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## **[Assessment of STAX (Stacked Income Protection Plan) for Arkansas Representative Panel Farms]**

## ***Introduction***

The American Cotton Producers (ACP) is an organization of the National Cotton Council (NCC). Its leaders are 24 peer-elected cotton producers from Cotton Belt States. The ACP's Farm Policy Task Force (FPTF) met at the 2011 summer ACP meeting to discuss policy-related options for United States (U.S.) cotton producers in the 2012 Farm Bill. The current political environment affected by efforts to reduce the Federal budget deficit was strongly taken into consideration. Based on its FPTF's recommendations and following an internal debate, the ACP approved a plan that includes an income safety net program for cotton farmers and a modification to the marketing loan program for upland cotton. The plan was to be later presented to the National Cotton Council's (NCC) FPTF during the NCC's 2011 Mid-Year Board Meeting and be forwarded to the Senate and House Agriculture Committees upon request.

The ACP's recommendations to the NCC consisted of three major points:

1. To endorse an income safety net program named Stacked Income Protection Plan (STAX) for Upland Cotton. If STAX is costly or unacceptable to Congress, an improved Average Crop Revenue Election (ACRE) program should be supported.
2. To support the maintenance of an effective marketing loan for upland cotton while addressing concerns resulting from the U.S.-Brazil WTO dispute.
3. To contribute proportionally to cotton's share of the Federal budget deficit reduction.

In its recommendations, the ACP emphasized general concepts rather than program-specific parameters since it acknowledged the need to remain flexible due to significant obstacles caused by the extraordinary national political environment.

## ***Goal and Objective***

The goal of this study is to assist Arkansas farmers to better understand alternative policy proposals and in developing their positions regarding the 2012 Farm Bill. The objective of the study is to assess the impacts of the STAX proposal at the specific farm level in Arkansas during the period 2012-2016 in which the 2012 Farm Bill is expected to be in place. To achieve the main objective, three scenarios are considered:

1. What is the average probability of receiving a STAX indemnity payment on a by farm/crop/coverage level basis?
2. What is the average STAX indemnity payment on a by farm/crop/coverage level basis?
3. Is it more profitable for farmers to participate in STAX as compared to participation in 2008 Farm Bill Title I (BASE) programs?

## ***Stacked Income Protection Plan (STAX) for Upland Cotton Overview***

STAX is alleged to be designed to be fiscally-responsible while providing an income safety net for cotton producers. The program also is proposed to compliment and be implemented in consistency with current crop insurance programs and crop insurance delivery mechanisms. STAX addresses shallow revenue losses on a county-wide basis. In cases when county data is unavailable larger areas may be used (e.g., county groupings). As the name "stacked" implies, the program will be available in addition to a producer's crop insurance policy while a producer would not necessarily have to purchase a crop insurance policy in order to be STAX-eligible.

Producer-paid premiums will in part fund the proposed program. However, such premiums will be reduced as much as possible by using available upland cotton baseline spending for the ACRE program, direct payments (DPs) and counter-cyclical payments (CCPs) which will all be replaced by the Stacked Income Protection Plan.

STAX is designed similarly to the current Risk Management Agency's (RMA) Group Risk Income Protection (GRIP) plans. However, STAX introduces the idea of a fixed-reference price and covers only shallow revenue losses. Potential indemnity payments will be paid on STAX-enrolled number of acres.

In its "Summary of ACP Farm Policy Deliberations" document, the ACP provides a basic STAX overview while specifying that the specific program parameters will be established by budget considerations. The Preliminary Price Protection is determined as the greater of the Projected Price and the Fixed Reference Price. Here, the Projected Price is determined as in the current crop insurance products. The Area-Wide Reference Income is determined as the product of the Expected County Yield and the higher of the Preliminary Price Protection and the Harvest Price. Here, the Harvest Price is determined as in the current crop insurance products. The Area-Wide Realized income is determined as the product of the Harvest Price and the Actual County Yield. Anytime the Area-Wide Realized Income falls below 95 percent of the Area-Wide Reference Income, an indemnity payment is received equal to the difference between the two.<sup>1</sup> However, the indemnity payment cannot be greater than 25 percent of the Area-Wide Reference Income.

