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# Interaction Effects of Promotion, Research, and Price Support Programs for U.S. Cotton

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# Objectives

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- **Examine Nature of Interaction Effects**
- **Empirically Determine Magnitude**
- **Implications**

# Agricultural Commodity Markets

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- **Government Programs**
  - **Support Prices**
  - **Supplement Incomes**
  - **Manage Supplies**
- **“Checkoff” Programs**
  - **Increase Commodity Demand**
  - **Increase Producer Profits**

# Checkoff Programs

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- **Producers Vote to Institute**
- **Producers Retain Right to End Programs**
  - **Pecans**
  - **Limes**
  - **Pork**
- **Need for Estimates of Returns**

# U.S. Cotton

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- **Substantial Checkoff Program**
  - **\$67 million in 2000**
- **Market with Large Subsidies for:**
  - **Cotton Producers**
  - **Consuming Textile Mills**

# Cotton Research and Promotion Program

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- **Background**

- **1966 Cotton Research & Promotion Order**
- **1990 Amendments**

- **Activities**

- **Promotion (~66% of Budget)**
- **Fiber and Textile Research (~16%)**
- **Agricultural Research (~11%)**

# Selected Federal Farm Programs for Cotton

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- **Cotton Producers**
  - **Marketing Assistance Loans**
  - **Loan Deficiency Payment (LDP)**
- **Textile Mills**
  - **Step 2 Program**

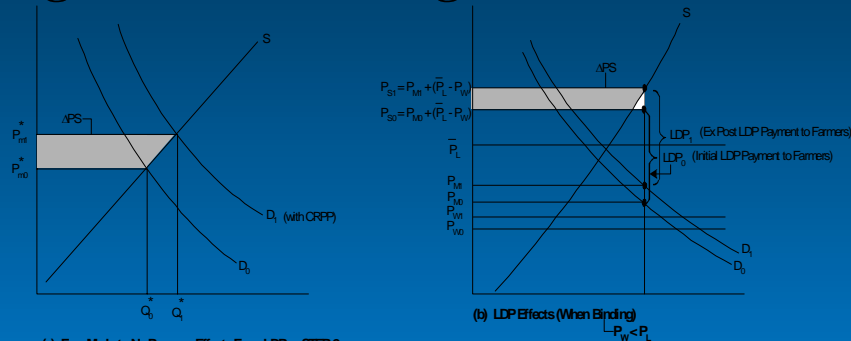
# Effective Prices

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- **Demand Price**
  - **Net of Step 2 subsidy**
- **Supply Price**
  - **Expected price (including per-unit government payments)**

# Farm Program Interactions

Figure 2. Farm Program Interactions

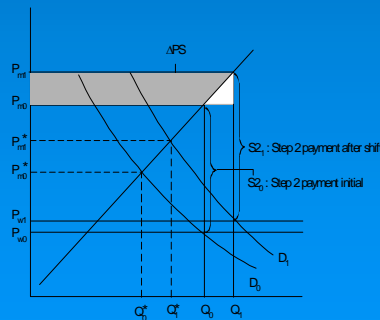


(a) Free Market: No Program Effects From LDP or STEP 2

Here  $P_m^*$  = Market Price = Supplier Price = Demand Price  
 $\Delta PS$  = Producer Benefits from Demand Shift

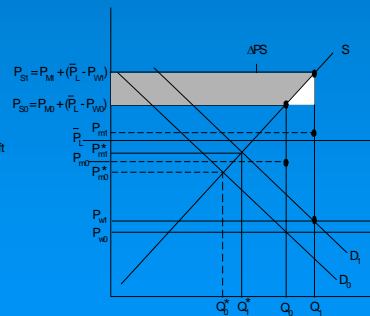
(b) LDP Effects (When Binding)

$P_M$  = Market Price = Demand Price  
 $P_S = P_W + (\bar{P}_L - P_W)$  = Supply Price  
 $P_W$  = World Price, where  $P_W = F(P_A)$   
 $\bar{P}_L$  = LDP Rate (Fixed)  
 (Shift effects on producer price)  
 $\Delta P_S = (P_S - P_M) = (P_M - P_M) - (P_W - P_W) = \Delta P_M - \Delta P_W$   
 Since  $\Delta P_W > 0$ , then  $\Delta PS < \Delta PM$  (Also  $LDP_1 < LDP_2$ )  
 Calculate  $\Delta P_S$  accordingly



