United States – Subsidies on Upland Cotton

(WT/DS267)

Comments of the United States of America
Concerning Brazil's Econometric Model

December 22, 2003

I. The Sumner Model Presented By Brazil Does Not Provide Acceptable Economic Support for Brazil's Claim of Serious Prejudice

A. Introduction

1. Our review of Brazil's economic model analysis as submitted by Brazil and independently by Dr. Bruce Babcock of Iowa State University shows a clear and consistent manipulation of well-known econometric tools and mischaracterization of the U.S. cotton program in order to exaggerate acreage and ultimate price impacts. In particular:

- The Sumner approach forces changes onto the FAPRI system, and misleadingly claims the result as a FAPRI-type analysis;
- Using flawed and often unsubstantiated economic assumptions, Brazil transformed the FAPRI model for its own purposes;
- Every economic result ascribed to a FAPRI-type analysis by Brazil contains the same flawed assumptions originally introduced by Dr. Sumner;
- Brazil did not use the correct models or assumptions according to FAPRI/CARD analysts and appears to have even changed the underlying FAPRI baseline in order to exaggerate acreage and price impacts of program removal.

2. This critique is directed primarily at Dr. Sumner's model, the results of which were first presented to the Panel in Annex I.[1] Brazil continues to cite Annex I as a part of its fundamental economic findings. The United States notes that Brazil has introduced different analytical tools since the United States and the Panel requested to see the model used to produce the Annex I results.[2] In no instance has Brazil appeared to retreat from its impacts cited in Annex I.

3. Dr. Sumner's supply-side adaptations or modifications to the FAPRI model with respect to various components of the U.S. cotton program, such as direct payments or export credit guarantees, continue to be the key reason his model displayed the results presented in Annex I and are carried forward into all subsequent econometric demonstrations using subsequent FAPRI baselines. In many respects, Brazil's Annex I (and subsequent) results are caused directly by introduced changes to the FAPRI model.

4. Brazil offers Dr. Sumner's model results as evidence that *but for* the U.S. cotton program, U.S. cotton acreage would have declined and world prices would have increased. While the U.S. has in its submissions and oral statements demonstrated the fatal flaws in Brazil's arguments on subsidy identification, causation, and its actionable subsidies claims, it is clear to the United States that *but for* the significant manipulation and adaptation of the FAPRI model carried out by Brazil and Dr. Sumner, acreage impacts attributed to the U.S. cotton program by that economic model

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[1] In evaluating Dr. Sumner's impacts (and this critique of them), the Panel should take into consideration that Annex I results have not been, and apparently cannot be, confirmed. The models used and outputs obtained were, by their own admission, not retained by Dr. Sumner nor Dr. Babcock. *See*, Letter dated October 31, 2003 from Dr. Bruce Babcock to Dr. Dan Sumner, submitted to Panel by Brazil on November 5, 2003. The record remains incomplete with respect to Dr. Sumner's adaptations. The United States has attempted in this critique to note where it has been forced to make assumptions due to missing data.

[2] The United States has based its critique on three Excel spreadsheets that have been provided by Brazil and/or Dr. Bruce Babcock. These include the CARD international cotton model, delivered by Brazil on November 13; the cotton-only U.S. model provided by Brazil on November 18; and the U.S. crops model provided by Dr. Babcock on November 26. A graphical representation of the scope and disclosure of Brazil's modeling system is provided in Exhibit US-113.

would be far less than reported in Annex I. As a result, Dr. Sumner's economic analysis cannot serve as a basis for any findings on the effect of challenged U.S. subsidies.

II. Brazil Model is Not FAPRI/CARD Analysis

5. The adaptations and modifications made to the FAPRI model by Brazil have so changed the model that Brazil cannot rely on FAPRI's reputation to confirm the results.

- Dr. Babcock, Dr. Sumner's "collaborator" on the project, states that a FAPRI analysis would have used different models and applied different assumptions;
- Thus, Dr. Babcock has stated that the Sumner analysis is "in no way" an official FAPRI analysis.

6. In a recent letter, Dr. Babcock, an economist at the CARD located at Iowa State University and the "technician" that carried out much of Dr. Sumner's economic analysis,[3] cleared up some of the confusion regarding the models used in Brazil's analysis. In Dr. Babcock's opinion, a true FAPRI analysis would have used different models and applied different assumptions to those models to arrive at the type of estimate presented by Brazil in its Annex I. In his letter Dr. Babcock states that the analysis carried out by Dr. Sumner and used by Brazil was

> "in no way an official FAPRI analysis and if FAPRI had done the analysis, FAPRI would have come up with different estimates of the effects of U.S. cotton subsidies on world prices."[4]

7. Dr. Babcock also stresses the differences between FAPRI and Dr. Sumner's assumptions used to estimate the effects of various components of U.S. cotton policy. Many of these different assumptions are described in Bra-313 and will be discussed in detail.

8. Dr. Babcock indicates a FAPRI analysis would have used different models. He states that FAPRI would have used different models entirely.

