

**Equitability of Government Support Across Major Crop Commodities  
A Method of Comparison**

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# **Equitability of Government Support Across Major Crop Commodities**

## **A Method of Comparison**

### **Introduction**

Of the many issues associated with modifying the 1996 FAIR Act, equitability of government support across program commodities ranks high on the list of priorities. This concern is associated with both a limited amount of government support and the method that can be used to derive or ascertain some measure of equitability. Likewise, government support that is out of balance across commodities can likely become the supply inducing expected revenue -- which tends to erode market signals. This may be particularly true in times of very low (below loan rate) prices.

A reference point commonly used to focus this debate is the variable cost of production per unit of commodity produced. The reason for selecting this measure is that it only reflects costs associated with planting to harvest of the crop. Other costs are deliberately excluded such that comparisons can more easily be made across commodities and regions. Obviously, other costs such as land are important and are included in the total cost of production. However, a logical first step in an economic evaluation of equitability for government support across commodities is the expected unit of return relative to the variable cost of production. After making this derivation, it is relatively easy to calculate whether the margin generated will support other costs including -- land, taxes, a return to management, etc.

### **Formula for the Comparison of Equitability**

One measure of equitability is the ratio derived when dividing the variable cost investment that a producer has in the production of a crop into the corresponding amount of protection the government provides for the same unit. This implies that if the farmer has \$1.00 invested per unit in variable costs and the government also provides \$1.00 of protection for the same unit then the ratio of implied support of government to producer investment is 1 to 1 relative to variable costs. Likewise a \$2.00 per unit investment by the government relative to \$1.00 for the farmer implies a 2 to 1 ratio to variable costs.

This same measure also provides a method of determining whether a region may favor one crop over another relative to risk assuming all other variables held constant. Obviously, farmers will shift acreage towards crops with the highest returns relative to risk holding all other variables constant. As the government becomes more heavily involved with programs that may favor one crop over another, farmers tend to shift production in this direction.

To conduct this comparison, the variable cost of production, as reported by the USDA, will be used as the reference point for farmer's investment per unit of production. Government support is divided into three categories: CCC non-recourse loan rate support, marketing loan gains, and direct payments (AMTA). Projected yields and variable costs of production are consistent with the FAPRI baseline projections reported in the FAPRI January 2001, Baseline (FAPRI 2001).

The relevant variables used in the formulas are:

- Variable cost of production as reported by the USDA<sup>1</sup>
- CCC nonrecourse loan rate as reported in FAPRI 2001
- Marketing loan gains as reported in FAPRI 2001
- AMTA Fixed Government Payment plus Market Loss Assistance as reported in FAPRI 2001

### **Equitability Formulas**

Formula 1    Loan Support  
Ratio of Government Loan Support [RGS(1)]

$$\text{RGS (1)} = \frac{\text{Loan Rate} * \text{Expected Yield}}{\text{Variable Cost of Production}}$$

Formula 2    Loan Support plus Adjusted LDP  
Ratio of Government Loan Support plus Adjusted LDP  
[ RGS (2) ]

$$\text{RGS (2)} = \frac{\text{RGS (1)} + \text{Adjusted LDP}}{\text{Variable Cost of Production}}$$

Formula 3    Loan Support plus Adjusted LDP plus AMTA  
Ratio of Government Support plus Adjusted LDP plus AMTA  
[RGS (3) ]

$$\text{RGS (3)} = \frac{\text{RGS (2)} + \text{AMTA}}{\text{Variable Cost of Production}}$$

A few notes should be remembered at this point.

- Loan and corresponding loan deficiency payments reflect government support for current production. Low yields due to productivity problems or weather events, or both, preclude payments – i.e., no production, no support.
- AMTA payments are based on the 1996 FAIR Act provisions implying farm program yields, projected yields, and base restrictions. It is common for payment yields to be lower than current yields.
- One reason for separating the equivalent formulas into three parts is the operator-owner issue. This is sometimes referred to as the landlord-tenant issue. The LDPs and loan

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<sup>1</sup> Crop production units are as follows: Wheat, corn, barley, and soybeans are in bushels, rice units are cwt., cotton units are lbs.

gains are associated with current production which normally flows to the producer/operator. However, in many cases the AMTA payment goes directly to the landowner. In some regions, especially with monoculture production, the AMTA payment has induced land idling which has contributed to a substantial decline in production and a source of dispute between landowners and operators.