### ***Data and Methods***

This study employs the Arkansas representative panel farms framework. Representative farms are developed based on information jointly collected by extension economists from the Arkansas Cooperative Extension Service and Texas A&M University's Agricultural Food and Policy Center. Every two to three years, these professionals work closely with panels of farmers to update (or construct new) representative farms sharing common features with farms of a certain geographical location. During this process, information such as (but not limited to) planted acreage, crop mix, land tenure arrangements, participation in Federal farm programs, base acreage, historical yields, location-specific price wedges relative to the mean national prices, assets, costs, loan interest rates, and depreciation method is collected (Hight, 2007). Table A1 shows characteristics for five eastern-Arkansas representative panel farms providing the framework for the analysis. Farm names start with AR, Arkansas' two-letter State label, and end with a number representing the total planted cropland acres specific to each farm. For example, ARHR3000 is a 3,000 acre rice, soybean, and corn farm located in Hoxie (Lawrence County), and ARNC5000 is a 5,000 acre cotton farm in Leachville (Mississippi County).

Following Richardson, Klose and Gray (2000), a procedure for developing multivariate empirical (MVE) probability distributions for farm-related variables is employed. Specifically, ten-year historical data are used to develop empirical distributions for national and world crop prices, projected and harvest prices, county-specific yields, as well as farm-specific yields and expenses (diesel fuel, fertilizer and electricity). Simetar is used to simulate stochastic baseline five-year projections for the period 2012-2016 with 500 iterations per variable per year.

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<sup>1</sup> Please note that the actual Area-Wide Reference Income coverage level will be determined by Congress and may be lower than 95 percent. This study considers coverage levels in the range of 95-70 percent.

Historical national and adjusted world prices are obtained from the United States Department of Agriculture's National Agricultural Statistics Service (USDA/NASS),<sup>2</sup> the USDA's Economic Research Service (ERS) Rice Yearbook,<sup>3</sup> and the USDA/ERS Rice Outlook.<sup>4</sup> Historical projected and harvest prices are obtained from the USDA's Risk Management Agency.<sup>5</sup> Actual historical farm and county-specific yields, on the other hand, are obtained during the panel farm interview process. 2008 Farm Bill policy variables such as crop-specific direct payment rates, loan rates and target prices are obtained from the USDA/ERS Side-By-Side Comparison.<sup>6</sup> Finally, historical farm expense data are obtained from USDA/NASS (diesel fuel, potash, nitrogen, and phosphate) and personal communication with Mr. Phil Tacker (electricity).<sup>7</sup>

The "February 2012 Baseline Update for United States Agricultural Markets" by the Food and Agriculture Policy Research Institute (FAPRI)-University of Missouri is used to obtain projected crop prices.<sup>8</sup> An earlier version of the same publication (March 2011), on the other hand, is used to obtain projected indices of prices paid by farmers. Finally, projected farm and county-specific crop yields are calculated by the authors by assuming farm, county and crop-specific growth trends.

Since the ACP provides recommended only general STAX concepts and not detailed program parameters, the following assumptions are made. First, following analysis by Coble (Mississippi State University), the Fixed Reference Price is assumed to be the difference between the 2012 target price and the 2012 direct payment rate for a specific crop (e.g., \$8.15/cwt for rice; \$2.35/bu for corn). Second, we assume that shallow revenue losses are in the range of 5-30 percent resulting in Area-Wide Reference Income coverage levels in the range of 70-95 percent. Third, we do not account for premiums paid by producers because currently we do not have any cost-structure information. Finally, for each specific crop/year/county combination, we define the Expected County Yield as the average of the 500 simulated Actual County Yields.

