained tied to an average of past market prices with the minimum lowered to 50 cents from the 55 cent level in the 1981 Act. These changes were mainly to reduce government costs.

The program was to protect farm income by using target prices and regular deficiency payments along with marketing loan repayments when implemented. A target of lower ending stocks was set. The program allowed the Secretary of Agriculture discretionary control over acreage set-aside and paid land diversions to reduce planted acreage when ending stocks were expected to exceed the 4 million bale target. Another new change in

Table 2. Cotton Program Provisions Compared: 1981 and 1985 Farm Acts

Year	1981 Farm Act			Year	1985 Farm Act		
	Target	Loan	ARP/		Target	Loan	ARP/
	Price	Rate	PLD		Price	Rate	PLD
	---Cents/Lb.---		Percent		---Cents/Lb.---		Percent
1981	70.87	52.46	0/0	1986	81.00	55.00	25/0
1982	71.00	57.08	15/0	1987	79.40	52.25	25/0
1983	76.00	55.00	20/28	1988	75.90	51.80	12.5/0
1984	81.00	55.00	25/0	1989	73.40	50.00	25/0
1985	81.00	57.30	20/10	1990	72.90	50.27	12.5/0

the 1985 Act was the acreage conservation reserve to reduce program acreage for a 10 year period and the conservation compliance program to protect erodible lands (Stucker and Collins).

An important new policy instrument mandated by the 1985 Food Security Act is the conservation reserve program. The conservation reserve program has reduced the cotton base by 1.3 million acres. The conservation compliance program has also added to the appropriate care and preservation of erodible land resources. In all, the 1985 cotton provisions have made a positive move toward the major objectives of improving the competitiveness of the cotton industry.

Other Critical Factors

In evaluating the cotton market performance it is extremely important to recognize the impact of dollar devaluation on exports and adverse weather on yields along with the 1985 program. As the debate on program issues for the 1990 Act develop, it is important to investigate the cotton market's response to the major factors influencing market performance during the past four years against the same period before.

Impact Simulation Analysis

The Model Structure

In conducting the computer simulation of policy impact, a large-scale econometric model was used in examining counterfactual scenarios for policy evaluation purposes. Analytical capability of the model can be described by its size, structure, and availability of policy instruments. The model is a simultaneous equation system of 68 equations describing supply-demand, inventory stock, and price determination for the cotton sector.

In specifying the supply relationship, planting decisions for the program participant and non-participant are described separately. The theoretical framework of the implicit revenue function is utilized to determine program participation rate and acreage response as well as yield per acre. A comprehensive set of policy instruments, target price, loan rate,

and loan repayment rate are used to determine program payment rates such as deficiency payment, loan deficiency payment, paid land diversion, disaster payment, and conservation reserve program rental costs.

The model includes international linkages in determining the rest of the world production, consumption, inventory stock and exports. Spot domestic market price in Memphis and world market price of "A" Index are also endogenized in the model. The linkage between "A" Index and Memphis price takes into account the transportation costs and quality differences.

Four Scenarios for Program Impact Evaluation

Four scenarios are examined in the present study:

- 1985 FSA support rates scenario,
- dollar devaluation scenario,
- U.S. drought scenario,
- conservation reserve program (CRP) scenario.

1985 FSA Support Rates Scenario

The key policy assumption in the reduced support rates scenario is that the target price and loan rate were held at the 1985 levels, 81 cents per lb. and 57.3, respectively. In accordance with the 1981 farm bill, annual increase in target price level averaged 6 percent, while loan rates are established at the level anticipated to be below the world market for cotton (Knutson, 1981). The marketing loan provisions of the 1985 farm act are assumed to continue in the simulation period with loan repayment rate at adjusted world price level.

For impact simulation the model was used to quantify the effect on three sets of performance variables: 1) domestic market performance indicators of exports, mill use and ending stocks; 2) international competitive position indicators such as U.S. cotton world

market share, relative stocks/use ratio, price received by farmers relative to world cotton price of "A" Index; and 3) farm income indicators of cash receipts, direct payments and the total.

Simulation results are compared with actual to determine the impact of the 1985 FSA target price and loan rate reduction. Figure 4 and Table 3 show how the reduction in target price and loan rate from the 1981 to the 1985 farm bill level affected the market performance for cotton. In the absence of the 1985 farm bill, U.S. cotton exports for the four year period 1986-1989 would have decreased by an annual average of 1.1 million bales from the actual level of 6.7 million bales. Ending stocks show an even stronger effect, increasing 2.1 million bales from the four year average of 5.3 million bales.

