



**AgEcon** SEARCH  
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

*The World's Largest Open Access Agricultural & Applied Economics Digital Library*

**This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.**

**Help ensure our sustainability.**

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

[aesearch@umn.edu](mailto:aesearch@umn.edu)

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

TX

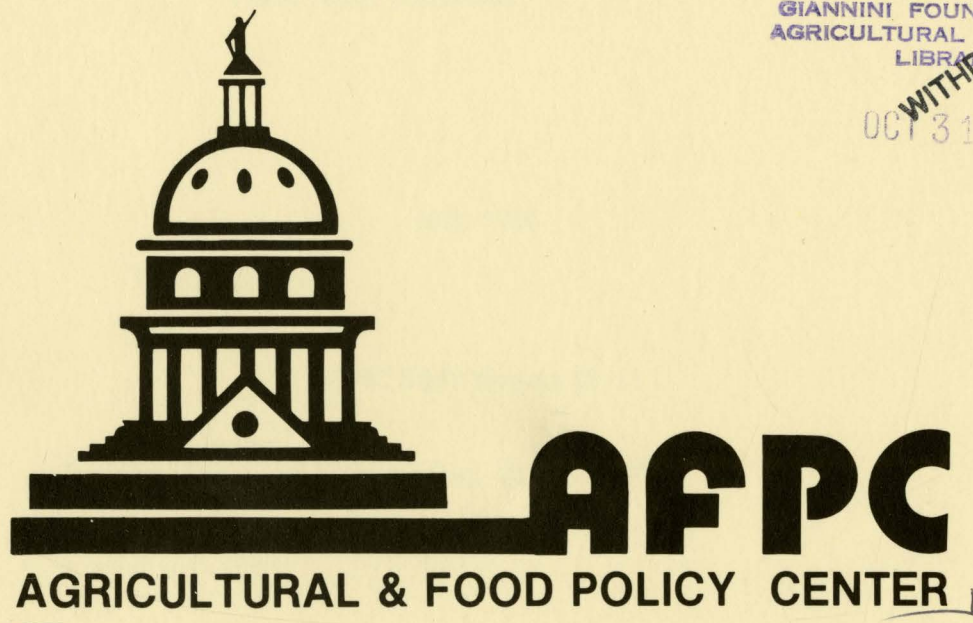
AFPC staff rpt 87-11

**EVALUATION OF UNCERTAINTIES  
AFFECTING POLICY DECISION OF THE  
1988 COTTON PROGRAM**

Department of Agricultural Economics  
Texas Agricultural Experiment Station  
Texas Agricultural Extension Service  
Texas A&M University *system.*

GIANNINI FOUNDATION OF  
AGRICULTURAL ECONOMICS  
LIBRARY

**WITHDRAWN**  
OCT 31 1989



**EVALUATION OF UNCERTAINTIES  
AFFECTING POLICY DECISION OF THE  
1988 COTTON PROGRAM**

**Dean T. Chen and Carl G. Anderson**

**Agricultural and Food Policy Center  
Department of Agricultural Economics  
Texas Agricultural Experiment Station  
Texas Agricultural Extension Service  
Texas A&M University**

May 1988

AFPC Staff Report 88-11

College Station, Texas 77843

**EVALUATION OF UNCERTAINTIES AFFECTING  
POLICY DECISIONS OF THE 1988 COTTON PROGRAM**

**Dean T. Chen and Carl G. Anderson**

-----  
The paper was prepared for presentation at The Annual Beltwide Cotton Production Research Conferences--The Cotton Economics and Marketing Conference, January 6, 1988, Marriott Hotel, New Orleans, Louisiana.

# EVALUATION OF UNCERTAINTIES AFFECTING POLICY DECISIONS OF THE 1988 COTTON PROGRAM

Dean T. Chen and Carl G. Anderson

Key Words: Cotton program, Discretionary provisions, Cotton model, Uncertainty evaluation, Policy impact.

## Abstract

Key uncertainties of the cotton industry, such as yield per acre, domestic mill consumption, and export sales, are evaluated using a microcomputer-based econometric model, AGGIES/Cotton (AGricultural Globally Integrated Econometric System), to generate a baseline forecast and alternative scenarios for the 1988/89 crop year. Various discretionary provisions of the 1988/89 cotton program are analyzed in relation to these simulation results. Effects of uncertainties are discussed with respect to alternative production and demand projections in relation to a carryover stock target of 4 million bales, as specified by the 1985 farm legislation and deviations from this target.

An econometric model can best be utilized in the policy process for a baseline economic projection, impact simulation of alternative economic outcomes, and evaluation of policy response to uncertainties. The most useful model application to the cotton industry, under the existing program of marketing loan and the dynamic transitions in the world market, is to forecast major market trends and evaluate the areas of uncertainty for policy decisions.

## INTRODUCTION

The U.S. cotton industry started the 1987/88 crop season in an unusually strong market condition. Rising mill consumption and increasing export sales contributed to a sharp decline in carryover stocks and significant increases in market price and producers' incomes for the year (Skinner, 1987). As a result, the cotton program began to shift toward relaxation of production restrictions for the 1988/89 crop season.

Even though the Secretary of Agriculture has selected various discretionary provisions for the 1988/89 cotton crop, considerable uncertainty exists as to supply-demand conditions and ending stocks by July 1989. The uncertainties include program participation by producers, acreage planted outside of the program, yield, production,

-----  
The authors are a professor, Department of Agricultural Economics and an extension economist-cotton marketing, Texas Agricultural Extension Service, respectively. Texas A&M University, College Station, TX. 77843

domestic mill use, exports, price, producer income, and resulting program costs.

Cotton yields, over the last decade, have varied widely while trending upward (Figure 1). Consumption of U.S. cotton has fluctuated substantially from 8.2 million bales in 1985/86 to 15.7 million in 1979/80 (Figure 2). Domestic mill use trended steadily downward until a strong recovery beginning in 1985/86. Ending stocks have ranged from 2.8 million in 1980/81 to 9.3 million in 1987/88. Thus, the uncertainties greatly affect the supply-demand-price relationships over any growing and marketing season.

Given the open and competitive market environment created by the marketing loan program since August 1986, the U.S. cotton industry is extremely sensitive to changing supply-demand conditions at home and abroad. Policy actions, therefore, are vulnerable to large market fluctuations and resulting government costs. Thus, a quantitative assessment of the uncertainties is helpful in understanding the policy process and for developing contingency plans for program implementation.

The objective of this study is to explore the implications of the major uncertainties, such as weather variations on domestic and foreign crop production, and changes in macroeconomic and trade policies on domestic consumption and export demand. To incorporate these uncertainty factors into econometric model application, a baseline forecast solution was first generated assuming normal weather and trend-yield projections, and continuation of current macroeconomic conditions into the 1988/89 crop season. Deviations from this baseline forecast solution were evaluated in terms of departure of exogenous assumptions from their normal patterns. Estimated probabilities of departure from normal in terms of cotton yield per acre, domestic mill consumption and export sales, were calculated by the standard error of forecast from the model.

Five simulation solutions generated from the model were evaluated: (1) the baseline, (2) strong demand, (3) low yield per acre, (4) weak demand, and (5) high

yield per acre. The baseline solution for 1988/89 crop year required parameters specifying program loan provisions, target price level and acreage control provisions. The same set of cotton program parameters was used in generating four alternative simulated solutions. Therefore, the evaluation process focused upon the alternative assumptions to be measured as deviations from baseline and assessment of their policy impacts.

This study begins with a brief description of the model and uncertainty evaluation procedures. An overview of the 1988/89 cotton program and the baseline projection will then be presented, followed by a comparative analysis of impact simulation results. The last section contains concluding remarks.

### MODEL STRUCTURE

The AGGIES/Cotton Econometric System utilized for policy simulation is a monthly model of the U.S. cotton industry containing 3 major blocks and 67 simultaneous equations. This is a fully integrated structural model linking the domestic market block with a farm program simulator and the world market block. The model has been examined for predictive performance and policy simulation capabilities over the transition period of the marketing loan program as reported in earlier studies (Chen and Anderson, 1987; Chen and Bessler, 1987). The previous studies were mostly concerned with model performance in forecasting accuracy and linkage mechanisms between cotton market and government program. This study, on the other hand, stresses the importance of changing supply-demand conditions and the effect of uncertainty on government policy decisions for acreage control and overall performance of U.S. cotton industry.