## **Results**

Table 1 illustrates the results from the first scenario as average annual probabilities of receiving a STAX indemnity payment during the period 2012-2016. As expected, with a greater coverage level there is a greater probability of receiving an indemnity payment. For example, there is a 45 percent chance that the Stuttgart farm will receive an indemnity payment for long-grain rice with a 95 percent coverage level. However, in a case of a 90 percent coverage level, this probability decreases by 12 percentage points. Overall, among all crops, wheat has the highest probability of receiving an indemnity payment while corn is a distant second. For example, assuming a 95 percent coverage level, the McGehee farm has a 72 percent chance to receive an indemnity payment for wheat and a 50 percent chance to receive an indemnity payment for corn. Long and medium-grain rice have somewhat similar probabilities of receiving an indemnity payment. In

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<sup>2</sup> Available online at: <http://www.nass.usda.gov/>

<sup>3</sup> Available online at: <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1229>

<sup>4</sup> Available online at: <http://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1285>

<sup>5</sup> Available online at: <http://www.rma.usda.gov/>. Table A2 illustrates commodity price discovery periods and contract months for projected and harvest prices by specific crop.

<sup>6</sup> Available online at: <http://www.ers.usda.gov/FarmBill/2008/>

<sup>7</sup> Mr. Tacker is currently an Irrigation Specialist with Delta Plastics.

<sup>8</sup> The latest version of the report is available online at: [http://www.fapri.missouri.edu/index.asp?current\\_page=home](http://www.fapri.missouri.edu/index.asp?current_page=home)

addition, rice producers are more likely to receive an indemnity payment than cotton and particularly soybean producers (dryland soybeans for the Hoxie farm are an exception to this overall trend).

Tables 2 and 3 illustrate the results from the second scenario. Table 2 shows STAX indemnity payments as annual averages during the period 2012-2016 by farm/crop/coverage level expressed on a \$/acre basis. As expected, greater coverage levels result in greater expected indemnity payments. Among all sample crops, long and medium-grain rice receive the greatest indemnity payments on average and are followed by corn and wheat. The analysis also suggests that soybean producers are not likely to benefit greatly from STAX participation since this crop receives the lowest payment on average among all crops in the sample. At the 95 percent coverage level, the Hoxie farm on average receives \$67 and \$68 per acre for long and medium-grain rice, respectively. However, at the lowest coverage level examined, 70 percent, expected indemnity payments plunge to \$10 and \$9 per acre, respectively. Table 3 shows average weighted STAX indemnity payments (by crop planted acres) for the period 2012-2016 by farm and coverage level expressed in dollars per acre. At all coverage levels and among all sample farms, the Stuttgart farm receives the greatest STAX average indemnity payments. For instance, assuming a 95 percent coverage level, the Stuttgart farm on average receives \$47/acre and is followed by the McGehee farm which receives \$43/acre. As expected, at lower coverage levels, the expected weighted STAX indemnity payments are also lower. A comparison to what these farms were receiving from direct payments is also provided.

Table 4 provides the average weighted STAX indemnity payments for each crop (by planted acres) for the period of 2012-2016 by coverage level. Only at the high but unlikely coverage level of 95%, STAX indemnity payments approximate direct payments for rice and exceed direct payments for the other four crops.

Tables 5 and 6 illustrate the results from the third and final scenario in terms of net farm income expressed as annual averages for the years 2012-2016 in dollars per acre on a by farm basis. Table 5 compares profitability of each of the sample farms under STAX and BASE participation while assuming an 80 percent coverage level. Table 6, on the other hand, provides a sensitivity analysis in terms of profitability comparison between the two participation possibilities at all coverage levels examined. Since ACRE participation rates have been low in Arkansas since 2009, we assume that farmers do not participate in the ACRE program during the period 2012-2016 and instead only receive CCPs, LDPs and DPs under BASE participation. As Table 5 shows, total farm receipts (or revenues) are calculated as the sum of market receipts and total government payments. Total costs, on the other hand, are calculated as the sum of total cash expenses and depreciation. Finally, net farm income (profit) is calculated as the difference between total farm receipts and total costs. As Table 5 shows, market receipts range from \$551/acre for the Stuttgart farm to \$929/acre for the Leachville farm. Total government payments, on the other hand, range from \$0/acre for the Leachville farm to \$18/acre for the Stuttgart farm under STAX participation, and from \$20/acre for the Leachville farm to \$53/acre for the Wynne farm under BASE participation. Under STAX participation, among all sample farms, the Stuttgart farm has the lowest total receipts (\$569/acre) while the Leachville farm has the highest (\$929/acre). Under BASE participation, on the other hand, total receipts range from \$598/acre for the Stuttgart farm to \$949/acre for the Leachville farm. The Stuttgart farm on