(c) Step 2 Program Effects

$P_m$  = Market Price = Supply Price  
 $P_w$  = World Price = Demand Price (Demanders are guaranteed to pay world price + \$0.0125)  
 (Shift Effects)  
 $\Delta P_M$  is larger than it would be in a free market ( $\Delta P_M^*$ )  
 $\Delta Q$  is larger than it would be in a free market ( $\Delta Q^*$ )



(d) Combined Effects of LDP & Step 2

$P_s$  = Supply Price =  $P_w + (\bar{P}_L - P_w)$   
 $P_w$  = Demand Price = World Price (Guaranteed + \$0.0125—not depicted)  
 $P_M$  = "Market" Price, though it is neither a supply nor a demand price  
 $P_m^*$  = Free market price  
 (Shift Effects)  
 $\Delta P_S < \Delta P_M$ , but  $\Delta P_M$  vs  $\Delta P_M^*$  is an empirical issue

# Data

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- **Market data (prices, quantities, etc...)**
  - **Cotton and Wool Outlook, Cotton Council, Cotton Incorporated, BLS**
- **Macroeconomic and trade data (GDP, imports/exports)**
  - **OECD, Cotton and Wool Outlook**
- **Cotton Research and Promotion Program expenditures**
  - **Cotton Incorporated**
- **Farm Program data (LDP, Step 2,...)**
  - **USDA**

# Econometric Model of US Cotton Market

Market Component	Dependent Variable	Explanatory Variables *
<b>Raw Cotton Demand – Domestic</b>	Domestic mill use per capita	Price of US cotton Price of substitute fibers Macro variables CI Promotion Expenditures CI Non-Ag Research Expenditures
<b>Raw Cotton Demand – Exports</b>	U.S. exports	Price of US cotton Price of substitute fibers Macro variables
<b>Raw Cotton Supply – Domestic</b>	U.S. cotton production	Price of cotton (futures) Lagged input price Trend

\* Adjustments for time lag effects and seasonality

# Econometric Estimation Results

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- **Model Performance**
  - **Theoretical consistency**
    - ✓ **Price effects as expected**
    - ✓ **Domestic and foreign cotton are substitutes**
    - ✓ **Export demand and import supply more elastic than domestic supply & demand**
  - **Rigorously tested lag structures**

# Regression Results: Domestic Demand

Independent Variable	2SLS & First-Order Autocorrelation		
	Parameters	t-values	Elasticity
CONSTANT <sub>t</sub>	1.75181	2.07	
PCOTTON <sub>t</sub>	-0.01089	-3.21	-0.413
PPOLY <sub>t</sub>	-0.00361	-1.65	-0.129
PRAYON <sub>t</sub>	0.00261	1.50	0.137
DTEXWAGE <sub>t</sub>	-0.13169	-0.87	-0.453
WPCOTTON <sub>t</sub>	0.01264	4.08	0.427
DECI <sub>t</sub>	-0.00723	-2.14	-0.256
DPI <sub>t</sub>	-67879.7	-0.87	-0.616
FGDP <sub>t</sub>	0.000061	0.79	0.309
SAGPROM <sub>t</sub>	2.12E-08	2.00	0.023
SAGNARES <sub>t</sub>	5.12E-07	4.72	0.152
SAGNARES <sub>t-1</sub>	7.30E-08	0.68	0.022
SAGNARES <sub>t-2</sub>	2.79E-07	2.75	0.083
SAGNARES <sub>t-3</sub>	3.16E-07	3.06	0.094
rho	0.19303	2.62	
N	176		
R <sup>2</sup>	0.7990		
R <sup>2</sup> -bar	0.7671		
DW	2.0318		