- This points out another issue with regard to government support, if the AMTA is high relative to loan support then the incentive for idling land increases in a monoculture region. Therefore, a hidden danger in the subsidy situation is simply making a cash payment that is high enough to create an incentive for the landowner to exit production in regions where pasture or conservation practices are the only other viable production options.
- This is not to suggest that operators only get benefits from LDPs and land owners only receive benefits from the AMTA payments. As these programs increase returns, land values increase or are supported. Returns are supported providing support to owners and operators.
- Dollar figures on government support, for example, loan rate \* yield in Table 1, should not be confused with actual government spending per acre on these crops. Loan gains and LDPs are generally received when prices are below the loan rate. When commodity prices are above loan levels government support is reduced. The government support ratios reflect the amount of revenue support over variable costs that is maintained. The calculated loan rate \* yield is not a payment made to farmers.

### **Government Loan Rate Support GLS (1)**

All values in Table 1 come from the FAPRI 2001 baseline publication. The FAPRI crop sector models project cost of production estimates comparable to USDA's cost of production. Three reference point years have been selected to demonstrate current and future levels of support. For this reason, ratios have been generated for the year 2000, 2002 and 2010 based on FAPRI projections.

Consider the situation for the year 2000. Given a wheat loan rate of \$2.58 per bushel and a national yield of 41.90 bushels per acre, the loan support level for an acre of wheat land is \$108.10. Given an estimated variable cost of \$63.00 per acre, the ratio of government loan support to the variable cost of production is 1.72. This implies that for each dollar of variable cost investment by the producer the government is providing 1.72 dollars of support. The leverage for the producer is 1.72 to 1 implying considerable protection for the initial variable cost investment provided.

Similar estimates are generated for each of the major crops. Soybean protection with a \$5.26/bushel nonrecourse loan rate is significantly greater than other crops at a 2.38 to 1 ratio. An explanation often given for this considerable differential is that soybeans only receives support from the loan, as the FAIR Act provided no AMTA payments on traditional soybean land. Nonetheless \$2.38 of support by the government for each \$1.00 of variable cost invested

by the producer offers a considerable hedge against potential losses for soybean producers. It also implies that during low market price periods across all commodities, farmers have a strong incentive to produce relatively more soybeans.

The estimated ratios in Table 1 reflecting loan support ranges from a low of \$1.04 for rice to a high of \$2.38 for soybeans in 2000. Obviously the sorghum, barley, upland cotton and rice producers have considerably less loan rate protection if the variable cost of production is used as an equity base of reference.

The ratios for 2002 and 2010 reflect a similar pattern and tend to decline except for cases where the loan rates have been adjusted according to formulas prescribed by the 1996 FAIR Act. The exception in 2002 is the soybean ratio at 2.52, which reflects FAPRI's projected decline in the variable cost of production.

An interesting observation regarding the relationship of the overall ratios is the exceptionally wide range of implied support. Relative to variable costs at risk, the most significant winners of governmental protection are, first soybeans, second wheat, and third corn.

### **Government Loan Rate Plus Adjusted LDP Support GLS (2)**

Table 2 reflects an additional step up the scale of government support. This table answers the question of how much additional support is likely, when a marketing loan is used to protect farm income. Two points must be considered in making this estimate. First, even if the market price is at or near the loan rate, it is likely that some farmers exercised their option for payments during a time when adjusted world prices or posted county prices have dipped below the loan rate. Therefore, a seasonal adjustment factor has been added for each crop. Secondly, since the first level of support reflected the actual loan rate then an adjustment is also required to ensure that double counting does not take place when considering the actual market price only the differential above the loan to market price should be considered. Combining the seasonal adjustment factor leads to an adjusted payment associated with the LDP.

Loan deficiency payments were received for all commodities in 2000. As a result the additional support increases the implied ratios for each of the commodities. This adjustment adds \$16.34 per acre to the \$108.10 per acre for wheat in Table 1, resulting in government support from the loan and LDP of \$124.44 per national acre. A variable cost of \$63.00 per acre implies an operator support ratio that increases from 1.72 to 1.98 (Table 2).