> "The domestic model used was not based on the models used for the FAPRI 2003 baseline. ... the model that FAPRI uses to conduct domestic and international U.S. policy analysis is the U.S. stochastic model and the FAPRI international models. The international cotton model used in Dan's analysis was a stand-alone cotton model developed to better understand the role that China plays in international cotton markets."
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> "... FAPRI would have used different models...."[5]

9. Dr. Babcock's letter confirms that the concerns of the United States have been well-founded. While cloaking itself in the FAPRI model's reputation, Brazil and Dr. Sumner's analysis is, in fact, something quite different. The differences between FAPRI and the Brazil analysis reflected in Annex I involve much more than small, "conservative" changes. As the United States will demonstrate, Brazil's Annex I analysis relies too heavily on adaptations, modifications and

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[3] Opening Statement of Dr. Sumner, 2 Dec. 2003, "I have specified equations and parameters which adapt the systems to apply to the specific questions of interest in this dispute and I have worked closely with skilled and experienced technicians who have operated the details of the system. This is the same procedure that economists routinely use in performing simulation modeling in academic research and that they use in performing complex econometric statistical analysis. I rely on the technician to operate the "machinery" of the models just as a medical doctor would rely on an X-ray or Magnetic Resonance Imaging technician to operate those systems and generate results for analysis and interpretation."

[4] Letter from Dr. Bruce Babcock, Exhibit US-114.

[5] *Id.*

adjustments to suggest acceptance based upon FAPRI's reputation. Brazil's estimates, to a very great extent, distort the FAPRI system for the express purpose of achieving pre-conceived results.

10. The United States, after completing as complete a critique of Annex I results as possible in this proceeding, respectfully submits that the results indicated in Annex I are significantly exaggerated, due either to economic errors or to Dr. Sumner's introduced biases (most of which are discussed in Bra-313 and in Annex I, and many of which contain errors). Brazil's results set out in Annex I and subsequent submissions have no explanatory power.

11. The United States submits that the results in Annex I provide very little guidance to the Panel in terms of overall impacts of the U.S. cotton program. The United States has stated that the FAPRI model as used by Dr. Sumner was an inappropriate tool for the intended job. This opinion has now been confirmed by Dr. Sumner's chief "technician" on this project,[6] who has directly stated that FAPRI would not have used the models used by Dr. Sumner and would not have made the adaptations to that model that he discusses in Annex I and in Bra 313 if it had been requested as an organization to conduct this analysis.

A. Brazil Model Not Comparable to FAPRI System

12. The differences between Dr. Sumner's analysis and the FAPRI framework are significant. Those differences arise primarily as a result of Brazil's disagreement with FAPRI and many other agricultural economists over the impact of payment programs that are not directly linked to production decisions. There are other important differences. Most notably, FAPRI does not include crop insurance as a production-distorting program. The FAPRI model also does not contain components designed to estimate production effects from the export credit guarantee program, a seemingly appropriate choice since Brazil itself has stated that it cannot quantify the alleged benefit to upland cotton provided by the export credit guarantee programs.[7]

13. Whenever the FAPRI modeling system did not tend to show acreage impacts high enough to satisfy Brazil in this case, Dr. Sumner simply made modifications to encourage it to do so. The United States disagrees with these modifications, but still cannot confirm all of these changes or the specific components of each of them. Second, whenever the FAPRI modeling system did not include a program component challenged by Brazil, Dr. Sumner simply forced acreage impacts of that program onto the system - showing little or no economic foundation for the introduced variables.[8]

14. All of these effects, displayed in Annex I, were introduced into the FAPRI system by Dr. Sumner. Dr. Sumner discusses some of his modifications in Bra-313, but not all of them. Dr. Sumner has never provided the United States with an electronic, verifiable version of his modifications. Efforts by the United States to replicate the Sumner formula using a FAPRI model have been unsuccessful, leading to the conclusion that other modifications, adaptations or calibrations are involved.

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[6] "...FAPRI would have used different models." Letter from Dr. Babcock, Exhibit US-114.

[7] Paragraph 82 of Answers of Brazil to Questions from the Panel, October 27, 2003.

[8] For example, Brazil cites export impacts ascribed to the export credit guarantee program by the National Cotton Council of America and uses those impacts without further foundation. The National Cotton Council of America's economic analysis in this instance has no foundation and no demonstrated methodology.

B. Adaptations to and Modifications of FAPRI Model Resulted in Exaggerated Results

15. Dr. Sumner's treatment of decoupled payments, crop insurance, and export credits are significant deviations from the FAPRI modeling framework. These changes are forced onto the FAPRI system resulting acreage effects that are much greater than would ever be anticipated by a true FAPRI analysis. Again, as Dr. Babcock has now candidly stated:

> "In addition, the modeling assumptions that Dan used to estimate the effects of the various U.S. domestic program components of U.S. policy are different than FAPRI would use if asked to answer the same questions."[9]

1. Dr. Sumner exaggerates the impact of decoupled payments as compared to FAPRI's modeling of those payments

16. FAPRI analysis of the impacts of decoupled programs (like Production Flexibility Contract payments (PFC), Direct Payments (DP), Market Loss Assistance payments (MLA) and Counter-cyclical Payments (CCP) was discarded by Dr. Sumner and replaced with an approach not supported by FAPRI, nor supported by the bulk of economic literature on the subject.

17. Dr. Sumner's decoupled effects are different than those normally used by FAPRI and were supposedly justified by Dr. Sumner's own estimation of producers' "anticipation" of future program changes and on his, now proven incorrect, contrived assumptions about actual planting patterns in the United States.[10]

18. The FAPRI baseline reflects their "most-likely" outcome for acreage, production, consumption and prices under a defined set of assumptions. Acreage projections for each of the crops reflect assumptions and outcomes for market indicators and government policy. According to the US crops model (Excel file US CROPS MODEL 2002.xls) sent by Dr. Babcock on November 26, upland cotton acreage in each region is determined by the following equation:

$$CTPLT_i = \alpha_0 + \alpha_1 * CTENR_i/PD + A*(\text{Vector of Competing Crop Returns}_i)/PD + \text{Decoupled Payment Impacts}_i + CRP[11]\ \text{Impacts}_i + \varepsilon_i$$

where

CTPLT = upland cotton planted acreage in region i
CTENR = expected cotton net returns from the market and the marketing loan in region i
PD = general price deflator
A = vector of parameter estimates for competing crops.