average has the smallest total cash expenses among all sample farms (\$469/acre) while the Leachville farm has the largest (\$737/acre). Among all sample farms, depreciation is in the \$49-\$61/acre range. However, the Wynne farm is an exception and it has depreciation of \$167/acre. The reason for this is that the Wynne farm is the smallest farm in the sample (1,400 acres) and does not have the ability to distribute fixed costs over a greater number of acres as the other sample farms. When comparing net farm income under both participation options, as the lowest portion of Table 5 shows, none of the farms benefit from STAX participation compared to the 2008 farm bill direct payments. For example, the Stuttgart farm net farm income is lower by (\$29/acre). The Wynne and the Hoxie farm, on the other hand, are more profitable under BASE participation. In addition, the Leachville and McGehee farm have the lowest losses from a STAX program compared to the base. Finally, Table 6 suggests that none of the farms would be profitable under STAX participation unless the coverage level is 95 percent.

### ***References***

- Hignight, J.A. 2007. "An Economic Comparison of Alternative Farm Policies on Arkansas Representative Panel Farms." MS thesis, University of Arkansas.
- Richardson, J. W., S. L. Klose and A. W. Gray. 2000. "An Applied Procedure for Estimating and Simulating Multivariate Empirical (MVE) Probability Distributions in Farm-Level Risk Assessment and Policy Analysis." *Journal of Agricultural and Applied Economics* 32 (2): 299-315.

## Tables and Figures

**Table 1: Average Annual Probabilities (2012-2016) of Receiving a STAX Indemnity Payment, by Farm, Crop and Coverage Level\***

Area-Wide Reference Income		Stuttgart			Wynne			Leachville		Hoxie				McGehee						
Coverage	Shallow Loss	LRICE	ISOY	WHEAT	LRICE	ISOY	DSOY	ICOT	DCOT	MRICE	ISOY	DSOY	LRICE	CORN	LRICE	FSSOY	DCSOY	CORN	WHEAT	COT
95%	5%	45%	27%	69%	45%	22%	51%	38%	35%	47%	33%	48%	47%	53%	45%	32%	32%	50%	72%	43%
90%	10%	33%	7%	60%	35%	8%	46%	27%	1%	35%	7%	38%	34%	40%	35%	18%	18%	35%	63%	25%
85%	15%	26%	5%	50%	26%	5%	38%	0%	1%	26%	5%	31%	26%	28%	26%	12%	12%	27%	53%	19%
80%	20%	19%	3%	40%	19%	3%	17%	0%	0%	20%	3%	26%	19%	21%	19%	4%	4%	20%	43%	13%
75%	25%	13%	2%	32%	13%	2%	12%	0%	0%	13%	2%	20%	13%	14%	13%	2%	2%	14%	34%	9%
70%	30%	9%	1%	27%	9%	1%	8%	0%	0%	9%	1%	15%	9%	9%	9%	1%	1%	9%	25%	6%

\*note: LRICE, ISOY, WHEAT, DSOY, ICOT, DCOT, MRICE, CORN, FSSOY, DCSOY, and COT stand for long-grain rice, irrigated soybeans, wheat, dryland soybeans, irrigated cotton, dryland cotton, medium-grain rice, corn, full-season soybeans, double-crop soybeans, and cotton, respectively.

**Table 2: Average Annual (2012-2016) STAX Indemnity Payments (in \$/Acre), by Farm, Crop and Coverage Level\*\***

Area-Wide Reference Income		Stuttgart			Wynne			Leachville		Hoxie				McGehee						
Coverage	Shallow Loss	LRICE	ISOY	WHEAT	LRICE	ISOY	DSOY	ICOT	DCOT	MRICE	ISOY	DSOY	LRICE	CORN	LRICE	FSSOY	DCSOY	CORN	WHEAT	COT
95%	5%	78	7	48	70	8	18	34	12	68	6	18	67	47	73	15	16	48	43	46
90%	10%	60	4	40	53	4	13	10	0	51	3	14	51	34	55	8	8	36	36	30
85%	15%	44	2	33	39	2	7	0	0	38	2	11	37	24	40	4	4	25	29	19
80%	20%	30	1	26	27	1	4	0	0	26	1	8	26	16	28	2	2	16	22	11
75%	25%	19	0	20	17	1	2	0	0	16	0	5	17	10	18	1	1	9	17	5
70%	30%	11	0	14	10	0	1	0	0	9	0	3	10	5	11	0	0	5	12	1