Given the adjusted world price formula for rice, this substantially increases government support implying an additional \$141.26 per acre moving the rice support ratio from 1.04 to 1.39. Upland cotton increases support moderately with the adjusted world price providing an additional \$18.75 per acre improving the support ratio from 1.06 to 1.13. Soybeans also benefited as this industry received about \$11.05 per acre from additional LDP payments.

For the year 2000, the most significant benefactors relative to variable cost when considering both loan and LDP payment were soybeans at 2.52, wheat at 1.98, corn at 1.67 and

oats at 1.61. Cotton, rice, sorghum and barley remain considerably lower on the variable cost equitability support scale.

### **Government Loan Support Plus Adjusted LDP and AMTA Payments and Market Loan Assistance (MLA)**

One of the more popular mechanisms of the 1996 FAIR Act is the decoupled payment (AMTA), designed to provide protection with implied flexibility in production decisions. In previous farm bills, the majority of support was tied to the production of a crop with a prescribed base acreage. Planting beyond the prescribed base resulted in severe government support penalties.

The decoupled payment (AMTA) is made according to a prescribed formula in the 1996 FAIR Act. As previously indicated, soybeans did not receive a decoupled payment. However, during the 2000 round of Market Loss Assistant payments (MLA) soybean producers received additional support.

Table 3 reflects the actual AMTA and MLA payments for 2000. If the 1996 FAIR Act is continued without MLA payments, then per acre support declines to base levels reported in 2002 and 2010.

In 2000, if government support from the three sources is considered, then wheat producers received \$160.21 per acre of support if they also qualified for one base AMTA payments per planted acre. This implies a ratio of support 2.54 to 1. For each dollar invested in variable production cost, the government invested \$2.54. Using this criteria for measured support, three commodities exceed the 2 to 1 ratio; soybeans, wheat and corn. Rice is nearly at the 2.0 ratio with a ratio of 1.96.

Given all three levels of support, cotton receives the least protection relative to variable costs of all crops. By 2010, the cotton ratio is projected at 1.08. Others slide down the scale rather significantly including barley and oats at 1.16, rice at 1.30 and sorghum at 1.33. Note that commodities which reflect the greatest amount of land area -- corn, wheat and soybeans -- also carry the highest per variable cost unit of government support. This is a consistent pattern given current 2000 payments and planting projections by FAPRI for 2002 and 2010.

### **Summary**

A summary of the three government support ratios is provided in Table 4. Observations drawn from the analysis are presented here.

Soybeans. Across the three years considered, soybeans maintain the highest level of protection relative to variable costs, primarily through the loan rate. In general, for each unit of investment by the producer, the government provides for 2.34 to 2.63 units of protection. The majority of this protection via the loan is a strong inducement for planting especially in periods of low market prices. Not surprisingly, given the run of low market prices since 1998, there has

been a significant shift towards soybean production. Soybeans have increased from 64.2 million acres in 1996-97 to 76.7 million acres in 2001-02.

Wheat. Across all three years considered, wheat maintains the second highest level of relative protection. The current ratio of 2.54 with all levels of support is projected to decline to 1.74 by 2010 as prices increase and MLA is no longer used. However, wheat acreage has declined rather dramatically since the inception of the FAIR Act. Why? In areas where other crops can be grown, soybeans have become a major substitute for wheat. Producers have taken the fixed AMTA payment, \$13.43 per acre for 2010, and opted for the higher protected ratio offered by the soybean support loan. This option is even more attractive when MLA payments are added which moved the guaranteed income to \$35.77 per acre in 2000. Acreage of wheat has declined continuously from 75.1 million acres in the first year of the 1996 farm program to a current projected level of 60.3 million acres in 2001-2002. Although the government support ratios imply strong relative support for wheat, the option to plant soybeans for many producers was and is more attractive given current price pressure.

Corn. Corn ranks number three on the list with the majority of the support coming from the loan rate except in double AMTA years, as reflected in 2002. Corn acreage has hovered near 80 million acres since the inception of the 1996 farm program. However, the soybean ratio does appear to be attracting corn acreage with a projected planting of 76.7 million acres for 2001. For the average acre of corn land, it will take an additional supplement support in 2002 before expected returns per acre exceeded returns supported for an acre of soybeans.