The cotton model contains a series of supply-demand equations with price and government payment playing the key role for market clearance. The theoretical framework of implicit revenue is utilized to reflect profit maximization conditions with respect to the producer's return from cotton marketing, as well as direct and indirect government program benefits. The effect of farm program provisions can be

traced to the producer's decision process regarding program participation, acreage response, price determination, CCC loan activity, inventory stock adjustment, farm income, and government payment (Chen, 1987).

In regard to cotton production, the model is disaggregated into planted and harvested acreage, and yield per acre for four U.S. regions. The model contains monthly equations for domestic mill consumption, exports, stock, U.S. and world prices, cash receipts, government program payments and gross farm income. The commodity sector components are linked with the cotton program simulator for simultaneous determination of the program participation rate, acreage reduction percentage, market price, producer's income, and government payment. The key program instruments of target price, loan rate, loan repayment rate, and adjusted world prices can be explicitly used for estimating the deficiency payment, loan deficiency payment, diversion payment, disaster payment, and other program benefits.

#### UNCERTAINTY EVALUATION PROCEDURES

Although forecasting is an important model application, the largest single use of the econometric model is for the study of economic alternatives (Klein, 1981). This is particularly true for agricultural policy analysis, because farm commodity markets are subject to wide fluctuations in production, demand, stock, and prices. Evaluation of uncertainty becomes necessary in light of the strong influence of external factors such as weather variation, macroeconomic and trade policies. The usual way to incorporate uncertainty factors for policy analysis is to develop normality assumptions for weather and macroeconomic variables, and to further evaluate the probabilities of their departures from normal patterns.

In this study such an evaluation procedure is an exercise in the use of the cotton model, specifically in the preparation of baseline and alternative scenarios. This procedure requires projections of baseline assumptions of U.S. and foreign economies,



in particular the exchange rates of major cotton trading countries, economic growth, interest rates, and other factors. Of critical importance is the specification of cotton program parameters based on the latest announcement of the 1988/89 cotton program provisions such as loan rate, target price, percentages of acreage reduction program (ARP), paid land diversion (PLD), conservation reserve program (CRP), adjusted world price and other parameters.

Formal quantitative analysis of policy response to uncertainties begins with a model evaluation of the effect of policy. For this reason, alternative scenarios describing the outcome should take into account the probability distribution over future events for each possible setting of policy (Sims,1982). This study takes two approaches to evaluating uncertainty of exogenous future events. The first approach relies upon the standard error of the model forecast, particularly in the projection of cotton yield per acre. A second approach deals directly with historical data for domestic mill use, export and total consumption variables, using sample period standard deviation of estimates to determine the probability range of projection.

In developing the baseline projection and four alternative scenarios, several key exogenous assumptions were used in this simulation experiment. A brief summary of these underlying assumptions for uncertainty evaluation is presented below:

In the baseline projection, cotton yield per acre for 1988/89 crop is 648 pounds per acre, a significant 6.8 percent drop from the record 695 pound level estimated for the 1987/88 crop. The projected decrease in cotton yield for 1988/89 crop is based primarily on the effect of the increase in planted acres in the next crop season. This is based on an assumption that some less productive crop land will be brought back into production.

In evaluating the weather effect on cotton production, two alternative cotton yield projections were estimated, using a 90 percent probability range and an estimated standard error of the model forecast of 49.3 pounds per acre. Two alternative yield

projections, high yield and low yield scenarios, were estimated at 731.6 pounds and 564.4 pounds, respectively, using the baseline projection of 648 pounds plus and minus 1.697 standard error of forecast of 49.3 pounds.

To incorporate the factors of demand for simulation analysis, one standard deviation of total cotton usage of 1,678 million bales was used to generate high demand and low demand scenarios for uncertainty evaluation. These two alternative demand projections were computed using the baseline projections of domestic mill consumption and export plus and minus 839 million bales to each of the demand components, respectively.

#### NEW COTTON PROGRAM

Government programs play a critical role in farm commodity outlook. For more than half a century the government has attempted to adjust cotton supply with demand to achieve price and income goals (Starbird, Glade, McArthur, Cooke, and Townsend, 1987). Due to uncertainties, however, none of the initial goals can be easily accomplished without modifications. In the policy process, it is necessary to develop baseline projections to reflect current market information and the latest policy decisions. This exercise must be forward-looking and comprehensive. Important program parameters are incorporated into the model in generating the baseline solution. An overview of the 1988/89 cotton program and baseline projection is summarized below.

The key policy assumptions used in the baseline were drawn from the Food Security Act of 1985. The program was designed to make U.S. agricultural commodities more competitive in the world market by lowering the CCC loan rate level, reducing its effectiveness as a price floor, and/or providing PIK certificates. Unique features of this new farm legislation are the marketing loan and export enhancement programs implemented since August 1986 to protect farm income and reduce carryover stocks to workable levels.

The marketing loan program must be implemented if the world price of upland cotton is below the base loan rate. It helps assure that U.S. cotton is competitively priced to meet foreign competition (Anderson and Paggi, 1986). This is in sharp contrast to the mid 1980's, when the U.S. price floor was high and a strong dollar priced U.S. cotton out of the world market. Changes of the farm act have strong implications on market prices, amount of government payments to farmers, and effectiveness of the CCC loan in supporting price.

The new farm act provides the Secretary of Agriculture with considerable discretionary authority. This includes setting the amount of base acreage to be reduced, the target price and loan rate levels, implementation of conservation reserve and paid land diversion programs, and procedure for a marketing loan repayment plan. For the 1988/89 crop, the Secretary has elected to implement the marketing loan provisions under Plan B. Under this plan, the loan repayment rate fluctuates weekly with the world market price. The Secretary strives to implement provisions that will minimize loan forfeitures, accumulation of stocks, and government storage costs. This will allow free marketing of cotton in domestic and international markets (Glaser, 1986).

An upland cotton producer can repay a 1988 CCC loan at the lower of the base loan level or the prevailing adjusted world market price announced weekly. Loan deficiency payments will be made to eligible producers who agree to forego loan eligibility. Up to 50 percent of any loan deficiency payment may be made in generic commodity certificates on a bale-by-bale basis. The announcement indicated that there will be no paid land diversion program or inventory reduction program for the 1988/89 crop.

To achieve the program goal of a 4 million bale carryover stock for the 1988/89 season, the Secretary has announced a 12.5 percent acreage reduction program (ARP), a target price of 77 cents per pound, and a loan level of 51.8 cents per pound for base quality, average location. While the target price and loan rates are somewhat lower,

the ARP is half the 25 percent for the 1987 crop. In late December, budget reduction legislation was passed that included a further cut of 1.4 percent in the target price. This adjustment was not included in the baseline projection presented in this study.

### 1988/89 BASELINE PROJECTION

Baseline projection for the 1988/89 crop was based on the announced 12.5 percent ARP and an assumed 80 percent program participation rate (Table 1). The participation rate is expected to be lower than 1987, because the market price is substantially above the loan rate, and some farmers will likely opt to plant acreage outside the program.