\*\*note: LRICE, ISOY, WHEAT, DSOY, ICOT, DCOT, MRICE, CORN, FSSOY, DCSOY, and COT stand for long-grain rice, irrigated soybeans, wheat, dryland soybeans, irrigated cotton, dryland cotton, medium-grain rice, corn, full-season soybeans, double-crop soybeans, and cotton, respectively.

**Table 3: 2012-2016 Average Annual Weighted (by Crop Planted Acreage) STAX Indemnity Payments (in \$/Acre), by Farm and Coverage Level**

Coverage	Wynne	Hoxie	Stuttgart	Leachville	McGehee
95%	39	40	47	33	43
90%	29	30	35	9	31
85%	21	22	26	0	22
80%	14	15	18	0	15
75%	9	9	12	0	9
70%	5	5	7	0	5
Compared to Direct Payments/Planted Acre	53	51	47	20	35

**Table 4. Average Annual (2012-2016) STAX Indemnity Payments (in \$/Planted Acre), by Crop and Coverage Level\*\***

Area-Wide Reference Income		Rice		Soybeans	Wheat	Cotton	Corn
Coverage	Shallow Loss	Long	Medium				
95%	5%	73	68	12	45	36	48
90%	10%	55	51	7	37	14	36
85%	15%	40	38	4	30	5	25
80%	20%	28	26	2	23	3	16
75%	25%	18	16	1	17	1	9
70%	30%	10	9	0	12	0	5
Compared to Direct Payments/Planted Acre		86	86	7	16	32	15

**Table 5: 2012-2016 Annual Average Net Farm Income, in \$/Acre (by Farm)**

Farm Location	Wynne	Hoxie	Stuttgart	Leachville	McGehee
	Annual Average (2012-2016), in \$/acre				
<b>Market Receipts</b>	<b>660</b>	<b>675</b>	<b>551</b>	<b>929</b>	<b>743</b>
LDPs (STAX)	0	0	0	0	0
STAX Payments (80% coverage)	14	15	18	0	15
<b>Total Government Payments (STAX)</b>	<b>14</b>	<b>15</b>	<b>18</b>	<b>0</b>	<b>15</b>
<b>Total Receipts (STAX)</b>	<b>674</b>	<b>690</b>	<b>569</b>	<b>929</b>	<b>758</b>
DPs (BASE)	53	51	47	20	35
LDPs (BASE)	0	0	0	0	0
CCPs (BASE)	0	0	0	0	0
<b>Total Government Payments (BASE)</b>	<b>53</b>	<b>51</b>	<b>47</b>	<b>20</b>	<b>35</b>
<b>Total Receipts (BASE)</b>	<b>713</b>	<b>726</b>	<b>598</b>	<b>949</b>	<b>778</b>
Total Cash Expenses	672	649	469	737	642
Depreciation	167	49	61	60	61
<b>Net Farm Income (STAX)</b>	<b>-165</b>	<b>-8</b>	<b>39</b>	<b>132</b>	<b>55</b>
<b>Net Farm Income (BASE)</b>	<b>-126</b>	<b>28</b>	<b>68</b>	<b>152</b>	<b>75</b>
Difference (STAX-BASE)	-39	-36	-29	-20	-20