Sorghum. The sorghum ratio of government support range from a total of 1.67 to a low 1.33 projected for 2010. Unless market prices improve, sorghum production will face continued competition from commodities in the same region. This is especially the case for wheat, soybeans and corn.

Upland Cotton. Cotton remains on the low end of the scale for government support relative to the other crops. The loan rate only covers slightly more than variable cost of production at the national level – implying nearly a 1 to 1 ratio. This means that cotton producers are more dependent on LDP and AMTA payment to balance the ledger in low-income price years. Because the FAPRI baseline includes projected increases in world prices, this necessarily means less support from the LDP in the future and more dependence on world markets for expected returns. These ratios would suggest a reduction in cotton acreage over time. However, projected plantings of 15.61 million acres in 2001-02 reflect a gradual increase over time. Although not shown in the report, it is likely that the additional protection under crop insurance is a primary stimulus.

Rice. Rice is also on the low end of support relative to its variable cost of production. The loan rate protects variable cost on about a 1 to 1 basis across all years. This implies that the ratio only improves with the LDP payment and from AMTA. Or stated another way, like cotton, rice has chosen to receive the higher end of its protection from potential LDP and AMTA. Shifting in this direction has created problems for some regions, especially where rice is the primary option for production. An \$83.00 AMTA payment per base acre of rice may result in the incentive to convert rice land to other options while retaining the AMTA payments.

Given that the operator is protected marginally above variable cost without part of the AMTA, there is little incentive to rent or share the land unless part of the AMTA also flows to the operator. For many landowners, without other program crop alternatives the most attractive option is to discontinue rice production, take the AMTA check, and grow grass.

In general, during low price periods, government payments become a strong incentive for making production decisions. Balancing these supports is a major concern. Commodities on the higher end of support will certainly benefit at the expense of those on the lower side of the equation. This paper focuses on one way to gain insights on reference points in making equitable decisions.

Budgets for agriculture are tight, implying more scrutiny on making decisions. For this reason more attention should be given to formulas that focus on where and how equitability and balanced government support across commodities can be achieved.



**Table 1. Government Loan Rate Support for Program Crops per Acre 2000, 2002, and 2010.**

	<b>Loan Rate (\$/unit)</b>	<b>Yield (Per Acre)</b>	<b>Govt. Support (Loan rate * Yield) (\$/acre)</b>	<b>Variable Cost (\$/acre)</b>	<b>Ratio (1) Loan Rate Support to Variable Cost</b>	<b>Govt. Support Minus Variable Cost (\$/acre)</b>
<b>2000</b>						
Wheat	2.58	41.90	108.10	63.00	1.72	45.10
Corn	1.89	137.10	259.12	172.20	1.50	86.92
Sorghum	1.71	60.90	104.14	92.88	1.12	11.26
Barley	1.62	61.10	98.98	89.84	1.10	9.14
Oats	1.16	64.20	74.47	53.70	1.39	20.77
Soybeans	5.26	38.10	200.41	84.06	2.38	116.35
Upland Cotton	0.52	625.00	324.38	304.97	1.06	19.41
Rice	6.50	62.78	408.07	394.08	1.04	13.99
<b>2002</b>						
Wheat	2.58	41.3	106.55	65.34	1.63	41.21
Corn	1.89	138.10	261.01	176.82	1.48	84.19
Sorghum	1.69	68.3	115.43	93.47	1.23	21.96
Barley	1.71	62.8	107.39	91.22	1.18	16.17
Oats	1.14	60.7	69.20	55.56	1.25	13.64
Soybeans	5.26	40	210.40	83.65	2.52	126.75
Upland Cotton	0.52	644	334.24	311.83	1.07	22.41
Rice	6.50	60.49	393.19	395.73	0.99	-2.54
<b>2010</b>						
Wheat	2.58	44.2	114.04	73.06	1.56	40.98
Corn	1.89	153.10	289.36	200.35	1.44	89.01
Sorghum	1.71	71.5	122.27	103.53	1.18	18.74
Barley	1.65	67.3	111.05	102.12	1.09	8.93
Oats	1.12	62.7	70.22	61.45	1.14	8.77
Soybeans	5.26	43.6	229.34	98.17	2.34	131.17
Upland Cotton	0.52	676	350.84	351.18	1.00	-0.34
Rice	6.50	63.94	415.61	443.24	0.94	-27.63

Source: FAPRI January 1, 2001 Baseline is source of the data in columns 1-4.

