

Title: Government Payments: Economic Impact on Southeastern Peanut Farms

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## **Government Payments: Economic Impact on Southeastern Peanut Farms**

### **Abstract**

Southeastern peanut farms with diversified field crops utilize government payments to supplement market receipts. Production in 2002 represented growing conditions under adverse weather, while 2003 represented optimal conditions. Representative farm analysis provides insight into allocation of market receipts and government payments for meeting variable costs and fixed costs.

*Key Words:* peanut farms, government payments, farm income support, trade agreements, direct payments, countercyclical payments, loan deficiency payments

JEL Classifications: **Q12, Q18**

## **Government Payments: Economic Impact on Southeastern Peanut Farms**

Support of commodity prices and farm income has been an objective of U.S. agricultural policy since the 1930s. While beneficial for farmers and rural communities, subsidies have led to issues related to distortion of market signals through imbalances in price and production equilibrium. Commodity programs that link payments to current prices and production provide an incentive for producers to receive more payments by producing larger quantities of subsidized commodities. It follows that such linkages encourage farms to realize economies of size by increasing acreage per farm unit (USDA, ERS 2004b).

The *2002 Farm Act* continued and expanded provisions of the *1996 Farm Act* to increase market orientation of U.S. program crops by decreasing linkages with payments and the relationship of prices and production levels. Peanuts were added to the group of field crops covered by commodity programs, eliminating production limitations and market price supports. Direct payments (*DP*) for program crops in the *2002 Farm Security and Rural Investment (FSRI) Act* are completely decoupled from current prices and farm production. Payments are fixed and determined by historical acreage and yields with no decision by a farmer having a possibility to alter payment levels (USDA, ERS 2003b). Countercyclical payments (*CCP*) are fixed and determined similarly to direct payments, but payment is triggered when prevailing commodity prices are below a target price. As in the case for direct payments, individual farmer decisions do not alter countercyclical payment levels to the farm unit (USDA, ERS 2002a). A third source of payments for program crops is from the marketing loan program. Instead of receiving

marketing loan financial benefits, farmers may elect to receive benefits in the form of loan deficiency payments (*LDP*) that are determined by farm production and a payment rate that is based upon the difference between market price and the established loan rate (USDA, ERS 2004a). Consequently, *LDP* receipts have linkage between prices and production with payment levels increasing as farm production increases.

Domestic agricultural policy is increasingly subject to restrictions imposed by trade agreements between the U.S. and World Trade Organization (WTO) members. Compliance with many trade agreements are subject to member interpretation and disputes focus on whether or not a member's policy is categorized as least trade distorting (green box support) or most trade distorting (amber box support). Current U.S. policy does not include payments that are included in blue box support. Green box payments must have little or minimal trade distorting effects on production. There is no clear definition of "minimal" and many criteria for green box inclusion are subject to interpretation. Categorization into green box or amber box support is important because all amber box support is included in the aggregate measure of support (AMS) allocated to WTO members. Green box support has no limitations subject to AMS commitment levels (USDA, ERS 2002b).

Evaluation of U.S. agricultural programs involves aspects of achieving national priorities, as well as complying with trade agreements. One provision of *FSRI* is to maintain economic growth and infrastructure development in rural America (USDA, ERS 2003a). A desirable policy objective is to support rural economies while allowing for local market adjustments which indicate economic efficiency. Due to their composition, financial enhancement of rural economies generally involves support of farm income.

Multiplier effects that begin with farms, lead to impacts on suppliers, equipment dealers, service providers, and both agribusiness and general retailers. Financial soundness in all of these realms solidifies local tax bases that enable rural communities to achieve economic and social vitality.

Farm level analysis indicates the efficacy of agricultural policy in supporting farm income while demonstrating whether tendencies of individual farm units are to follow production practices that are not trade distorting. Evaluation of representative farms simulates outcomes for a range of market prices and realized yields under prevailing policies. Alternative policies may be evaluated, including exclusion of all commodity support, for determination of farm level impacts. Farm level impacts inform policy makers as to likely ramifications for rural communities where agribusinesses are important to local economies.