**Table 6: STAX Versus BASE Participation Comparison: 2012-2016 Annual Average Net Farm Income, in \$/Acre (by Farm)**

Coverage	Wynne	Hoxie	Stuttgart	Leachville	McGehee
	Annual Average (2012-2016), in \$/acre				
<b>95%</b>	<b>-140</b>	<b>17</b>	<b>68</b>	<b>165</b>	<b>83</b>
<i>Difference (STAX-BASE)</i>	<u>-14</u>	<u>-11</u>	<u>0</u>	<u>13</u>	<u>8</u>
<b>90%</b>	<b>-150</b>	<b>7</b>	<b>56</b>	<b>141</b>	<b>71</b>
<i>Difference (STAX-BASE)</i>	<u>-24</u>	<u>-21</u>	<u>-12</u>	<u>-11</u>	<u>-5</u>
<b>85%</b>	<b>-158</b>	<b>-1</b>	<b>47</b>	<b>132</b>	<b>62</b>
<i>Difference (STAX-BASE)</i>	<u>-32</u>	<u>-29</u>	<u>-21</u>	<u>-20</u>	<u>-14</u>
<b>80%</b>	<b>-165</b>	<b>-8</b>	<b>39</b>	<b>132</b>	<b>55</b>
<i>Difference (STAX-BASE)</i>	<u>-39</u>	<u>-36</u>	<u>-29</u>	<u>-20</u>	<u>-20</u>
<b>75%</b>	<b>-170</b>	<b>-14</b>	<b>33</b>	<b>132</b>	<b>49</b>
<i>Difference (STAX-BASE)</i>	<u>-44</u>	<u>-42</u>	<u>-35</u>	<u>-20</u>	<u>-27</u>
<b>70%</b>	<b>-174</b>	<b>-18</b>	<b>28</b>	<b>132</b>	<b>45</b>
<i>Difference (STAX-BASE)</i>	<u>-48</u>	<u>-46</u>	<u>-40</u>	<u>-20</u>	<u>-31</u>
Threshold Level	_____	_____	95%	95%	95%

## Appendix A

### Table A1: Arkansas Representative Panel Farm Characteristics

<b>Farm Name</b>	<b>ARHR3000</b>	<b>ARNC5000</b>	<b>ARC7500</b>	<b>ARHR3240</b>	<b>ARWR1400</b>
Location	Hoxie	Leachville	McGehee	Stuttgart	Wynne
County	Lawrence	Mississippi	Desha	Arkansas	Cross
Acres Owned	1,000	1,000	1,200	648	420
Acres Under Crop Share Lease	1,500	3,200	5,985	1,552	490
Acres Under Cash Lease	500	800	315	1,040	490
Cash Rent for Land (\$/acre)	100	125	130	100	100
<b>Planted Acres</b>	<b>3,000</b>	<b>5,000</b>	<b>7,500</b>	<b>3,240</b>	<b>1,400</b>
Medium Grain Rice	150	0	0	0	0
Long Grain Rice	1,300	0	1,875	1,620	700
Irrigated Soybeans	1,125	0	1,625	1,296	650
<i>Full-Season Irrigated Soybeans</i>	0	0	1,625	0	0
<i>Double-Crop Irrigated Soybeans</i>	0	0	750	0	0
Dryland Soybeans	125	0	0	0	50
Corn	300	0	1,500	0	0
Irrigated Cotton	0	4,750	1,500	0	0
Dryland Cotton	0	250	0	0	0
Wheat	0	0	1,000	324	0
<b>Base Acres</b>					
Medium Grain Rice	175	0	0	0	0
Long Grain Rice	1,575	0	2,375	1,620	700
Irrigated Soybeans	1,125	0	2,585	1,296	650
<i>Full Season Irrigated Soybeans</i>	0	0	2,585	0	0
<i>Double Crop Irrigated Soybeans</i>	0	0	0	0	0
Dryland Soybeans	125	0	0	0	50
Corn	0	0	0	0	0
Irrigated Cotton	0	4,250	2,375	0	0
Dryland Cotton	0	225	0	0	0
Wheat	0	0	0	235	0

### Table A2: Commodity Price Discovery Periods and Contract Months

<b>Crop</b>	<b>Commodity Exchange</b>	<b>Contract Month</b>	<b>Projected Price Discovery Period</b>	<b>Harvest Price Discovery Period</b>
Rice	CBOT	November	January 15-February 14	September 1-September 30
Cotton	ICE	December	January 15-February 14	October 1-October 31
Soybeans	CBOT	November	January 15-February 14	October 1-October 31
Corn	CBOT	December	January 15-February 14	August 15-September 14
Wheat	CBOT	July	August 15-September 14	June 1-June 30