The 1985 farm bill also represents a sizable savings in government costs, with a reduction in deficiency payments of 190 million dollars per year. However, it is interesting to note that with the target price and loan rate at the 1981 farm bill level (81 cents per pound and 57.3 cents per pound, respectively), deficiency payments in 1986 would be lower by 111 million dollars due to a 6.3 cents per pound increase in market price for that year. Strong positive price impacts are found for both Memphis price and "A" Index in the program period due to strong demand in domestic mill use and exports. The effect of higher support rates has only a short term positive impact on market prices. While, in the longer term, cotton price would be substantially lower due to decreased demand conditions. The overall effect of the FSA85 target price and loan rate reduction in the four year period shows a 2 cent increase in Memphis price and 5.4 cent increase in "A" Index for the 1986-89 period.

Table 3. Impact of Loan Rate and Target Price Reduction: Actual vs. 1981 Act

	86/87	87/88	88/89	89/90	82-85	86-89
Exports	-----Million Bales-----					
Actual	6.7	6.6	6.2	7.5	5.0	6.7
Impact	0.1	2.0	-0.1	2.3	0.0	1.1
Ending Stocks						
Actual	5.0	5.8	7.1	3.5	6.0	5.3
Impact	-0.2	-2.1	-1.8	-4.3	0.0	-2.1
Cash Receipts	-----Million Dollars-----					
Actual	\$3,605	\$4,087	\$4,668	\$4,517	\$3,881	\$4,219
Impact	-156	105	-255	217	0	-22
Deficiency Payment						
Actual	\$1,258	\$951	\$1,177	\$693	\$724	\$1,020
Impact	111	-294	-183	-395	0	-190
Memphis Price	-----Cents/Lb.-----					
Actual	51.7	62.5	56.7	67.1	63.1	59.5
Impact	-6.3	5.0	-3.3	12.6	0.0	2.0
"A" Index						
Actual	62.0	72.2	66.4	80.2	69.0	70.2
Impact	3.5	3.3	7.4	7.4	0.0	5.4

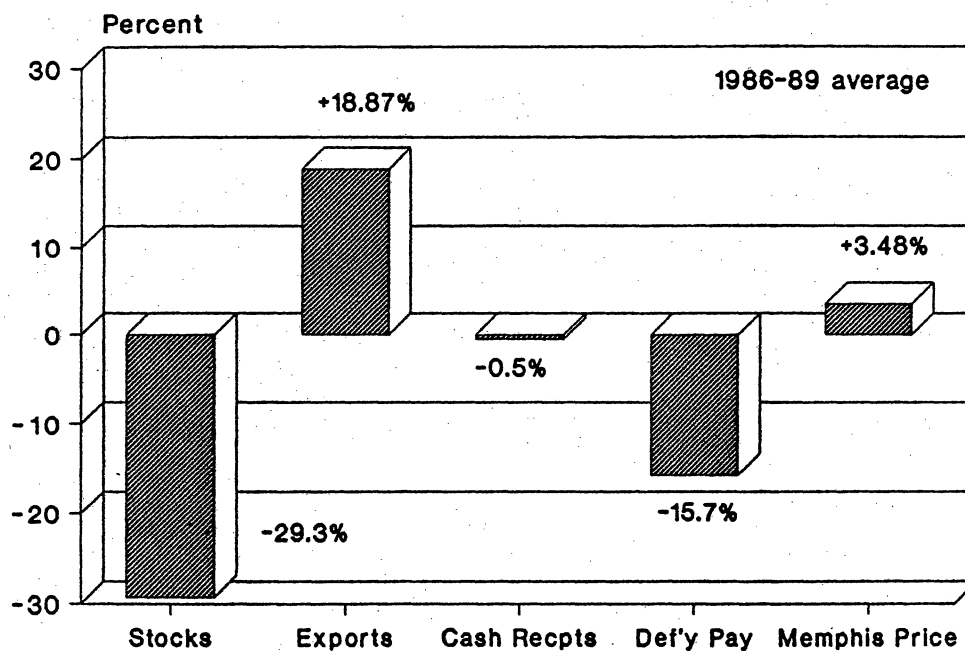


Figure 4. Impact of FSA85 Target Price & Loan Rate Reduction

Dollar Devaluation Scenario

In the late 1980's a significant shift of macroeconomic policy led to a sharply lower dollar exchange value in the world currency market. During the 1986-89 period, the cotton trade weighted value of foreign currency increased from 2.66 to 3.25. Dollar devaluation has strong effect on U.S. cotton exports and textile imports. As U.S. cotton is effectively priced lower in the international market, export demand improves sharply while textile imports decrease. The positive net effect of dollar devaluation contributed substantially to a strong recovery of cotton exports during the 1985 program period.