Table 1. Cotton Model Baseline Projection  
Selected Farm Program, Supply-Use Indicators.

|                               | 85/86  | 86/87  | 87/88  | 88/89  |
|-------------------------------|--------|--------|--------|--------|
| <b>Program Participation</b>  |        |        |        |        |
| Participation Rate/ARP        | 82.0   | 88.0   | 89.2   | 80.0   |
| Percentage/ARP                | 20.0   | 25.0   | 25.0   | 12.5   |
| Participation Rate/PLD        | 82.0   | 0.0    | 0.0    | 0.0    |
| Percentage/PLD                | 10.0   | 0.0    | 0.0    | 0.0    |
| <b>Program Payment (c/lb)</b> |        |        |        |        |
| Target Price                  | 81.00  | 81.00  | 79.40  | 77.00  |
| Base Loan Rate                | 57.30  | 55.00  | 52.25  | 51.80  |
| Loan Repayment Rate           | 57.30  | 44.00  | 52.25  | 51.80  |
| Deficiency Payment Rate       | 23.70  | 26.00  | 18.81  | 17.95  |
| <b>Acreage (Thou Acres)</b>   |        |        |        |        |
| Total Base                    | 15,823 | 15,531 | 14,567 | 14,500 |
| Reduced-ARP                   | 2,315  | 3,300  | 3,200  | 1,400  |
| Reduced-PLD                   | 1,287  | 0      | 0      | 0      |
| Conservation Reserve          | 0      | 100    | 800    | 400    |
| PLTD by Participants          | 8,110  | 9,360  | 9,213  | 9,717  |
| PLTD by Nonpart               | 2,575  | 685    | 1,203  | 2,423  |
| Total Planted                 | 10,685 | 10,045 | 10,416 | 12,140 |
| Total Harvested               | 10,229 | 8,468  | 9,870  | 11,290 |
| Yield (Lb./Acre)              | 630    | 552    | 695    | 648    |
| <b>Supply (Thou Bales)</b>    |        |        |        |        |
| Beginning Stocks, 8/1.        | 4,102  | 9,348  | 5,030  | 4,401  |
| Production                    | 13,432 | 9,731  | 14,281 | 15,242 |
| Imports                       | 33     | 2      | 10     | 32     |
| Total Supply                  | 17,567 | 19,081 | 19,321 | 19,675 |
| <b>Use (Thou Bales)</b>       |        |        |        |        |
| Mill Use                      | 6,399  | 7,450  | 7,799  | 7,348  |
| Exports                       | 1,960  | 6,684  | 7,200  | 6,799  |
| Total Use                     | 8,359  | 14,134 | 14,999 | 14,147 |
| End Stocks (Thou Bales)       | 9,348  | 5,030  | 4,401  | 5,528  |
| End Stocks/Use Percent        | 112    | 36     | 29     | 39     |

Crop Year Ending 7/31.

Sources: Actual 85/86,86/87, USDA Projection 87/88, Model Baseline 88/89.

The total base acreage was estimated at 14.5 million acres. The base has been reduced because around one million acres, largely in the Southwest, have already been placed under the conservation reserve program (CRP) since 1986. Further, the effective base is estimated to be much less than the total (Skelly, 1984). The anticipated ARP reduced acreage was estimated at 1.4 million acres. The acreage planted by participating farmers was estimated at 9.72 million, and at 2.42 million for non-participating farmers. The baseline projection of the total planted and harvested acreages were 12.14 million and 11.29 million, respectively, assuming a normal harvest-to-planting ratio of 93 percent.

A yield of 648 pounds per acre was projected for the baseline. Although highly variable, yields have trended upward sharply since dipping down to 404 pounds in 1980/81, and reaching a record high of 695 estimated for 1987/88. Production technology has advanced rapidly in recent years. Growers are striving for higher yields to lower production costs per pound. Also cotton yield tends to increase as more productive land is planted and more marginal land is taken out of production to comply with the ARP and CRP programs. The average yield of base acreage placed under ARP and CRP programs is rather low.

For 1987/88 ending stocks, the USDA December estimate of 4.4 million bales was used. Using the 1988/89 acreage and yield projections, a 15.24 million bale cotton crop is expected. This adds up, with imports, to a total supply of 19.68 million bales for the year. In projecting consumption, the model baseline estimate included 7.35 million bales for domestic use, and exports of 6.80 million bales. Both domestic use and exports were projected to decline, with total usage dropping from 15 million in 1987/88 to 14.15 million in 1988/89. Even with this decline, 1988/89 demand projection is still much stronger than in recent years before the marketing loan was implemented in 1986.

Much of the expected weakness in domestic use is due to continued strong textile imports and prospects for a slow down in U.S. economic growth for the coming crop year. Exports are projected to slip, largely due to some anticipated increase in foreign production and a slow-down in foreign consumption in response to the higher price level in 1987/88.

Given these supply-demand projections, the baseline solution points to an ending carryover stock of 5.53 million for 1988/89, which is substantially higher than the 4.00 million bale program target. As a result, the stock-to-use ratio in percentage terms is expected to rise to 39, nearly 10 percentage points higher than the projected 29 percent for the 1987/88 crop. This suggests a lower price for cotton, while government program costs should remain high for the year.

#### UNCERTAINTY EFFECTS

In order to evaluate uncertainty, the results of four alternative scenarios were compared to the baseline projection for the 1988/89 crop year. Selected economic indicators of production, mill use, exports, total usage, ending stocks, and stock-to-use ratios in percentage terms, for the baseline and the alternative scenarios of strong demand, low yield, weak demand, and high yield are presented in Table 2.

Of the four scenarios, strong demand and low yield lead to lower ending stocks, while weak demand and high yield have the opposite effect (Figure 3). When simulation results are discussed, these two types of scenarios are presented in two separate categories, of reduced supply and surplus conditions.

Under the strong demand scenario, the projected cotton production for 1988/89 is 15.33 million bales, remaining close to the baseline projection of 15.24 million bales. On the other hand, the low yield scenario, assuming cotton output per acre at 564 pounds, 84 pounds below baseline, has cotton production falling to 13.28 million bales (Figure 4).

Table 2.  
 Summary of Uncertainty Effects on U.S. Cotton Industry  
 Baseline vs. Strong Demand, Low Yield, Weak Demand  
 and High Yield Projections, 1988/89 Crop Year

|                                   | Base-<br>Line | Strong<br>Demand | Low<br>Yield | Weak<br>Demand | High<br>Yield |
|-----------------------------------|---------------|------------------|--------------|----------------|---------------|
| -- Million (net 480 lbs) Bales -- |               |                  |              |                |               |
| Production                        | 15.24         | 15.33            | 13.28        | 15.15          | 17.21         |
| Mill Use                          | 7.35          | 8.19             | 7.34         | 6.51           | 7.36          |
| Exports                           | 6.80          | 7.64             | 6.76         | 5.96           | 6.83          |
| Total Usage                       | 14.15         | 15.83            | 14.10        | 12.47          | 14.19         |
| Ending Stocks                     | 5.53          | 3.88             | 3.61         | 7.17           | 7.45          |
| -- Percentage (ratio x 100) --    |               |                  |              |                |               |
| Stocks/Use<br>Ratio x 100         | 39            | 25               | 26           | 58             | 52            |

Source: model projections

The strong demand scenario points to a total usage of domestic mill and exports of 15.83 million bales, compared to 14.15 million bales baseline projection. By contrast, the low yield scenario shows a total demand of 14.10 million bales, virtually unchanged from baseline (Figures 5,6).

Under strong demand and low yield scenarios, cotton ending stocks are expected to be substantially lower than the baseline, at 3.88 million and 3.61 million, respectively. Even with such a decline, projected carryover stocks would only be slightly lower than the 4.0 million bale program target. The stocks-to-use ratio in percentage terms for these two scenarios would be 25 and 26, indicating tighter supply condition in relation to demand, and a stronger price picture than the 39 percent projected for the baseline.

By contrast, the weak demand and high yield scenarios project total cotton production at 15.15 million bales and 17.21 million bales for 1988/89, respectively. The high yield projection assumes 731 lbs. cotton output per acre, leading to a nearly 2 million bale increase in cotton production over the baseline.

Usage projection under the weak demand scenario shows a drop of 1.68 million bales from the baseline total of 14.15 million, while the high yield projection is little different from the baseline. Reflecting weak demand and high yield, ending stocks for the season climb to 7.17 and 7.45 million bales respectively. Given these sizes of increase, ending carryover stocks as percentages of use reach 58 and 52 by the end of 1988/89. This suggests a rebuilding of surplus stock and weak market price condition, in contrast to the 39 percent stock-to-use ratio projected for the baseline.

Given the demand and yield uncertainties, it is useful to evaluate the deviations of projected ending stocks for each scenario from the initial program target of 4.0 million bales set by the 1985 farm bill.