The purpose of this study is to evaluate current agricultural policy for peanut farms as established under *FSRI*. Peanut farms typically include rotation crops that are covered by commodity programs that are fundamentally similar. Thus, analysis of representative peanut farms provides a means to evaluate the entirety of policy for U.S. program crops. Specific objectives include determining levels of income support and potential consequences for trade distortions caused by artificially stimulating production.

### **Representative Farms**

The National Center for Peanut Competitiveness (NCPC) has developed representative southeastern peanut farms for analyzing impacts of potential adoption of alternative production technologies, environmental regulations, water usage, and other

changes related to peanut production. Each farm is developed by a panel of approximately six producers in a geographical location who have similar farm size and production practices. Panel members participate in focus group type interviews to reach a consensus representative farm for an area. Data for each representative farm is compiled in the form of budgeted operating costs for individual crops, while fixed costs are itemized components of a farm total. Farm costs are updated every second year with yields and commodity prices updated annually. Revenue for a farm includes market receipts, *DP*, *CCP*, *LDP*, and insurance indemnity payments. Confidentiality of representative farm data is maintained so that no farm may be potentially identified by acreage, location, or crop mix.

Five farms are included for this study with yields and prices for production years 2002 and 2003. Most acreage on the representative peanut farms is devoted to cotton as a rotation crop. Poor weather conditions negatively impacted yields for both peanuts and cotton in 2002, while cotton experienced extremely low prices. Improved yields and prices in 2003 make possible a comparison in representative farms under unfavorable conditions in 2002 and more favorable conditions in 2003.

Average acreage in program crops is 1547 acres, including an average of 100 acres in double cropped wheat. Peanut farms average 445 acres in peanuts and 850 acres in cotton. There is an average of 152 acres planted in corn. Some farms have additional acreage for vegetables, hay, pasture, or livestock and poultry. Average irrigated acreage is 874 acres, or 56 percent of total program crop acreage.

### Empirical Model

Data for five representative farms includes variable costs per acre and total farm fixed costs for one year, as well as acreage with yields and prices received for two years. Confidentiality restrictions do not permit reporting of research results by individual representative farm. Reporting of results for a composite farm provides analysis for Southeastern peanut farms while maintaining confidentiality. Fixed costs are first computed as a weighted average per acre and estimated for an assumed composite farm with 1400 acres. Variable costs, prices, and yields are a composite of the five representative farms. Irrigated acreage for the composite farm consists of 54 percent of peanut acreage and 48 percent of cotton acreage.

Application of an optimization model allows for sensitivity analysis by changing composite farm variables, and outcomes depict farm level decision making. A linear programming (LP) model for a composite farm is specified as:

$$(1) \quad \max NR = \sum_i R_i + G_i - C_i - F,$$

where  $NR$  is net returns maximized,  $R$  is receipts for crop  $i$ ,  $G$  is government payments received,  $C$  is operating costs, and  $F$  is fixed costs for the farm. In addition to the irrigation limits previously stated, other constraints imposed by harvesting equipment limitations include no more than 400 acres of peanuts and 800 acres of cotton. Corn and wheat are custom harvested and are limited to 150 acres and 100 acres, respectively, due to observed acreage for the representative farms.

Operating costs per acre are reported for 2002 in Table 1, and adjustments for 2003 costs are based on FAPRI (2003) projections for each crop. Operating costs for 2003 reflect increases over 2002 of 1.026 percent for peanuts, 1.011 percent for cotton,

1.026 percent for corn, and 1.028 percent for wheat. Fixed costs for 2003 are estimated from FLIPSIM (Richardson et al., Richardson and Nixon). Labor, repairs, and land rent are reported as “lumpy” expenditures and are included as fixed costs. Yields and prices are reported each year for the representative farms and are presented in Table 2, along with *LDP* rates calculated by FLIPSIM (Richardson, et al., Richardson and Nixon).