In conducting our simulation, the six major trading countries weighted dollar exchange rate for cotton was assumed to remain at the 1985 level of 2.66 throughout the four year simulation period, as compared to the actual level of 3.58.

As shown in Figure 5 and Table 4, cotton exports would be substantially lower for every year in the absence of dollar devaluation. The overall impact points to an average increase of 1.1 million bales in cotton exports due to the lower valued dollar. The accumulative effect of increased exports represents a 2.1 million bale impact on ending stocks in the simulation period. In other words, without the dollar devaluation cotton stocks would be 7.4 million bales as compared to 5.3 million bales average for the period. The impact of the exchange rate on Memphis price is particularly strong showing a gain of 9 cents per pound in the presence of dollar devaluation.

Given the size of the dollar devaluation, in particular, the accumulative effect of decreased dollar exchange value in the international market over a four year period, the estimated impact on U.S. cotton exports in this paper are higher than in other studies. For example, it has been estimated that more than 25 percent of the increase in U.S. exports

Table 4. Impact of Dollar Devaluation: Actual vs. No Devaluation

	86/87	87/88	88/89	89/90	82-85	86-89
Exports	-----Million Bales-----					
Actual	6.7	6.6	6.2	7.5	5.0	6.7
Impact	0.7	1.0	1.4	1.3	0.0	1.1
Ending Stocks						
Actual	5.0	5.8	7.1	3.5	6.0	5.3
Impact	-0.7	-1.3	-2.5	-3.3	0.0	-2.1
Memphis Price	-----Cents/Lb.-----					
Actual	51.7	62.5	56.7	67.1	63.1	59.5
Impact	7.0	7.9	10.2	11.1	0.0	9.0

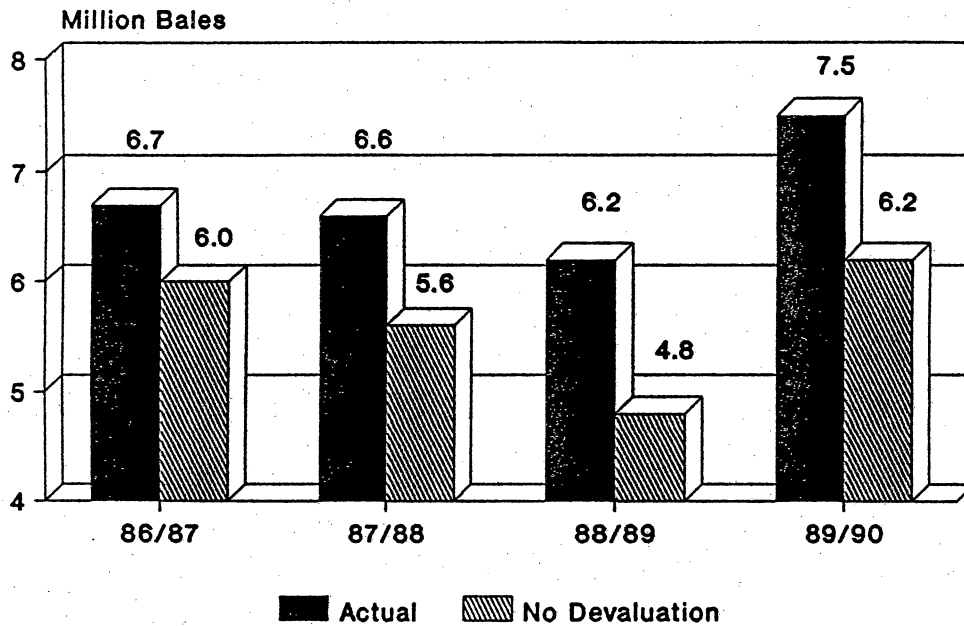


Figure 5. Impact of Dollar Devaluation on Exports

are accounted for by changes in exchange rate (Shane, Bailey). It is important to note that the estimated 1.1 million bale increase in cotton exports was a result of partial analysis. Simultaneous determination of exchange rate impact on exports with other factors such as relative prices, tariffs, and non-tariff barriers would be desirable.