A comparative analysis of the projected stocks of baseline and the four alternative scenarios, show significant departures from the 4.0 million bale program goal (Table 3). Even under the baseline projection, which assumes a 12.5 percent ARP and a projected 80 percent participation rate, 1988/89 cotton stock would be 1.53 million bales higher than the target. This implies an additional acreage reduction of 1.13 million acres would be needed.

For weak demand and high yield scenarios, the projected ending stocks would be 3.17 and 3.45 million bales higher than the target. The implied adjustments indicate total acreage needed to be taken out of production range from 3.76 million acres for weak demand and 3.66 million for the high yield scenario. Upon comparison with the baseline projection, this suggests additional acreage reductions of 2.36 and 2.26 million acres, respectively, for the 1988/89 crop season.

The additional adjustments needed to approach 4.0 million bales ending stocks target would require very strong cotton program provisions. For baseline projection an additional 10 percent acreage reduction over the 12.5 percent ARP would be needed. It is doubtful, however, that producers would be willing to participate in such a large



Table 3.  
 Acreage Adjustments Needed to Meet  
 4.0 Million Bales Target of Cotton Ending Stocks  
 Baseline vs. Alternative Projections, 1988/89 Crop Year

|  | Base-<br>Line | Strong<br>Demand | Low<br>Yield | Weak<br>Demand | High<br>Yield |
|--|---------------|------------------|--------------|----------------|---------------|
| -----Ending Stocks: Million Bales-----     |               |                  |              |                |               |
| Projection                                 | 5.53          | 3.88             | 3.61         | 7.17           | 7.45          |
| Target                                     | 4.00          | 4.00             | 4.00         | 4.00           | 4.00          |
| Difference                                 | +1.53         | -0.12            | -0.39        | +3.17          | +3.45         |
| --Needed Acreage Adjustments: Mil. Acres-- |               |                  |              |                |               |
| Implied Total                              | -2.53         | -1.31            | -1.07        | -3.76          | -3.66         |
| 12.5 Percent<br>ARP                        | -1.40         | -1.40            | -1.40        | -1.40          | -1.40         |
| Additional<br>Adjustment                   | -1.13         | +0.09            | +0.33        | -2.36          | -2.26         |

Source: model projections

acreage reduction program voluntarily in order to qualify for program benefits. Therefore, a paid land diversion program would probably be needed to attract a high level of program participation.

Weak demand and high yield scenarios require even larger acreage cutbacks, up to a total of a third, or about 20 percent more than the 12.5 percent ARP designated for 1988/89.

For uncertainty evaluation, there is also possibility of strong demand and low yield situations, the scenarios arising either from weather-induced production shortfalls, or improved macroeconomic in U.S. or abroad.

The strong demand and low yield scenarios would draw ending stocks a little below the target level. Acreage would need to be increased about 90,000 under strong demand and expanded by 330,000 under low yield to match the target 4.0 million bales of cotton.

Obviously, tight supply and high prices would result under strong demand and low yield conditions. This scenario would give man-made fibers a competitive edge and stimulate foreign production expansion. U.S. program participation would also fall as would total cotton program costs to the government.

The uncertainty effect can best be evaluated with regard to the overall performance of the U.S. cotton industry. For analysis of the aggregate impact, Memphis price, cash receipts from cotton marketing and CCC loan, government program payment, and gross farm income are selected. The results, as measured by the differences of alternative projections from baseline, are presented in Table 4.

Table 4. Memphis Price, Cash Receipts and Government Costs  
Difference Between Alternative Projections and Baseline  
1988/89 and 1989/90 Crop Years

|   | Strong<br>Demand | Low<br>Yield | Weak<br>Demand | High<br>Yield |
|---|------------------|--------------|----------------|---------------|
| Memphis Price, cents/lb.                  |                  |              |                |               |
| 1988/89                                   | 9.50             | 10.25        | -10.64         | -10.25        |
| 1989/90                                   | 9.77             | 8.24         | -10.97         | -8.22         |
| Average                                   | 9.64             | 9.25         | -10.81         | -9.24         |
| Cash Receipts, <sup>1</sup> mil. \$       |                  |              |                |               |
| 1988/89                                   | 377              | -133         | -417           | 35            |
| 1989/90                                   | 410              | 291          | -444           | -290          |
| Cumulative Total                          | 787              | 158          | -861           | -255          |
| Government Payments, <sup>2</sup> mil. \$ |                  |              |                |               |
| 1988/89                                   | -128             | -137         | 143            | 137           |
| 1989/90                                   | -293             | -289         | 291            | 289           |
| Cumulative Total                          | -421             | -426         | 434            | 426           |
| Gross Incomes, <sup>3</sup> mil. \$       |                  |              |                |               |
| 1988/89                                   | 249              | -270         | -274           | 172           |
| 1989/90                                   | 116              | 2            | -152           | -2            |
| Cumulative Total                          | 365              | -268         | -426           | 170           |

Source: Model projections

<sup>1</sup> Cash receipts from cotton marketings plus net loan receipts.

<sup>2</sup> Deficiency payment.

<sup>3</sup> Cash receipts from cotton marketings and net loan receipts plus deficiency payment.

The effect of strong demand and low yield on the Memphis market price are about the same, 9.64 cents and 9.25 cents per pound average higher price levels for both 1988/89 and 1989/90 crop years versus the baseline projection. On the other hand, weak

demand and high yield projections represent a price that is 10.81 cents and 9.24 cents per pound under the baseline (Figure 8). The total price range between strong demand and low yield levels, and the weak demand and high yield price is roughly 20 cents per pound.

The greatest impact on boosting cash receipts from marketings plus net loan receipts is clearly the strong demand situation (Figure 9). The two year cumulative impact amounts to \$787 million over baseline. The low yield impact is \$158 million, with receipts reduced \$133 million in 1988/89 but posts a \$291 million gain the following year.

The largest decrease from the baseline of the four alternatives shows weak demand reducing receipts by a two-year total of \$861 million, with the declines about equal each year. Because of lower price, the high yield situation drops cash receipts a total of \$255 million over the two years, with the second year carrying the brunt of the decline. Clearly, cash receipts to farmers fare the best under strong demand and the worst under weak demand.

Government payments are reduced about equal under strong demand and low yield projections, \$421 million and \$426 million, respectively (Figure 10). And, payments increase about equal, given the weak demand and high yield scenarios, \$434 million versus \$426 million.

The highest gross income--cash receipts, net loan receipts and deficiency payments--total \$365 million above the baseline projection for strong demand over the two seasons (Table 4). By contrast, weak demand registers the lowest gross income, \$426 million less than the baseline projection. The high yield scenario turns out second best at \$170 million. Low yield comes in third but still \$268 million less than baseline (Figure 11).

Farm cash receipts are boosted the most by strong demand. Favorable demand expansion also reduces government payments substantially. The largest loss in receipts

and the largest increase in government payments stems from weak demand. Low yield posts the biggest reduction in payments by a small margin over strong demand. In both cases, government payments are reduced the most in the second year. The high yield scenario projects a heavy burden on government payments due to low market price.

### CONCLUDING REMARKS

Results from this study indicate that the cotton industry and the government both should strive to expand consumption and to reduce uncertainty impacting supply. Farm cash receipts increase and program costs drop sharply under strong demand conditions, reasonable supplies and higher market prices. In contrast, weak demand, abundant supplies and depressed price levels are costly to the industry and government.

Because of yield and demand uncertainties, administering the 1985 cotton program in line with the 4.0 million bale target will be difficult. When demand versus supply is strong and/or yields low, a fairly small acreage set-aside may hold ending stocks near the target. When yields, however, are average to above trend, or demand weak, ending stocks can become burdensome and government costs soar upward.

At times when unforeseen uncertainties in yields, or markets push ending stocks far above target, a large acreage set-aside is needed. To reach the required reduction, a combination of ARP and paid land diversion may be the most effective in reducing acreage and government costs. This is because depressed price levels can increase program payments substantially under the marketing loan provisions. Without a clear signal that stocks will be brought in line with demand in the next season, program costs can more than double the second year of plentiful stocks.