Cotton prices for 2002 and 2003 include revenue from selling cotton seed after deductions for marketing expenses. Table 2 includes expected yields calculated from ten years of historical data from the representative farms. Expected prices are averages from 5 years (2005-2009) of FAPRI (2004) forecasts with expected *LDP* rates calculated based on expected prices. Value of cottonseed sold net of marketing costs is derived from prevailing prices and costs (UGA).

*R* and *C* in Equation (1) enter into the optimization model on a per acre basis and represent variables for farmer decision making. *F* is determined by reports that form the representative farms and is constant for each farm. *G* has three components with only *LDP* representing a parameter for decision making. In addition to *LDP*, *G* includes *DP* and *CCP*. Calculation of *DP* is

$$(2) \quad DP = PR \times PY \times BA \times 0.85 .$$

*PR* is the payment rate that is constant and established by *FSRI*, and *PY* (payment yield), as well as *BA* (base acres) are determined by historical farm data that establish constant parameters. Calculation of *CCP* is identical to *DP* except that the payment rate for *CCP* is not fixed, but varies with commodity price. Payment rate for *CCP* is

$$(3) \quad PR = \max \{0, TP - PR_{direct} - \max(P, LR)\} .$$



$PR_{direct}$  is from Equation (2),  $TP$  is a target price, and  $LR$  is a loan rate, all three of which are constant and established by *FSRI*. Market price of the commodity is  $P$ , indicating that  $CCP$  varies only with price and a minus sign signifies an inverse relationship. For the representative farms,  $DP$  and  $CCP$  are calculated based on reported base acreages and yields, with  $CCP$  incorporating relevant market price levels.

An alternative provision in programs for marketing assistant loans is an  $LDP$ . Instead of putting commodities in storage for later loan repayment, a farmer may choose to receive benefits directly when marketing the commodity. Rates for  $LDP$  are determined by shortfalls in  $P$  that result when either the posted county price or the prevailing world price is below the loan rate. Loan rates for  $LDP$  calculation are identical to  $LR$  in Equation (3). Marketing loan gains from crops under loan are equivalent to gains from the  $LDP$  alternative. All quantities marketed are eligible for  $LDP$  and total receipts increase with production.

Total revenue ( $TR$ ) for a crop in Equation (1) is given by the summation of market receipts ( $R$ ), loan deficiency payment receipts ( $LDP_{receipts}$ ), direct payments, and countercyclical payments or

$$(4) \quad TR = (P \times Q) + (LDP \times Q) + DP + CCP,$$

where  $Q$  is quantity produced. Farmer decision making is determined by marginal revenue analysis that is given by

$$(5) \quad \frac{\partial TR}{\partial Q} = \frac{\partial R}{\partial Q} + \frac{\partial LDP_{receipts}}{\partial Q} + \frac{\partial DP}{\partial Q} + \frac{\partial CCP}{\partial Q}.$$

With Equations (2) and (3) indicating that

$$(6) \quad \frac{\partial DP}{\partial Q} = \frac{\partial CCP}{\partial Q} = 0,$$

production only changes total revenue through market prices and *LDP* rates. Provisions of current policy allow for receipt of direct payments and countercyclical payments as long as base acreage remains in agricultural usage, including fallow. There are no requirements to maintain production of any crop, including crops for which the payments are based. Thus, direct payments and countercyclical payments preserve farm acreage without artificially stimulating production in an attempt to increase revenue.

### **Results and Implications**

Optimized acreage allocations for each year are identical and are presented in Table 2. Financial values for the composite farm are presented in Table 3. Returns are to operating costs and include other farm returns, as well as insurance indemnities paid. Net Returns do not include opportunity costs for management or owned land. Government payments are much greater in 2002 than 2003 due to depressed commodity prices in 2002. Farm revenue from *LDP* is insignificant in 2003, and *CCP* in 2003 are over 50 percent less than in 2002 due to improved commodity prices in 2003. Direct payments are fixed annually. Results for program crops are presented on a per acre basis in Table 4.