U.S. Drought Scenario

In determining the effect of weather disturbances on the U.S. cotton market, a critical assumption was made in that, under normal weather conditions, cotton yield would follow a trend projection. Cotton yield per acre as a function of trend for a fifteen year period 1975-1989, was estimated as follows:

$$\begin{aligned} \text{colsy} &= 6.744 * \text{trend} - 12810 \\ &\quad (8.47) \quad (8.17) \\ \text{ar}_t &= -0.539 * \text{ar}_{t-1} \\ &\quad (2.107) \end{aligned}$$

where colsy is cotton yield in pounds per acre, trend is the numerical number of the year, the figures within parenthesis are t-ratios, ar_t and ar_{t-1} are first order autocorrelation equations.

Trend projections suggests that cotton yield per acre in three of the past four years was below trend (Figure 6 and Table 5). In 1986 and 1989, drought in the U.S. caused a substantial decline in cotton yield, reduced to 552 and 592 pounds per acre, respectively. This represents a 52 and 55 pounds per acre reduction from the trend. However, the 1987 cotton yield jumped sharply higher above trend to 706 pounds, an increase of 88 pounds. The net result for the four year simulation period indicates cotton yield averaged 617 pounds, 8 pounds per acre below the trend.

Table 5. Weather Impact on Yield: Actual vs. Trend Yields

	86/87	87/88	88/89	89/90	82-85	86-89
Yield	-----Pounds/Acre-----					
Actual	552	706	619	592	582	617
Impact	-52	88	-13	-55	0	-8
Production	-----Million Bales-----					
Actual	9.7	14.8	15.4	11.8	11.5	12.9
Impact	-2.0	2.1	0.3	-1.2	0.0	-0.2
Ending Stocks						
Actual	5.0	5.8	7.1	3.5	6.0	5.3
Impact	-2.0	0.7	0.4	-1.1	0.0	-0.5
Memphis Price	-----Cents/Lb.-----					
Actual	51.7	62.5	56.7	67.1	63.1	59.5
Impact	6.6	-3.3	-0.8	4.0	0.0	1.6

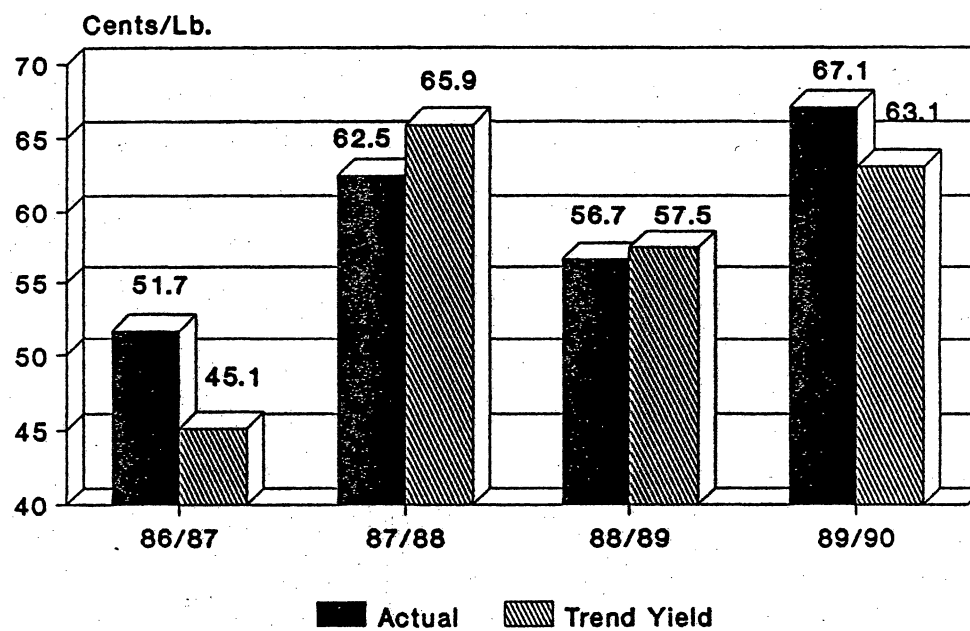


Figure 6. Weather Impacts on Memphis Price: Actual vs. Trend Yield

The effect of drought shows up strongly in both 1986 and 1989, a production cutback of 2 and 1.2 million bales, respectively. These sizable crop failures led to significantly higher Memphis prices of 6.6 and 4 cents. While the drought caused higher prices in 1986 and 1989, the exceptionally high cotton yield per acre in 1987, on the other hand, had a large negative price effect.