The marketing loan has been very effective in making the U.S. cotton industry competitive worldwide. However, higher market prices can lead to abundant stocks within a crop year. As a result, price levels could drop below the loan rate, leading to additional government outlays due to loan repayment levels under loan.

For policy decisions, the uncertainties of production, demand and price levels suggest the importance for the administration to develop contingency plans for program implementation. Market prices will continue to be very volatile. Cotton producers and buyers should prepare marketing and purchasing plans to minimize income risk.

## REFERENCES

1. Anderson, C.G. and Mechel Paggi. 1986. "Marketing Loan Impacts - Rice and Cotton." Increasing Understanding of Public Problems and Policies - 1986. Farm Foundation, Oak Brook, Illinois, pp. 47-60.
2. Chen, Dean T. 1987. "An Integrated Cotton Model with Interactions Between Domestic Program and International Market." Proceedings of the Beltwide Cotton Economics and Marketing Conferences, Dallas, Texas.
3. Chen, Dean T. and Carl G. Anderson, 1987. "Impact of Cotton Marketing Loan Program on Cash and Futures Price Movement." Symposium on Options, Futures, and Agricultural Commodity Programs, ERS/USDA, Commodity Futures Trading Commission and Farm Foundation, Arlington, Virginia.
4. Chen, Dean T. and David Bessler, 1987. "Forecasting the U.S. Cotton Industry: Structural and Time Series Approaches." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management, Chicago Mercantile Exchange, Chicago, Illinois.
5. Glaser, Lawrence K. 1986. Provisions of the Food Security Act of 1985, Agricultural Information Bulletin #498, ERS/USDA.
6. Klein, L. 1981. "The Value of Models in Policy Analysis." A Symposium Sponsored by the Federal Reserve Bank of Kansas City, Modeling Agriculture for Policy Analysis in the 1980s, Kansas City.
7. Sims, Christopher A. 1982. "Policy Analysis with Econometric Models." Brookings Papers on Economic Activity. 1:1982, pp. 107-164
8. Skelly, Carol. 1984. "Review of the Upland Cotton Acreage Base." Cotton and Wool Outlook and Situation Report, ERS/USDA.
9. Skinner, Robert. 1987. "U.S. and World Cotton Outlook." Annual Agricultural Outlook Conference, Outlook '88, Session #10, USDA, Washington, D.C.
10. Starbird Irving R., E.H. Glade, Jr., W.C. McArthur, F. T. Cooke, Jr., T. Townsend. 1987. The U.S. Cotton Industry, Agricultural Economic Report No. 567, ERS/USDA.

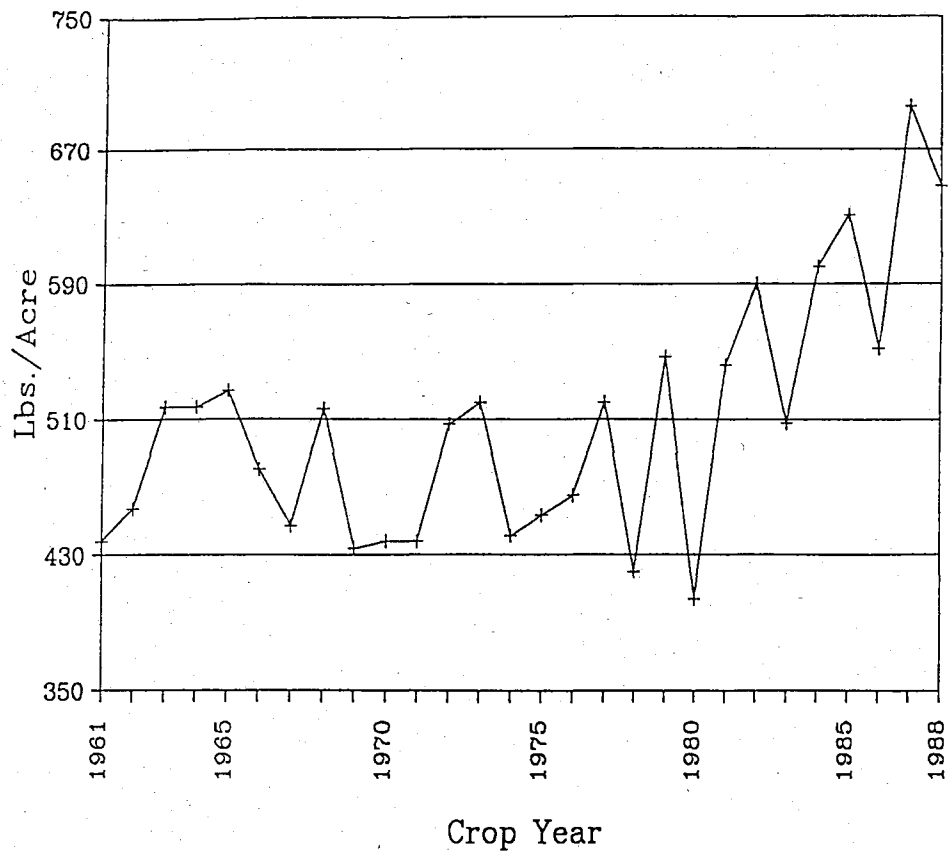


Figure 1. U.S. Cotton Yields, 1961-1988.

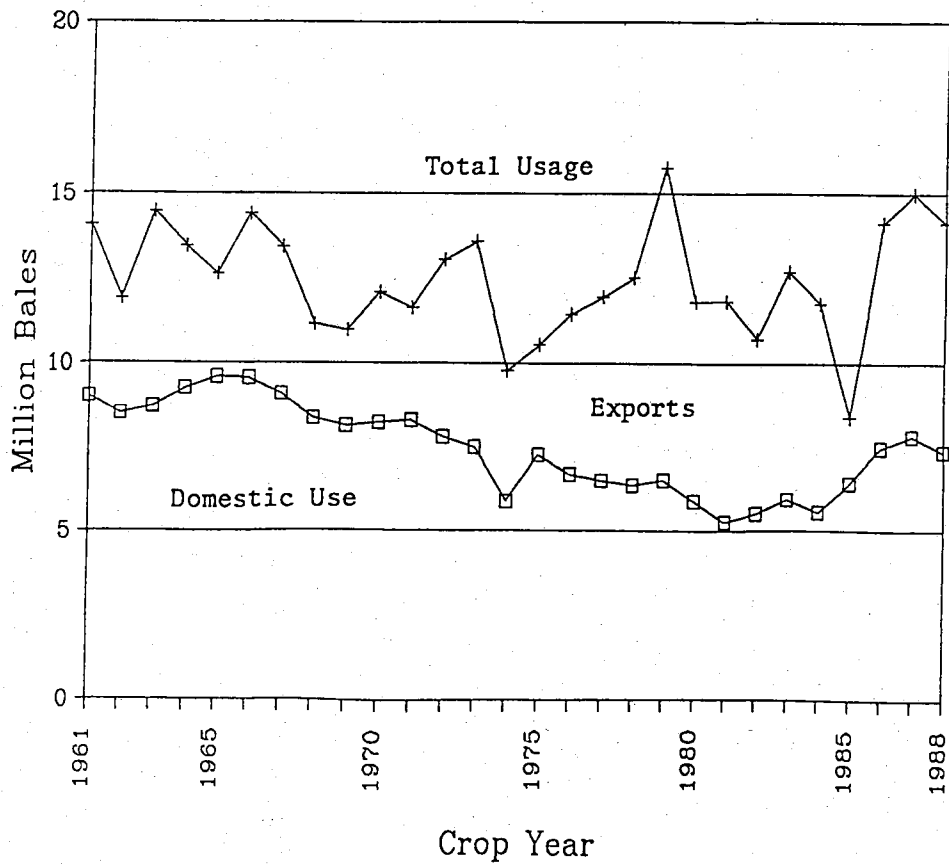


Figure 2. U.S. Cotton Usage: Domestic and Exports, 1961 - 1988.