19. Although the US does not agree that decoupled payments impact planting decisions, it is useful to compare FAPRI's view of the impacts with that of Dr. Sumner.

20. Looking further into the FAPRI model, one finds that the decoupled payments are not included on a crop-specific basis as done by Dr. Sumner in his adaptations. Instead, FAPRI allocates total decoupled payments across all crops in a region. First, the total money is put on a per-acre basis by dividing the payments by acres planted to the major crops. Second, FAPRI then determines a total acreage impact for the region based on the responsiveness of the total land to the

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[9] Letter from Dr. Babcock, Exhibit US-114.

[10] Paragraphs 39-44 of U.S. Opening Statement at the Second Session of the First Panel Meeting, October 7, 2003.

[11] CRP = Conservation Reserve Program.

infusion of money. Third, the total acreage impact is allocated to the individual crops in each region based on the crop's share of recent plantings.

- Dr. Sumner discarded this FAPRI approach to decoupled payments and inserted his own "coupling" factor.
- Cotton acreage impacts for U.S. decoupled programs as would likely be presented by FAPRI are about 0.3%, consistent with the estimates in the economic literature previously presented by the United States (e.g., Westcott et al.).[12]
- Dr. Sumner's cotton acreage impacts, by contrast, are as high as 15.9% - that is, more than 50 times larger than what the FAPRI model would indicate.

21. The following table provides a comparison of acreage impacts included in the FAPRI model to those calculated by Dr. Sumner. In the FAPRI model, the acreage contribution of all decoupled payments across all major program crops ranges between 1.4 and 2.6 million acres. Decoupled payments to all crops contribute between 69 and 123 thousand acres to upland cotton. If we isolate the impact of decoupled payments for upland cotton base acres, the FAPRI model indicates that the shift in total cotton plantings ranges between 23 and 45 thousand acres, or *less than three-tenths of one percent of upland cotton area.* Impacts of this magnitude would not have appreciable impact on production and prices.

22. In stark contrast to the FAPRI model are the contrived impacts calculated by Dr. Sumner. In order to present a complete picture to the Panel, the United States presents Dr. Sumner's impacts in two ways. In Dr. Sumner's analysis of decoupled payments, equations (5) and (6) of Exhibit Bra-313 document his formulas for determining "the amount of cotton acreage that was held in cotton by these program payments." This acreage is subtracted from the error term of the equation or the impact can also be thought of as a shift in the supply curve. This impact will be termed the "gross impact" on cotton acreage of the program in question. Values for these "gross impacts" have been taken from the file FINAL US2003CropsModel WORKOUT.xls (received by the United States on November 18). Dr. Sumner's "gross impacts" of cotton decoupled payments on cotton plantings range from a low of 352 thousand acres to a high of 2.2 million acres. In contrast, the FAPRI model shows a gross impact of 23 to 45 thousand acres. Dr. Sumner's impacts are almost 50 times larger than those included in the FAPRI model.

23. To avoid any confusion by the Panel, the gross impacts of the programs are not the same values as the impacts shown in Annex I and Exhibit Bra-325. The results of Dr. Sumner's scenarios reflect his estimate of the net impact of removing various aspects of the cotton program. Net impacts will reflect the fact that producers have responded to the higher cotton prices under the scenario and increased plantings to partially offset the initial loss in acreage.

24. The following table also provides a comparison of Dr. Sumner's net acreage impacts of removing decoupled payments. These impacts correspond to the results presented in Annex I. It is worthwhile to note that Dr. Sumner's net impacts are still 25 times larger than the gross impacts derived from the FAPRI model. Simply put, FAPRI's model would not show the kind of acreage impacts assumed by Dr. Sumner.

[12] Westcott, P., Young, C. E., and Price, M., USDA, ERS, The 2002 Farm Act, Provisions and Implications for Commodity markets, Economic Research Service, November 2002. (See Exhibit Bra-42)