Although the study confirms the importance of drought to the recent price increase, the negative price effect in 1987 due to the exceptionally high cotton yield was also very strong. Largely reflecting the offsetting effect, the net impact of weather disturbances during the four year period was relatively mild. Under the trend yield scenario, cotton production would increase an average of 0.2 million bales, while Memphis price would be 1.6 cents per pound lower.

Conservation Reserve Acreage Scenario

In developing the conservation reserve program (CRP) acreage scenario, sign-up reports to date show a total removal of 1.34 million acres for the 1989/90 crop year. The legislative goal of the CRP is to enroll 45 million acres of highly erodible crop land by 1990 as mandated by the Food Security Act of 1985. The CRP projection for cotton is currently estimated at 1.5 million acres. The CRP acreage scenario assumes zero removal of conservation reserve program acreage. For government cost estimates, the CRP rental cost per acre is estimated at \$52.5 per acre for the simulation period.

By assuming zero CRP acreage removal, cotton base acres would increase by 0.8 million acres (Figure 7 and Table 6). Much of the CRP acreage is less productive land and the zero CRP acreage scenario suggests only a small increase in cotton production of 0.3 million

Table 6. Impact of Conservation Reserve Program: Actual vs. Zero CRP Acres

	86/87	87/88	88/89	89/90	82-85	86-89
CRP	-----Million Acres-----					
Actual	0.1	0.7	1.0	1.3	0.0	0.8
Impact	0.1	0.7	1.0	1.3	0.0	0.8
Production	-----Million Bales-----					
Actual	9.7	14.8	15.4	11.8	11.5	12.9
Impact	0.0	-0.3	-0.4	-0.5	0.0	-0.3
Ending Stocks						
Actual	5.0	5.8	7.1	3.5	6.0	5.3
Impact	0.0	-0.3	-0.5	-0.8	0.0	-0.4
Memphis Price	-----Cents/Lb.-----					
Actual	51.7	62.5	56.7	67.1	63.1	59.5
Impact	0.0	1.5	2.4	3.5	0.0	1.9

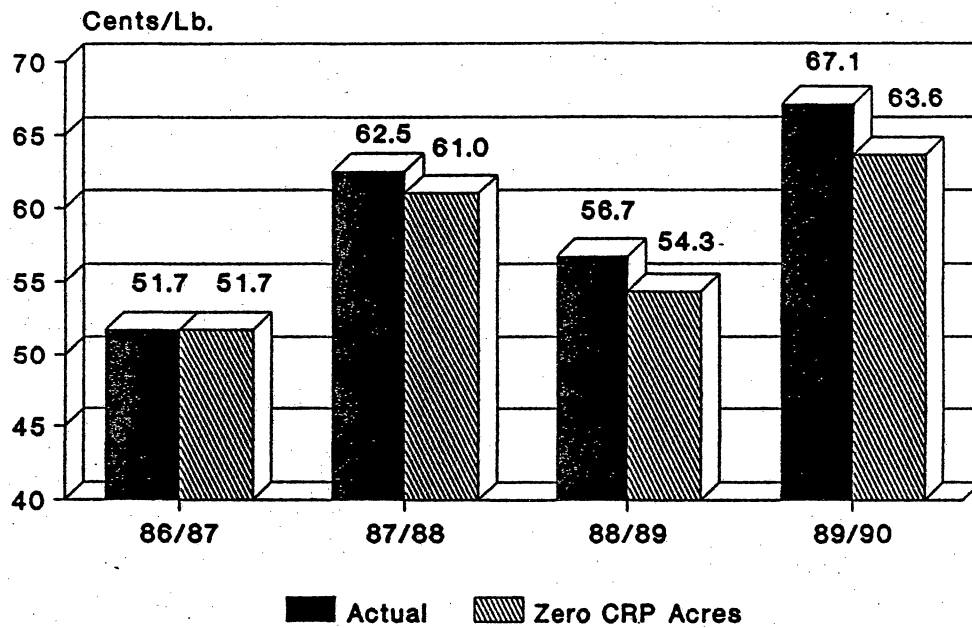


Figure 7. Impact of CRP Acreage Reduction on Memphis Price

bales in 1986-89. As a result, the estimated price effect under the zero CRP acreage scenario is only 1.9 cents per pound for Memphis price.

