

## STRUCTURE OF THE FAPRI COTTON MODEL

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### Abstract

The Food and Agricultural Policy Research Institute (FAPRI) maintains a structural econometric model for the world cotton market. The model covers thirteen countries and regions with approximately 200 equations. The U.S. component incorporates relevant policy parameters into regional supply response equations. Demand equations are estimated for mill use and commercial stock holdings. For the U.S., the aggregate supply elasticity is 0.46 and aggregate demand has an own-price elasticity of -0.49.

### Introduction

Large-scale econometric models are maintained by FAPRI for the purposes of making long-term projections for U.S. and world agriculture. These projections then serve as a basis for which scenarios can be measured against. FAPRI uses the models as tools for providing policy analysis to the U.S. Congress. A model for world cotton consisting of approximately 200 equations and covering thirteen countries and regions is included in the system.

### Theoretical Background

Microeconomic theory provides the basis for the specifications used in the cotton model. Theory concerning supply response provides the foundation for the acreage equations. Mill demand is a derived demand specification including the cotton price, input prices such as fuels and wages, and a textile price as a proxy for the output price. Commercial stocks are estimated as a function of the cotton price and production. Future cotton production is also included in the equation as a proxy for price expectations.

### Data Requirements

The model is developed using annual observations covering the period 1967 to 1994. Data sources are U.S. Department of Agriculture (USDA) publications.

### Empirical Results

The equations are estimated using simultaneous estimation techniques such as Two Stage Least Squares (2SLS). Given the estimated parameters, elasticities are calculated using the mean values of the historical data. The own-price elasticity for U.S. cotton acreage is estimated at 0.46 (Table

1). Regional elasticities show the Delta States to be the least responsive with the Far West being the most responsive. On the demand side, mill demand is found to be most price inelastic of the demand categories with exports being the most responsive (Table 2).

### Impact Multipliers

One of the most important tests of a model is the response to exogenous shocks. These responses are represented by impact multipliers. The magnitude of the multipliers reflect the supply and demand elasticities in the model. For example, a 20-pound increase in cotton yield is found to have a short-run price impact of -1.98 cents per pound.

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Table 1. U.S. Acreage Elasticities

Price	U.S.	Delta States	Southern Plains	Far West	Other U.S.
Cotton	0.46	0.37	0.48	0.73	0.40
Soybeans	-0.05	-0.08			-0.16
Sorghum	-0.08		-0.19		-0.01
Wheat	-0.02				-0.01
Corn	-0.05				-0.21

Table 2. U.S. Demand Elasticities

Price	Mill Use	Stocks	Exports	Total Demand
Cotton	0.46	0.37	0.48	0.73