Acreage Impacts of Decoupled Payments (Million Acres)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	99-02 Avg	03-07 Avg
FAPRI Model Gross Total Area Impact of all Decoupled Pymts Across All Crops (1)	1.379	1.838	1.912	2.091	1.534	2.180	2.566	2.379	2.101	1.805	2.152
% of Plantings of All Crops	0.5%	0.7%	0.8%	0.8%	0.6%	0.9%	1.0%	0.9%	0.8%	0.8%	0.8%
FAPRI Model Gross Impact of All Decoupled Pymts on Cotton Acreage (2)	0.069	0.090	0.092	0.101	0.075	0.105	0.123	0.115	0.101	0.088	0.104
% of Upland Cotton Area	0.5%	0.6%	0.6%	0.7%	0.5%	0.7%	0.8%	0.8%	0.7%	0.6%	0.7%
FAPRI Model Gross Impact of Cotton Decoupled Pymts on Cotton Acreage (3)	0.023	0.030	0.031	0.029	0.037	0.042	0.045	0.043	0.040	0.028	0.041
% of Upland Cotton Area	0.2%	0.2%	0.2%	0.2%	0.3%	0.3%	0.3%	0.3%	0.3%	0.2%	0.3%
Sumner's Gross Impact of Cotton Decoupled Pymts on Cotton Acreage (4)	0.352	0.437	0.670	0.538	2.185	2.114	2.200	2.038	2.029	0.500	2.113
% of Upland Cotton Area	2.4%	2.8%	4.3%	3.8%	15.9%	14.2%	14.9%	13.9%	14.2%	3.4%	14.6%
Sumner's Net Impact of Cotton Decoupled Payments on Cotton Acreage (5)	0.350	0.320	0.510	0.300	1.710	1.190	0.790	0.860	0.850	0.370	1.080
% of Upland Cotton Area	2.4%	2.1%	3.3%	2.1%	12.4%	8.0%	5.3%	5.9%	6.0%	2.5%	7.5%
FAPRI Model Gross Impact of Cotton AMTA/DP Pymts on Cotton Acreage (6)	0.018	0.017	0.013	0.014	0.014	0.014	0.014	0.013	0.013	0.016	0.014
% of Upland Cotton Area	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%	0.1%
Sumner's Gross Impact of Cotton AMTA/DP Payments on Cotton Acreage (7)	0.191	0.164	0.240	0.202	0.575	0.567	0.593	0.544	0.544	0.199	0.565
% of Upland Cotton Area	1.3%	1.1%	1.5%	1.4%	4.2%	3.8%	4.0%	3.7%	3.8%	1.3%	3.9%
Sumner's Net Impact of Cotton AMTA/DP Payments on Cotton Acreage (8)	0.190	0.100	0.170	0.120	0.420	0.310	0.200	0.220	0.220	0.145	0.274
% of Upland Cotton Area	1.3%	0.7%	1.1%	0.9%	3.0%	2.1%	1.4%	1.5%	1.5%	1.0%	1.9%
FAPRI Model Gross Impact of Cotton MLA/CCP Pymts on Cotton Acreage (9)	0.005	0.014	0.017	0.015	0.023	0.028	0.031	0.029	0.027	0.013	0.028
% of Upland Cotton Area	0.0%	0.1%	0.1%	0.1%	0.2%	0.2%	0.2%	0.2%	0.2%	0.1%	0.2%
Sumner's Gross Impact of Cotton MLA/CCP Payments on Cotton Acreage (10)	0.161	0.273	0.431	0.336	1.610	1.546	1.607	1.494	1.484	0.300	1.548
% of Upland Cotton Area	1.1%	1.8%	2.8%	2.4%	11.7%	10.4%	10.9%	10.2%	10.4%	2.0%	10.7%
Sumner's Net Impact of Cotton MLA/CCP Payments on Cotton Acreage (11)	0.160	0.220	0.340	0.180	1.290	0.880	0.590	0.640	0.630	0.225	0.806
% of Upland Cotton Area	1.1%	1.4%	2.2%	1.3%	9.4%	5.9%	4.0%	4.4%	4.4%	1.5%	5.6%

(1) Source: File US CROPS MODEL 2002.xls, Model sheet, Row 4484.
(2) Source: File US CROPS MODEL 2002.xls, Model sheet, Row 4475.
(3) Source: Calculated in file *US CROPS MODEL 2002 NO Decoupled.xls* by setting cotton decoupled payments to zero.
(4) Source: File FINAL US2003CropsModel WORKOUT.xls, Equations sheet, sum of Rows 728 and 740.
(5) Source: Sum of Sumner's Net Impacts of AMTA/DP Payments and MLA/CCP Payments.
(6) Source: Calculated by subtracting acreage impacts of NO MLA/CCP from acreage impacts of NO Decoupled payments.
(7) Source: File FINAL US2003CropsModel WORKOUT.xls, Equations sheet, Row 728.
(8) Source: Table I.5b of Annex I.
(9) Source: Calculated in file *US CROPS MODEL 2002 NO MLA CCP.xls* by setting cotton MLA/CCP payments to zero.
(10) Source: File FINAL US2003CropsModel WORKOUT.xls, Equations sheet, sum of Row 740.
(11) Source: Table I.5c of Annex I.

2. Dr. Sumner Assigns Production Effects to Crop Insurance that FAPRI Does Not

25. Dr. Sumner's arbitrary introduction of crop insurance into his acreage system is a direct departure from the FAPRI model. Dr. Sumner provides no statistical basis to support his incorporation of crop insurance. He simply derives a per-acre value, forces those impacts into the acreage system, and treats the results as valid analysis. There is absolutely no empirical validation associated with his results.

26. FAPRI does not explicitly attribute any acreage response to the availability of crop insurance. Dr. Sumner's gross impacts range as high as 1.05 million acres, and net impacts reach 590 thousand acres.

27. The exclusion of crop insurance from the FAPRI model is warranted. As the United States has previously suggested,[13] if one were to consider the coverage levels obtained by cotton farmers, over 90 percent of insured cotton area would be subject to coverage levels agreed by Members to have no or minimal trade-distorting effects.

28. The United States has also demonstrated that the economic literature examining acreage effects of crop insurance is clearly mixed, but have never gone so far as to attribute production impacts as great as those asserted by Brazil.[14] The literature in general reflects that by its very nature the impact of crop insurance on production may be significantly different than its impact on acreage.