Returns by crop in Table 5 show irrigated peanuts to have the greatest value per acre in each year. Nonirrigated peanuts are slightly lower than irrigated cotton in each year, but expected returns for nonirrigated peanuts are greater than for irrigated cotton. Conditions in 2002 caused nonirrigated cotton to have negative net returns, while nonirrigated peanuts realized a return of \$155 per acre. Returns for corn and wheat include expenses for custom harvesting.

Comparisons with yields and prices from 2002 and 2003 show farm program impacts in years of extreme pessimism and optimism. Representative farm data not only includes realized yields for each year, but also includes expected yields that represent a typical production year. Specifying composite farms with expected yields and prices presents a generalized analysis at the farm level that indicates long term impacts of commodity programs. Expected acreage allocation from LP analysis does not change from the annually optimized allocations in Table 2.

Returns for expected yields and prices in Table 3 are lower than 2003 levels, but greater than 2002. Direct payments and countercyclical payments are not affected by production as indicated by Equation (6). Expected receipts from *CCP* are less than 2002 because of low commodity prices in 2002. Net returns for expected yields and prices are 66 percent of the level for 2003 yields and prices, but over 4 times the 2002 level.

Comparisons in Table 3 show consequences on net returns of no support from government programs. Net returns are positive with 2003 yields and prices in Table 3, but deducting opportunity costs for unpaid farmer labor, management, and owned land would result in levels less than is reported for net returns less government payments. In contrast, 2002 yields and prices lead to negative net returns without government payments, and total losses would be greater after deducting opportunity costs. Expected net return results shows improvement over 2002 results, but is negative without benefit of government payments. Returns from commodity program crops and payments for expected yields and prices are presented on a per acre basis in Table 4.

Expected results in Table 3 depict long term outcomes and benefits of crop programs for southeastern peanut farms under current U.S agricultural policy. Expected

net returns of \$115,828 appear adequate to maintain viable enterprises that support agribusinesses and local economies. Results for years having depressed prices and yields such as 2002 in Table 3 show that commodity programs prevent undesirable outcomes that would predictably lead to financial hardships throughout rural economies.

Estimating returns to management as 5% of operating costs (UGA) leads to a \$50,231 charge to management. Weighted portion of owned land is 32% of all land, and applying a \$40 per acre charge (USDA, NASS) as an opportunity cost results in a total charge of \$16,453. Adding interest charges paid by the farm leads to derivation of return to assets at 4.6% for expected yields and prices (Kay and Edwards).

Further analysis of Table 3 provides insight into how government payments are distributed within farm enterprises. Annual fixed costs in 2002 are \$386,643 and \$352,633 for 2003. Positive expected returns indicate that market prices cover operating costs of crop production, even after subtracting *LDP* payments. However, returns with expected yields and prices are not sufficient to cover fixed costs, with shortfalls increasing after inclusion of opportunity costs for unpaid farmer management and owned land. Thus, government payments provide necessary income to enable a farm to acquire modern equipment, keep land in agriculture and maintain values (Flanders, White, and Escalante), provide incentives for proper management, and cover overhead costs.

Although covering variable costs maintains production viability in the short term, returns that include *LDP* are not sufficient to cover total costs that would lead to incentives for farm expansion. Direct payments and countercyclical payments are necessary for long term success of farms. Since these two payments have fixed bases and

do not increase with production, the total effect of U.S. commodity programs does not provide incentives for increasing total farm acreage that leads to overproduction.

### **Summary**

Agricultural commodity programs are intended to support farm income while not distorting market signals that lead to overproduction. Existing provisions provide direct payments that are not linked to either production or commodity prices. Countercyclical payments are linked to commodity prices, but payments do not increase with production levels. Loan deficiency payments are based on rates determined by commodity prices and receipts increase as production increases.

Compliance with world trade agreements is a consideration when implementing commodity programs. Programs that have little or no trade distorting elements are not subject to limitations. Aggregate limits are imposed on programs that have elements that are trade distorting. From a domestic perspective, programs that are trade distorting under trade agreement rules could lead to inefficiencies for U.S. agriculture.