The zero CRP scenario shows relatively more impact on production and prices in 1988/89 and 1989/90 crop years due to the accumulation of enrollment in the last two years to 1.0 and 1.3 million acres. Memphis price impacts are 2.4 cents per pound for 1988/89 and 3.5 cents per pound for 1989/90.

Conclusions

Cotton market performance in the U.S. has shown marked improvement during the 1985 Farm Program period. Domestic use and export sales registered a sizable gain, while the carryover stocks showed a sharp decline. The most significant improvement has been in the competitive position of U.S. cotton in the world market as the U.S. share of international trade rebounded with more competitive prices. Average market prices and producers' income have remained fairly stable. Deficiency payments have increased, but total direct government payments actually declined due to less payments on paid land diversion and payment-in-kind.

Results from this study confirm the effectiveness of the 1985 Farm Program in achieving the primary goal of enhancing a more competitive U.S. market position through the reduction in domestic price support. The cornerstone of the Act--the marketing loan--provided the useful vehicle in stimulating export sales. However, because the world price adjustment mechanism was not fully competitive against rapidly declining foreign prices and the CCC nonrecourse loan sheltered cotton from the market, cotton failed to flow freely into market channels as expected.

The cotton industry was successful in reducing the burdensome stocks to around the program target of 4 million bales by the 1989 crop. Despite the continuing downward pressure on farm income and prices, the cotton industry has been able to maintain a relatively favorable financial condition. The structural adjustment of the U.S. agricultural sector will likely continue to speed up the consolidation of farm operations affecting the profitability of medium to smaller sized units. Farm commodity programs will continue to be vital to their financial survival. The need is to maintain a policy tool to protect producers' income from over production and depressed prices.

The recent improvement in the market price has reduced government cost. Policy actions are particularly vulnerable to market price fluctuations affecting government cost projections. Uncertainty in weather and demand projections are the critical factors that need to be carefully evaluated to reduce risk of exceeding budget projections.

The conservation reserve was an important provision of the 1985 Act to reduce cotton base acreage and protect land resources and the environment. Although the economic consequence of land removed from production has a relatively small impact on prices and income, it plays an important role in environmental protection.

The results from the simulation study of four scenarios indicate that the impact of the 1985 FSA target price and loan rate reduction was higher export sales, sharply lower stocks, and higher price (Table 7). Cash receipts showed little change while deficiency payments registered a sizable savings in government costs. The impact of dollar devaluation also made a substantial contribution boosting export sales and supporting higher producer prices and income. The conservation acreage reduction contributed to a small production cutback

as less productive land was removed from production. The price impact of the conservation program was slightly below the effect of the reduced target price and loan rate.

Table 7. A Comparison of Memphis Price Impacts for Four Scenarios

	82-85	86-89
	-Cents/Lb.-	
Actual	63.1	59.5
FSA85 Support Impact	0.0	2.0
Devaluation Impact	0.0	9.0
Weather Impact	0.0	1.6
<u>CRP Acreage Removal Impact</u>	<u>0.0</u>	<u>1.9</u>

Confirming the common expectation regarding the importance of drought adversely affecting cotton production since 1986, cotton yields in three of the four years were below trend projections. The severe drought condition in 1986 and 1989 show actual yield per acre more than 50 pounds lower than trend yield. However, an unusually high 706 pound yield harvested in 1987, 88 pounds above trend, offset most of the production decline caused by lower yields. The price impact was strong during years of drought. The overall price impact from adverse weather was mild as high yields tended to offset low yields.

In determining the success of the 1985 Act, this study confirms the importance of policy provisions to enhance international competition. Much of the gain in price and income was attributable to competitive prices and the marketing loan policy. Although weather uncertainty may continue to be a critical factor affecting supply and price instability, policy action needs to be designed with flexibility to foster the proper interplay of supply and

demand that keeps stocks adequate and prices competitive (Anderson & Smith). In order to achieve the competitive goal, the U.S. cotton industry needs to keep productivity moving upward and costs moving downward relative to other countries (Gardner). The U.S. cotton industry needs to maintain the interaction between policy and market forces that protects farm income at reasonable government costs.

This study represents a ambitious attempt for performance evaluation of 1985 farm act using computer simulation experiment. The impacts of individual scenarios are evaluated based upon a partial analysis framework. Further study needs to be done within a general equilibrium framework for simultaneous determination of impact and evaluation of their relative contributions.

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