29. It seems intuitive to the United States that a dollar provided in the way of an insurance premium subsidy (provided to reduce the cost of an insurance product that pays when the crop is not produced) would have different impacts on producer decisions than a dollar provided to the producer when the value of a harvested crop falls short of some defined level (such as a marketing loan payment). Dr. Sumner's analysis treats them the same. FAPRI does not.

30. Thus, it is significant that the FAPRI model does not attribute acreage response to the availability of crop insurance. Dr. Sumner deviates from that model without any empirical foundation in the economic literature.

Acreage Impacts of Crop Insurance (Million Acres)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	99-02 Avg	03-07 Avg
FAPRI Model Impact of Cotton Crop Insurance Program on Cotton Acreage (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
% of Upland Cotton Area	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Sumner's Gross Impact of Cotton Crop Insurance Program on Cotton Acreage (2)	0.584	0.541	0.798	0.808	1.040	1.018	1.056	0.979	0.974	0.683	1.013
% of Upland Cotton Area	4.0%	3.5%	5.1%	5.7%	7.5%	6.8%	7.1%	6.7%	6.8%	4.6%	7.0%
Sumner's Net Impact of Cotton Crop Insurance Program on Cotton Acreage (3)	0.580	0.360	0.600	0.540	0.590	0.550	0.420	0.440	0.430	0.520	0.486
% of Upland Cotton Area	4.0%	2.3%	3.9%	3.8%	4.3%	3.7%	2.8%	3.0%	3.0%	3.5%	3.4%

(1) Source: No impact included in file US CROPS MODEL 2002.xls.
(2) Source: File FINAL US2003CropsModel WORKOUT.xls, Equations sheet, Row 752.
(3) Source: Table I.5d of Annex I.

[13] U.S. Opening Statement at the Second Session of the First Panel Meeting, Oct. 7, 2003, paras. 45-47.
[14] See Exhibits US-57 through US-60.

3. Dr. Sumner Assigns a Production Effect to Export Credits that FAPRI Does Not

31. In a further departure from the modeling approach used by FAPRI, Dr. Sumner introduces a 500 thousand-bale impact for export credit programs. US exports are reduced by introducing this shift in the US export equation.[15] The resulting effect is to lower the US price while increasing the world price. However, as with Dr. Sumner's other modifications, there is no statistical basis for these changes.

32. Brazil provides no statistical or other economic foundation for this level of impact from the export credit guarantee program. Dr. Sumner's stated source for the 500,000 bale impact is testimony delivered by the National Cotton Council of America in 2001, a U.S. trade association that operates on behalf of the U.S. cotton industry.[16] Brazil presents no evidence of how that estimate was calculated and presents no analysis of its own.[17]

33. With respect to any actual effects on world prices caused by the application of the U.S. export credit guarantee program to U.S. cotton exports, Brazil has cited no subsidy component estimates and demonstrated no economic analysis.

34. Dr. Sumner's model passes off his 500,000-bale export shift as economic analysis and forces it upon the FAPRI model. Does the Sumner model show acreage impacts from the removal of the export credit guarantee program? Of course it does since Dr. Sumner forced it to show those impacts. Brazil, cannot, however, base its estimates on FAPRI or on any demonstrated analytical approach.

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[15] Exhibit Bra-313, page 5, "For the export credit, as explained in the Annex I, I base the estimated shift in export demand conservatively on the information provided by the U.S. Cotton Council. The FAPRI baseline, which assumes continuation of the export credit program, implicitly includes 500,000 bales of cotton attributable to the export credit program. So eliminating the program is implemented by simply subtracting 500,000 bales from the intercept of equation 7 in each year."

[16] See Exhibit Bra-41. The National Cotton Council is a trade association that lobbies the U.S. government on behalf of the U.S. cotton industry.

[17] In the September 9 Brazil Submission before the Second Session of the First Panel Meeting, paras 192-194, Brazil carried out another economic sleight of hand by implying that Dr. Sumner's export estimates with respect to the export credit guarantee program were more conservative than the unsubstantiated estimate it cites from the National Cotton Council. Paragraph 194 of that submission acts as if the NCC estimate of a possible 3 cent per pound US price impact and Dr. Sumner's estimate of a .57 cent per pound world price impact are somehow independent analyses - and demonstrate Dr. Sumner's conservative approach. However, as demonstrated in Bra-313, all Dr. Sumner did was force a reduction in U.S. export estimates of 500,000 bales (using the NCC testimony as his sole economic foundation), which correspondingly reduced prices in the U.S., which correspondingly both reduced U.S. acreage and slightly increased exports - cutting into the initially imposed 500,000 bale shift. Further, the "different" price estimates were, in fact, estimates of two different set of prices - U.S. and world. Brazil inappropriately characterized Dr. Sumner's results as being conservative relative to the NCC estimate. (Paragraph 192, Brazil's Further Submission to the Panel, September 9, 2003) Later when the Panel raised a question about the results, Dr. Sumner somehow forced a full 500,000 bale decline in U.S. exports, ignoring the impacts of price response. (See, for example, Bra-325, last category of tables - export credit guarantee with fixed 500,000 bale impact) In that response, Brazil also maintained the stance that these two "analyses," neither demonstrating economic foundation, were somehow independent, while fairly clearly demonstrating that Dr. Sumner merely took the NCC testimony and imposed a 500,000 bale demand shift.