Figure 3. Ending Stocks Projections, U.S. Cotton, 1988 Crop.

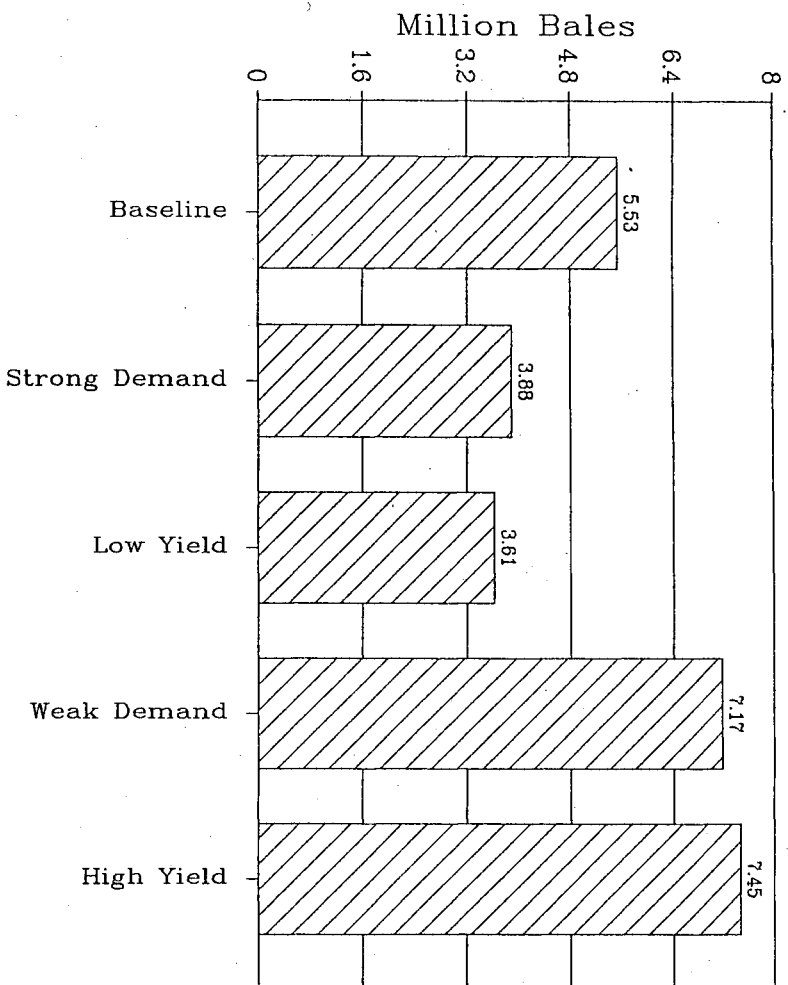
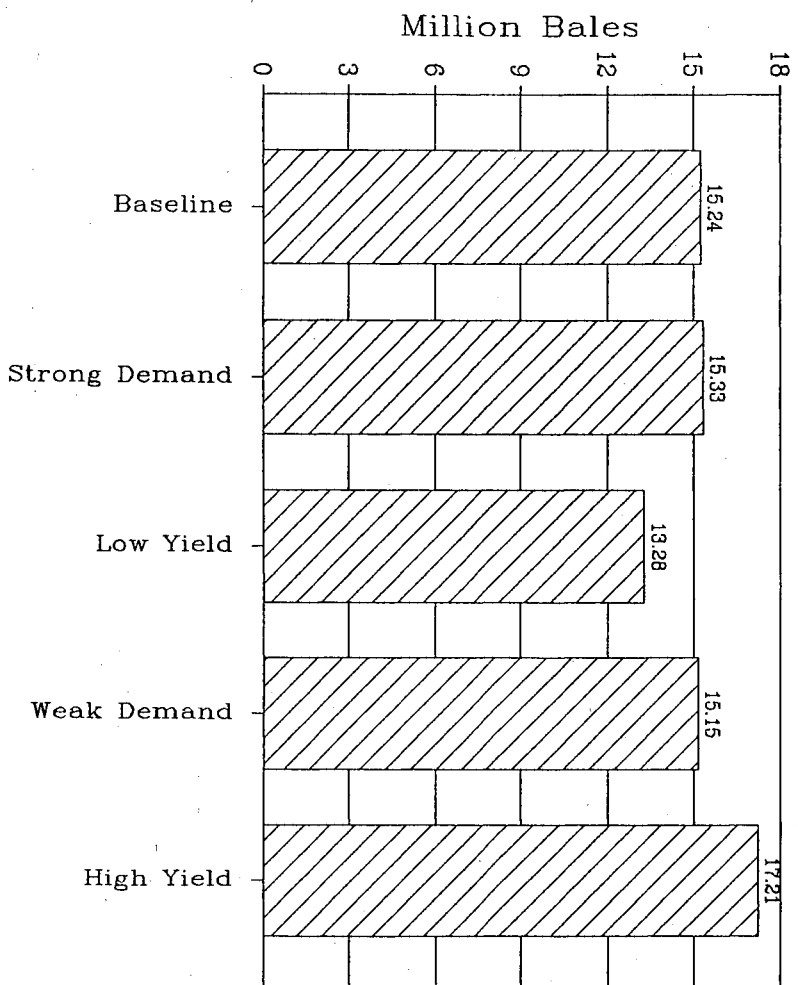


Figure 4. Production Projections, U.S. Cotton, 1988 Crop.





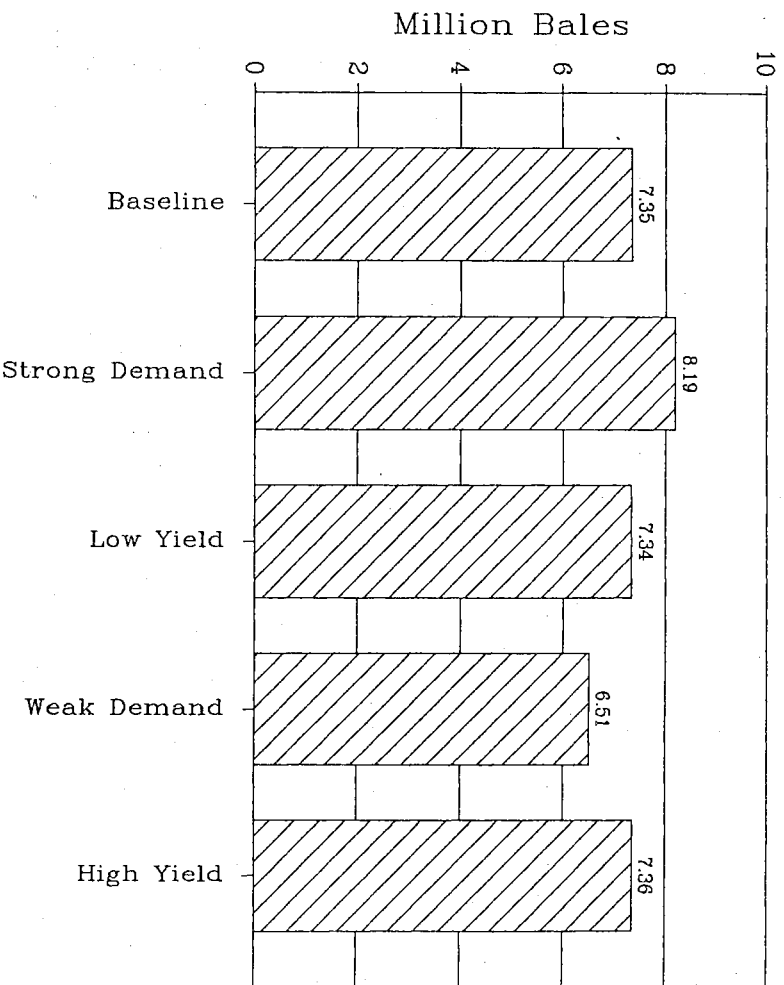


Figure 5. Mill Use Projections, U.S. Cotton, 1988 Crop.