**Table 2. Government Loan Deficiency Payments per Acre for Program Crops 2000, 2002, and 2010.**

	<b>Govt. Loan Deficiency Payment Govt. Support Adjusted LDP (\$/acre) (1)</b>	<b>Loan Rate * Yield + Column 1 Government Support \$ per acre (2)</b>	<b>Ratio (2) Loan Rate Plus LDP Support (3)</b>
<b>2000</b>			
Wheat	16.34	124.44	1.98
Corn	28.79	287.91	1.67
Sorghum	10.96	115.10	1.24
Barley	13.44	112.42	1.25
Oats	12.20	86.67	1.61
Soybeans	11.05	211.46	2.52
Upland Cotton	18.75	343.13	1.13
Rice	141.26	549.33	1.39
<b>2002</b>			
Wheat	0.83	107.38	1.64
Corn	0.00	261.01	1.48
Sorghum	0.00	115.43	1.23
Barley	6.28	113.67	1.25
Oats	6.07	75.27	1.35
Soybeans	10.00	220.40	2.63
Upland Cotton	0.00	334.24	1.07
Rice	150.02	543.20	1.37
<b>2010</b>			
Wheat	0.00	114.04	1.56
Corn	0.00	289.36	1.44
Sorghum	0.00	122.27	1.18
Barley	0.00	111.05	1.09
Oats	0.00	70.22	1.14
Soybeans	0.00	229.34	2.34
Upland Cotton	0.00	350.84	1.00
Rice	76.73	492.34	1.11

**Table 3. Government per Acre AMTA Assistance for Program Crops 2000, 2002, and 2010.**

	<b>Govt. Support PFC + MLA (\$/acre)</b>	<b>Govt. Support \$/acre</b>	<b>Ratio (3)</b>
2000			
Wheat	35.77	160.21	2.54
Corn	60.76	348.67	2.02
Sorghum	40.38	155.48	1.67
Barley	20.70	133.12	1.48
Oats	2.44	89.11	1.66
Soybeans	5.16	216.62	2.58
Upland Cotton	76.38	419.51	1.38
Rice	222.62	771.95	1.96
2002			
Wheat	13.43	120.81	1.85
Corn	22.75	283.76	1.60
Sorghum	15.12	130.55	1.40
Barley	7.80	121.47	1.33
Oats	0.90	76.17	1.37
Soybeans	0.00	220.40	2.63
Upland Cotton	28.36	362.60	1.16
Rice	83.53	626.73	1.58
2010			
Wheat	13.43	127.47	1.74
Corn	22.75	312.11	1.56
Sorghum	15.12	137.39	1.33
Barley	7.80	118.85	1.16
Oats	0.90	71.12	1.16
Soybeans	0.00	229.34	2.34
Upland Cotton	28.37	379.21	1.08
Rice	83.53	575.87	1.30

**Table 4. Summary of Government Support Ratios per Acre for Program Crops 2000, 2002, and 2010.**

	<b>Ratio (1) Loan Rate Support</b>	<b>Ratio (2)</b>	<b>Ratio (3)</b>
2000			
Wheat	1.72	1.98	2.54
Corn	1.50	1.67	2.02
Sorghum	1.12	1.24	1.67
Barley	1.10	1.25	1.48
Oats	1.39	1.61	1.66
Soybeans	2.38	2.52	2.58
Upland Cotton	1.06	1.13	1.38
Rice	1.04	1.39	1.96
2002			
Wheat	1.63	1.64	1.85
Corn	1.48	1.48	1.60
Sorghum	1.23	1.23	1.40
Barley	1.18	1.25	1.33
Oats	1.25	1.35	1.37
Soybeans	2.52	2.63	2.63
Upland Cotton	1.07	1.07	1.16
Rice	0.99	1.37	1.58
2010			
Wheat	1.56	1.56	1.74
Corn	1.44	1.44	1.56
Sorghum	1.18	1.18	1.33
Barley	1.09	1.09	1.16
Oats	1.14	1.14	1.16
Soybeans	2.34	2.34	2.34
Upland Cotton	1.00	1.00	1.08
Rice	0.94	1.11	1.30