Southeastern peanut farms produce a mix of crops that enable a general evaluation of U.S. agricultural policy. Typical crops besides peanuts are cotton, corn, and wheat, and each of these crops have similar provisions under current policy. A composite farm with all four crops and returns from other farm production is applied in a linear programming analysis.

Results show that peanut farms typically cover operating costs from market receipts, but fixed costs are only met with supplementation from government payments.

Direct payments and countercyclical payments are limited by base acreages and yields, providing no incentive for increased payments through increased production. Loan deficiency payments increase with production, but are not sufficient to stimulate increased in total farm acreage.

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Table 1. Operating Costs per Acre and Fixed  
Costs for Southeastern Composite Farm

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Irrigated Peanuts	\$367
NonIrrigated Peanuts	\$230
Irrigated Cotton	\$356
NonIrrigated Cotton	\$194
Irrigated Corn	\$278
Irrigated Wheat	\$146
Fixed Costs 2002	\$386,643
Fixed Costs 2003	\$352,633

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Table 2. Yield<sup>1</sup>, Prices<sup>2</sup>, LDP<sup>2</sup>, and Optimized Acreage

	<i>-2002-</i>			<i>-2003-</i>			<i>-Expected-</i>			Acres
	Yield	Price	LDP	Yield	Price	LDP	Yield	Price	LDP	
Irrigated Peanuts	3,877	\$368	\$29.97	4,314	\$380	\$0	4,072	\$396	\$0.000	216
NonIrrigated Peanuts	1,996	\$368	\$29.97	2,851	\$380	\$0	2,655	\$396	\$0.000	184
Irrigated Cotton	985	\$0.417	\$0.121	1,027	\$0.650	\$0.003	974	\$0.547	\$0.000	373
NonIrrigated Cotton	323	\$0.417	\$0.121	746	\$0.650	\$0.003	620	\$0.547	\$0.000	427
Irrigated Corn	159	\$2.44	\$0	180	\$2.16	\$0	174	\$2.34	\$0.000	100
Irrigated Wheat	65	\$3.07	\$0	73	\$3.16	\$0.039	72	\$3.24	\$0.000	100

<sup>1</sup>Units per acre: peanuts and cotton = lbs.; corn and wheat = bu.

<sup>2</sup>Dollars per unit: peanuts = ton; cotton = lbs.; corn and wheat = bu.

Table 3. Returns and Government Payments

	2002	2003	Expected
Returns	\$230,854	\$410,651	\$314,210
DP	\$55,165	\$55,165	\$55,165
CCP	\$125,696	\$62,315	\$99,086
Fixed Costs	\$386,643	\$352,633	\$352,633
Net Returns	\$25,072	\$175,498	\$115,828
LDP	\$61,243	\$2,386	\$0
Govt. Payments	\$242,104	\$119,866	\$154,251
Net Returns less Govt. Payments	-\$217,032	\$55,632	-\$38,423

Table 4. Returns from Program Crops, Government Payments, per Acre

	2002	2003	Expected
Returns	\$124	\$267	\$195
DP	\$39	\$39	\$39
CCP	\$90	\$45	\$71
Fixed Costs	\$276	\$252	\$252
Net Returns	\$18	\$125	\$83
LDP	\$44	\$2	\$0
Govt. Payments	\$173	\$86	\$110
Net Returns less Govt. Payments	-\$155	\$40	-\$27

Table 5. Returns per Acre, by Crop

	2002	2003	Expected
Irrigated Peanuts	\$393	\$425	\$394
NonIrrigated Peanuts	\$155	\$282	\$255
Irrigated Cotton	\$160	\$293	\$191
NonIrrigated Cotton	-\$35	\$241	\$120
Irrigated Corn	\$103	\$92	\$110
Irrigated Wheat	\$55	\$81	\$77
Total	\$124	\$267	\$195