# Regression Results: Export Demand

Independent Variable	2SLS and First-Order Autocorrelation		
	Parameters	t-values	Elasticity
CONSTANT <sub>t</sub>	338.440	0.77	
EXPORTS <sub>t-1</sub>	0.601	9.27	0.601
PCOTTON <sub>t</sub>	-6.757	-1.98	-0.692
PPOLY <sub>t</sub>	0.748	0.31	0.072
WPCOTTON <sub>t</sub>	7.266	2.23	0.732
DECI <sub>t</sub>	-0.389	-0.13	-0.037
FGDP <sub>t</sub>	0.016	0.52	0.211
ROWSTK <sub>t</sub>	-3.790E-09	-0.57	-0.103
rho	0.07600	-0.53	
N	178		
R <sup>2</sup>	0.7540		
R <sup>2</sup> -bar	0.7290		
DW	1.8939		

# Regression Results: Domestic Supply

Independent Variable	OLS with Input Price Index		
	Parameters	t-values	Elasticity
CONSTANT <sub>t</sub>	18,957.7	1.49	
FPCOTTON <sub>t</sub>	103.8293	2.21	0.498
TREND <sub>t</sub>	301.9883	1.43	0.021
FINDEX <sub>t-1</sub>	-190.0750	-1.61	-1.099
N	25		
R <sup>2</sup>	0.5952		
R <sup>2</sup> -bar	0.5374		
DW	2.3368		

# Simulation of Interaction Effects

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- **Estimate Change in Price and Quantity for a Marginal Change in CRPP Expenditures**
  - **Neither LDP nor Step 2 binding**
  - **LDP binding**
  - **Step 2 binding**
  - **Both LDP and Step 2 binding**

# Effects of Interaction on Domestic Producer ROI

**Table 3. Effects of Interaction with Government Cotton Programs on Domestic Producer ROI, 1996-2000 (2000\$)**

<b>Marginal Benefits, Costs</b>	<b>Free Market</b>	<b>LDP</b>	<b>Step 2</b>	<b>LDP and Step 2</b>	<b>Weighted Average</b>
Net Producer Benefits, Promotion	\$1,339,915	\$1,065,155	\$2,081,637	\$1,473,021	\$1,611,416
Net Producer Benefits, Non Ag Research	\$18,871,694	\$15,365,473	\$28,341,000	\$20,570,558	\$22,337,780
Net Producer Benefits, Combined	\$20,166,529	\$16,384,866	\$30,380,092	\$21,998,879	\$23,905,031
Domestic Producer Costs, Promotion	\$290,084	\$290,084	\$290,084	\$290,084	\$290,084
Domestic Producer Costs, Non Ag Research	\$67,334	\$67,334	\$67,334	\$67,334	\$67,334
Domestic Producer Assessment, Combined	\$453,447	\$453,447	\$453,447	\$453,447	\$453,447
<b>Producer Benefits/Producer Costs, Promotion</b>	<b>4.6</b>	<b>3.7</b>	<b>7.2</b>	<b>5.1</b>	<b>5.6</b>
<b>Producer Benefits/Producer Costs, Non Ag Research</b>	<b>280.3</b>	<b>228.2</b>	<b>420.9</b>	<b>305.5</b>	<b>331.7</b>
<b>Producer Benefits/Producer Assessments, Combined</b>	<b>44.5</b>	<b>36.1</b>	<b>67.0</b>	<b>48.5</b>	<b>52.7</b>

# Farm Program Interactions

	<b>LDP program</b>	<b>Step 2</b>
<b>Interaction</b>	Dampens the price effect on domestic producers	Enhances the price effect on domestic producers
<b>Effect on Total ROI</b>	-20 %	+55%

# Summary

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- Cotton Program has a strong and positive effect on the demand for US Cotton
- Returns to producers substantially outweigh the costs
- Interaction effects have large impact on net return to demand-side CRPP activities
  - LDP
  - Step 2
  - Target Price

# Policy Implications

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- **Incentive for Establishing Research and Promotion Programs**
  - **May be reduced for commodities with nonrecourse Loans/LDPs**
    - ✓ **Few commodities with required support have R&P Programs**
    - ✓ **Commodities that do have R&P Programs tend to have unique support Programs**
    - ✓ **Commodities without required support continue to show interest in R&P**
  
- **2002 Farm Bill**