Export Shifts due to Export Credits (Million Bales)

	1999	2000	2001	2002	2003	2004	2005	2006	2007	99-02 Avg	03-07 Avg
FAPRI Model Impact of Export Credits on Cotton Exports (1)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sumner's Gross Impact of Export Credits on Cotton Exports (2)	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500	0.500
Sumner's Net Impact of Export Credits on Cotton Exports (3)	0.300	0.290	0.330	0.300	0.300	0.300	0.300	0.310	0.310	0.305	0.304

(1) Source: No impact included in file US CROPS MODEL 2002.xls.
(2) Source: Paragraph 59 of Annex I.
(3) Source: Table I.5g of Annex I.

III. Annex I Results Used Variables Lower Than Cited November 2002 FAPRI Baseline

35. The United States has previously indicated to the Panel its concern that acreage impacts in Annex I were based off of the FAPRI preliminary November '02 baseline instead of the more recent and readily available final January 2003 FAPRI baseline. The United States believes this choice of baseline biased the results shown in Annex I.[18] A closer review of the Annex I results, however, show they were not exactly based off the November 2002 baseline either.

A. Use of Variables Lower than November 2002 Baseline Increased Acreage Impacts

- By using prices and other variables that were even lower than the FAPRI November '02 baseline, Brazil managed to further increase acreage impacts it attributed to the U.S. cotton program.

36. Contrary to the assertions contained in Annex I, it appears that the baseline that is presented there is not the FAPRI November 2002 baseline. The following table provides a comparison of the "A" Index from the baseline presented in Annex I with the FAPRI November 2002 baseline as provided by Dr. Babcock on November 26.

[18] U.S. Opening Statement at the Second Session of the First Panel Meeting, Oct. 7, 2003, para. 36.

Comparison of Annex I Baseline with FAPRI November '02 Baseline

	2003	2004	2005	2006	2007
"A" Index (Cents/Lb)					
Annex I	50.69	53.44	55.75	57.56	59.60
FAPRI Nov '02 Baseline	52.35	54.74	56.77	58.69	60.52
Change from FAPRI	-1.66	-1.30	-1.02	-1.13	-0.92
Upland Cotton Farm Price (Cents/Lb)					
Annex I	44.96	47.74	50.30	51.20	53.89
FAPRI Nov '02 Baseline	45.66	48.83	51.18	52.04	54.67
Change from FAPRI	-0.70	-1.09	-0.88	-0.84	-0.78
Upland Cotton Planted Area (Million Acres)					
Annex I	13.780	14.880	14.770	14.650	14.270
FAPRI Nov '02 Baseline	13.782	14.720	14.772	14.658	14.252
Change from FAPRI	-0.002	0.160	-0.002	-0.008	0.018
Upland Cotton Production (Million Bales)					
Annex I	16.050	17.420	17.400	17.370	17.010
FAPRI Nov '02 Baseline	16.052	17.215	17.397	17.377	16.982
Change from FAPRI	-0.002	0.205	0.003	-0.007	0.028

Source: FAPRI Nov '02 Baseline numbers from file *US CROPS MODEL 2002.xls*

37. The baseline used by the Annex I model appears to contain slightly lower cotton planted acreage, different upland cotton production, lower upland cotton farm prices and lower "A" index cotton prices than were shown in the FAPRI preliminary November 2002 baseline.[19]

B. Baseline Used in Annex I Exaggerated Program Effects Beyond That Previously Assumed By United States

38. The baseline used in Annex I exaggerated program effects even more than previously assumed by the United States. The baseline used in Annex I contained lower cotton prices than those included in the FAPRI November 2002 baseline. It also contains several other variables that are different from the November 2002 baseline. There is no basis for this discrepancy, if Dr. Sumner actually used the November 2002 FAPRI baseline and, as stated in Bra-313, "none of the other equations in the FAPRI specification are modified to explicitly analyze the removal of U.S. cotton programs." [20]

IV. Brazil's Model Has No Explanatory Power

39. It would be anticipated that a model proposed to demonstrate effects of removing program components of the U.S. cotton program and the impact of that removal on planting decisions would also demonstrate the ability to correctly predict planted acreage of upland cotton, given prices and other factors.

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[19] Brazil's later submissions refer to the November 2002 baseline, paragraph 114 of Brazil's Further Rebuttal Submission of Nov 18, 2003.

[20] Bra-313, page 5.

40. The Sumner-modified model presented in Annex I does not explain cotton planting decisions.

41. In fact, the simple ratio of cotton to soybeans expected harvest season futures prices at the time of planting, discussed by the United States,[21] does a much better job of explaining the movement in US cotton acreage than what is found in Dr. Sumner's formulation.

42. Even an analysis of planting decisions based on lagged prices, while not as correlated as the ratio of expected futures prices, also does a better job of explaining producer planting decisions than does Dr. Sumner's net returns formulation.

43. In fact, the formulation presented in Annex I actually contains a *negative* correlation between expected net revenue and planting decisions in most cotton regions of the United States.

44. In other words, the Annex I model tends to predict that cotton producers will plant *less* cotton in response to higher returns.

45. In Annex I, Dr. Sumner reports the functional form of expected net revenue used in determining planted acreage of upland cotton (equation 1 on page 13). Empirical results indicate that Dr. Sumner's contrived formulation of expected net revenue does not explain the movement in US plantings of upland cotton.[22] The following table presents correlation coefficients between the explanatory variables in Dr. Sumner's acreage equations and actual acreage levels for each region and for the United States over the 1996-2002 period.