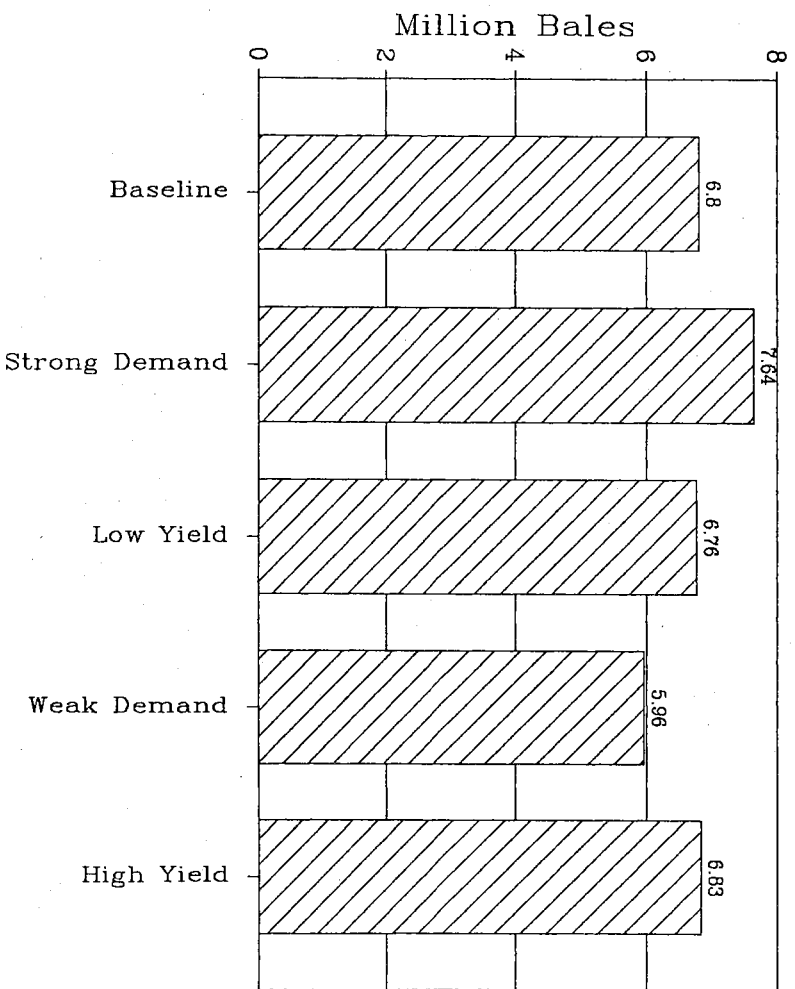


Figure 6. Export Projections, U.S. Cotton, 1988 Crop.

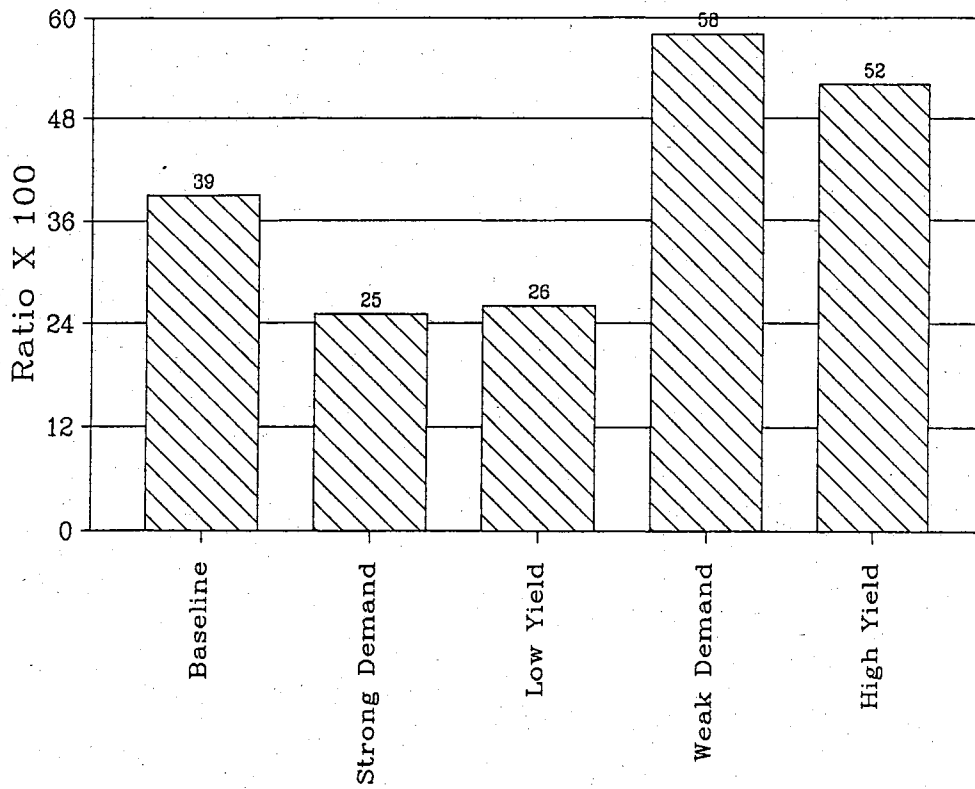


Figure 7. Stocks-to-Use Ratio Projections, U.S. Cotton, 1988 Crop.

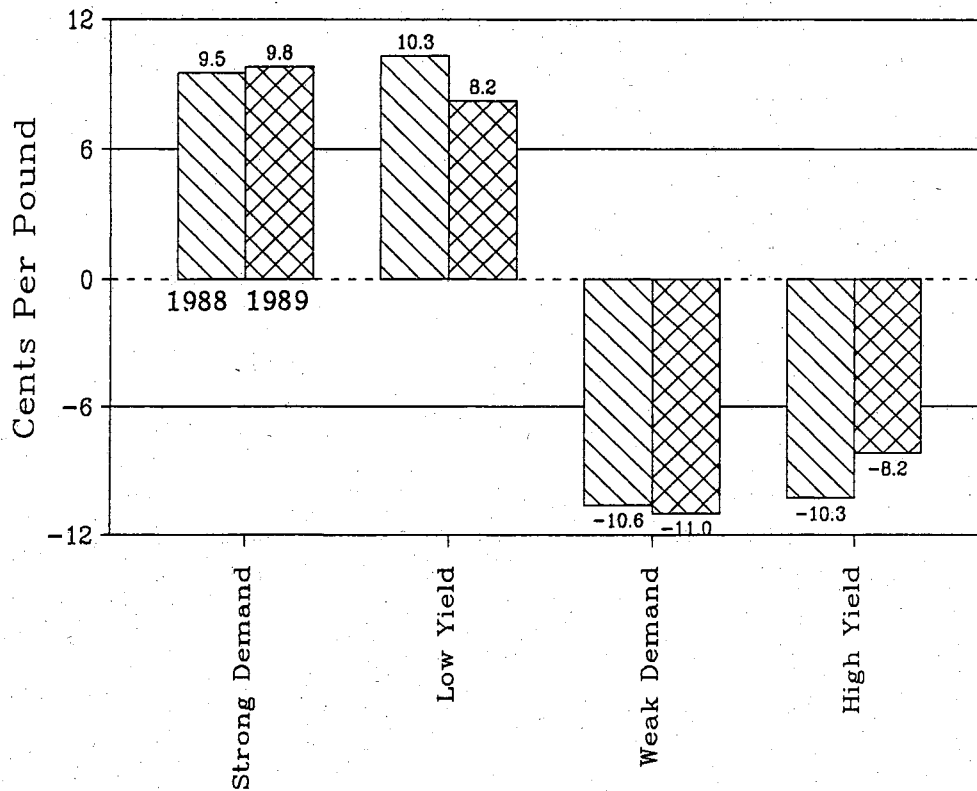


Figure 8. Difference in Memphis Price for Alternative Projections from Baseline 1988 and 1989 Crops.