46. Cotton expected net revenue, in nominal terms, calculated according to equation (1) of Annex I has a *negative* correlation with planted acreage in 4 of the 6 cotton-producing regions modeled by Dr. Sumner. Over the 1996-2002 period, those 4 regions accounted for 93% of US acreage. Dr. Sumner's equations for planted acreage are not solely based on nominal net revenue of cotton. They also take into account competing crops in each region, and returns are converted to real dollars by dividing by a general price deflator.

47. The lack of predictive ability of Dr. Sumner's acreage equations is best illustrated by the correlation between acreage and the Weighted Expected Net Returns for all Crops in real terms. This aggregate net return is calculated by multiplying each parameter estimate by the respective real net returns for that crop calculated according to equation (1) of Annex I and then summing the resulting values. This calculation incorporates all explanatory variables that are included in Dr. Sumner's acreage equations with the appropriate elasticity.

48. The correlation results indicate that Dr. Sumner's equations are not accurate predictors of the movements in cotton acreage. The correlation in 3 regions is negative, and in two other regions, the

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[21] Paragraphs 152-167 of U.S. Further Rebuttal Submission, November 18, 2003.

[22] The calculation of expected net revenue follows the general form indicated by equation (1) of Annex I. Data for expected market and marketing loan benefits are taken directly from the file FINAL US2003CropsModel WORKOUT.xls, which is a cotton-only US model supplied by Brazil. Exact calculations of per-acre PFC, DP, MLA and CCP payments, as well as crop insurance were not included in the file. Nor has this exact documentation been provided by Brazil. In the absence of a complete explanation regarding these calculations, the US has adopted the following formulas for expected per-acre payments for each region i:

PFCi = 0.85 * (PFC Payment Rate) * (Program Yield)i ,

MLAi = 0.85 * (MLA Payment Rate) * (Program Yield)i,

DPi = 0.85 * (Direct Payment Rate) * (Program Yield)i,

CCPi = 0.85 * max(0, Target Price – max(Loan Rate, Farm Price)) * (Program Yield)i.

The variables for decoupled payments and crop insurance have been calculated for each crop and region and included in expected net revenue for the determination of correlation coefficients and explanatory power.

correlation is weakly positive. Only in the smallest production region in the US is there a positive correlation that is statistically significant.

49. In fact, the explanatory power and reliability of Dr. Sumner's acreage model is far less than one explanation of recent movements in cotton acreage provided by the United States, the ratio of cotton to soybeans expected harvest season futures prices at time of planting. Because soybeans is a major competing crop of cotton in many cotton-producing regions, this ratio expresses the relative attractiveness of planting cotton from expected market returns.[23] Simply put, the ratio of expected futures prices does a much better job of explaining the movement in US cotton acreage than what is found in Dr. Sumner's arbitrary formulation.

Correlation of Selected Explanatory Variables with Upland Cotton Planted Area, 1996-2002 Period (1)

	Corn Belt	Central Plains	Delta States	Far West	Southeast	Southern Plains	**US**
Sumner's Cotton Expected Net Returns (Nominal $)	-0.27	0.11	-0.29	0.29	-0.53	-0.09	**-0.28**
Sumner's Cotton Expected Net Returns (Real $)	-0.29	-0.08	-0.32	0.38	-0.58	-0.14	**-0.30**
Sumner's Weighted Expected Net Returns for all Crops (Real $)	-0.21	0.40	-0.25	0.17	-0.35	0.16	**-0.14**
Ratio of Cotton and Soybean Futures Prices	0.55	-0.37	0.66	0.23	0.33	0.63	**0.69**
Ratio of Lagged Cotton and Soybean Farm Prices	0.14	-0.64	0.37	0.40	-0.06	0.46	**0.40**

(1) Source: File FINAL US2003CropsModel Correl 1.xls

50. The statistics are very clear. Dr. Sumner's methodology of modeling producer expectations and planting decisions has no explanatory power, and analysis based on these equations is not reliable. His proposed formulation of net returns is not consistent with producers' expectations and acreage decisions. The equations are not reliable for assessing the removal of U.S. programs, and this applies to not only decoupled payments and crop insurance, but also marketing loans.

51. Recent historical data clearly indicate that producers are making their decisions on their expectations of market prices for cotton and primary competing crops.[24] Furthermore, those price expectations are not captured by the naïve approach of simply using last year's price to determine this year's acreage decision. As Brazil's expert, Mr. MacDonald explained at the second session of the first panel meeting, futures markets embody the best available information about expected prices. The data indicate that cotton farmers' planting decisions are made accordingly.

[23] Paragraphs 5-9 of Answers of the United States of America to the Questions from the Panel to the Parties following the Second Session of the First Substantive Panel Meeting, October 27, 2003.

[24] Paragraphs 152-167 of U.S. Further Rebuttal Submission, November 18, 2003.

52. The formulations discussed in Annex I do not reflect the expectations of producers and do not explain the movement in U.S. cotton acreage. This is particularly troublesome as those formulations are a critical link in Brazil's attempt to ascribe significant acreage impacts to the U.S. cotton program. There is no credible statistical evidence that supports this linkage, and the Annex I formulations that form a part of this analytical linkage fail to accurately explain movement in acreage.

V. Dr. Sumner's Methodology Deviates from FAPRI's Linear Acreage System

53. FAPRI's linear acreage system would tend to ensure that impacts from a static change in returns should be the same across several years. However, contrary to the normal FAPRI system, the Sumner analysis shows impacts that grow substantially over several years.