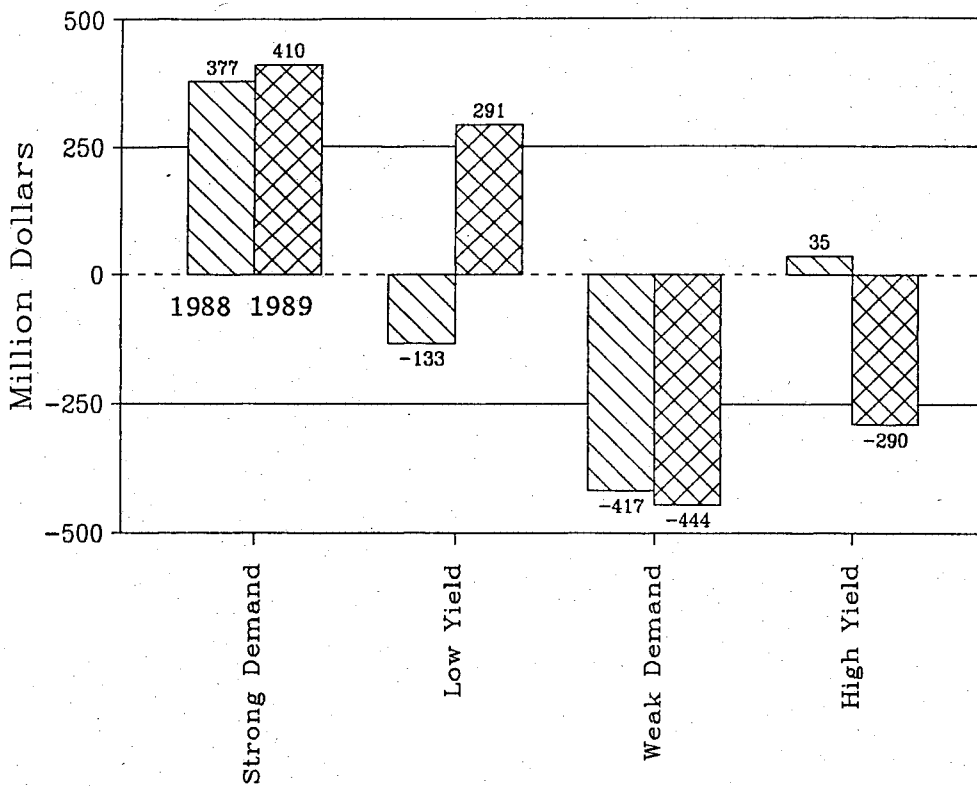


Figure 9. Difference in Cash Receipts for Alternative Projections from Baseline 1988 and 1989 Crops.

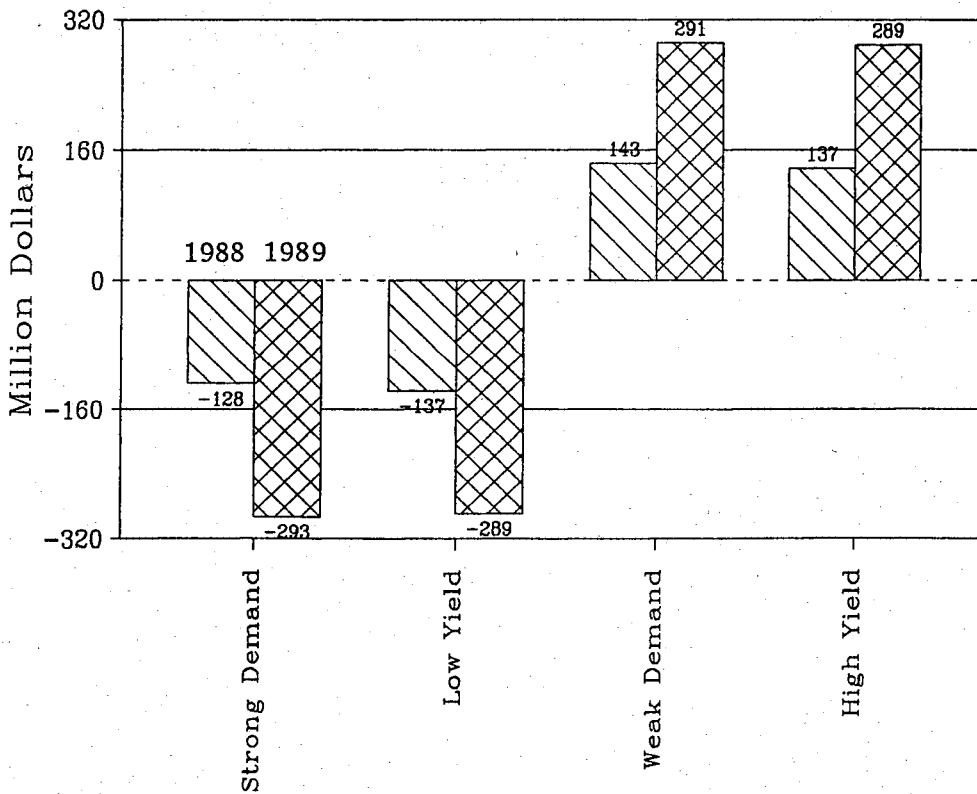


Figure 10. Difference in Government Payments for Alternative Projections from Baseline 1988 and 1989 Crop Years.

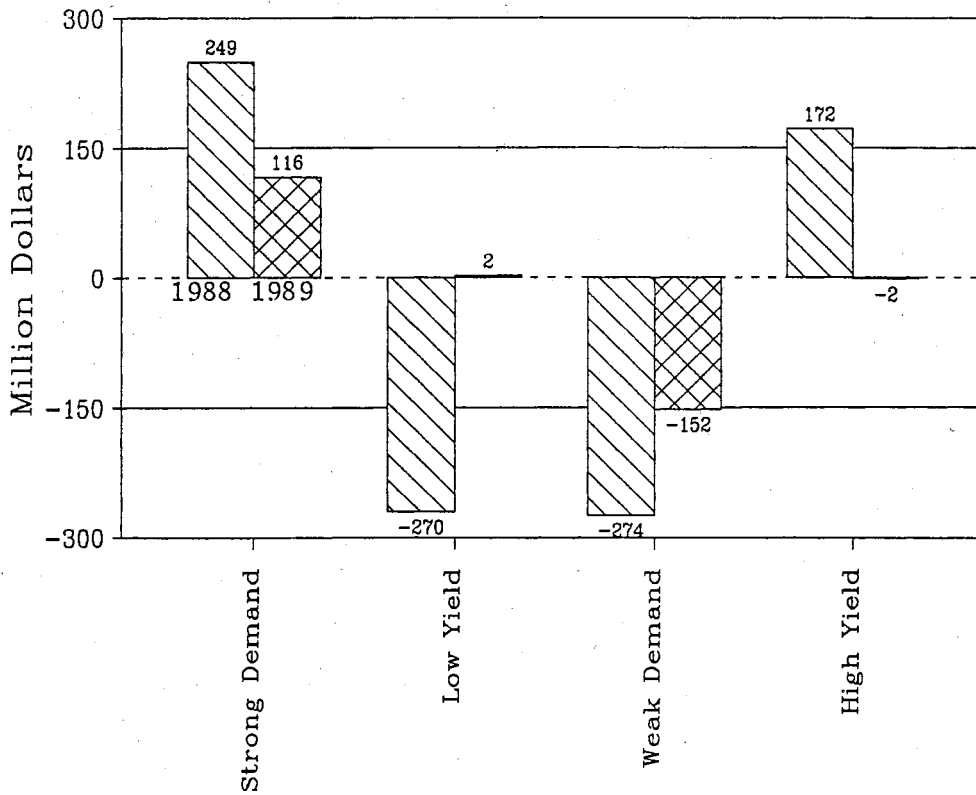


Figure 11. Difference in Gross Incomes for Alternative Projections from Baseline 1988 and 1989 Crop Years.

Mention of a trademark or a proprietary product does not constitute a guarantee or a warranty of the product by The Texas Agricultural Experiment Station or The Texas Agricultural Extension Service and does not imply its approval to the exclusion of other products that also may be suitable.

All programs and information of The Texas Agricultural Experiment Station and The Texas Agricultural Extension Service are available to everyone without regard to race, color, religion, sex, age, handicap, or national origin.