54. According to the US crops model (Excel file US CROPS MODEL 2002.xls) sent by Dr. Babcock on November 26, upland cotton acreage in each region is determined by the following equation:

$CTPLT_i = \alpha_0 + \alpha_1 * CTENR_i/PD + A*(\text{Vector of Competing Crop Returns}_i)/PD$
$+ \text{Decoupled Payment Impacts}_i + \text{CRP Impacts}_i + \varepsilon_i$

where

CTPLT = upland cotton planted acreage in region i
CTENR = expected cotton net returns from the market and the marketing loan in region i
PD = general price deflator
A = vector of parameter estimates for competing crops.

Expected net returns for each crop are defined as
(Lagged Farm Price + max(0, Loan Rate – Lagged Loan Repayment Price)) * Expected Yield – Variable Costs.

55. As documented in equation (1) of Annex I, Dr. Sumner modifies expected net returns to include his calculations of decoupled payments and crop insurance benefits. The new equations for expected net returns are transformed as follows:

(Lagged Farm Price + max(0, Loan Rate – Lagged Loan Repayment Price)) * Expected Yield – Variable Costs + b_{pfc} * PFC + b_{dp} * DP + b_{mla} * MLA + b_{ccp} * CCP + CIS,

where

PFC = per-acre PFC payments
DP = per-acre direct payments
MLA = per-acre MLA payments
CCP = per-acre counter-cyclical payments
CIS = crop insurance variable
b_{pfc} , b_{dp} , b_{mla} , b_{ccp} = scaling factors.

56. An important aspect of the linear acreage equations as modified by Dr. Sumner concerns the response to changes in net returns. If net returns for cotton change by a given amount, then the impact or shift in cotton acreage is determined as α_1*(Change in returns)/PD. If the change in returns is the same across years, then the only difference in terms of the acreage impact is due to the value of the price deflator PD.

A. Acreage Impacts for 2003-07 Appear Inconsistent with 1999-2002 Period

57. Dr. Sumner's acreage impacts attributed to decoupled payments and crop insurance show tremendous variations over the 1999-2007 period. Specifically, acreage shifts for the 2003-07

period are much larger than those reported for the 1999-02 period. The larger impacts are not consistent with the relative program values assumed by Dr. Sumner. In the case of decoupled payments, incorporating Dr. Sumner's "coupling" factors does not fully explain the differences in impacts.

58. The following table provides a comparison of the average acreage impacts reported in rows 720-771 of the file FINAL US2003CropsModel WORKOUT.xls. The averages reflect the two periods of the analysis covered by the different farm bills. The U.S. cannot verify Dr. Sumner's calculations due to insufficient information. However, some basic calculations cast serious doubt on the validity of Dr. Sumner's analysis.

59. The acreage impacts reported for DP payments over the 2003-07 period are much larger than those indicated for PFC payments during 1999-2002 even though direct payment rates under the current farm bill are actually smaller than PFC payment rates under the FAIR Act. Surprisingly, this difference cannot be adequately explained by Dr. Sumner's decision to provide much stronger acreage impacts for Direct Payments than he attributed to PFC payments. Even when the United States attempted to incorporate Dr. Sumner's "coupling" factor, the acreage impacts appear much larger than the increased (1.5 times) "coupling" factor would seem to indicate.

60. The same concern holds true for MLA and CCP payments. The acreage impact associated with CCP increases by a factor of five while the effective payment under the 2002 Act is 3.4 times larger than the MLA payment. In the Central Plains, the impact is more than 147 times larger over the 03-07 period than over 99-02. The Southeast shows an acreage impact due to CCP that is almost 8 times the size of that implied for MLA by Dr. Sumner under the 1996 Act.

B. Crop Insurance Impacts over 2003-2007 Period Vary From Impacts Over 1999-2002

61. In paragraphs 52 through 56 of Annex I, Dr. Sumner addresses his contrived methodology for incorporating crop insurance. He states that the per-acre crop insurance effect on net revenue is the same in all years of the analysis, and at the national level, it equals $19 per acre. He does not indicate if the value changes for each region in his acreage system. That notwithstanding, we do know that the impact on net revenue is the same in all years of the analysis. If that is the case, then the linear specification presented in equation (1) of Annex I would generate roughly the same acreage shift in each year of the analysis, with the exception of the impact of the change in the general price deflator. Since the price deflator, which is a measure of general price inflation, generally increases over time, then the actual impact on acreage should get modestly smaller over time. Instead, Dr. Sumner's acreage shifts due to crop insurance increase dramatically over the analysis period. In the early years, the impact of $19 in net revenue amounts to fewer than 600 thousand acres, while it grows to more than 1 million acres in 2003.

62. Despite the fact that the perceived benefit did not change, Dr. Sumner's methodology produced an acreage impact over the 2003-07 period that is roughly 1.5 times larger than over the 1999-2002 period. Furthermore, in the case of the Corn Belt, Dr. Sumner's analysis actually indicates that the presence of the crop insurance program has *removed* acres from cotton production - a result that is implausible.

Comparison of Calculated Payment Rates with Acreage Shifts Reported in FINAL US2003CropsModel WORKOUT.xls

	99-02 Average	03-07 Average	Ratio
AMTA/DP Effective Average Payment Rate (Cents/Lb) *	1.10 (= 7.34 * 0.15)	1.67 (= 6.67 * 0.25)	1.52
AMTA/DP Acreage Impacts (Mil Acres)			
Corn Belt	0.0015	0.0047	3.03
Central Plains	0.0025	0.0053	2.11
Delta States	0.0390	0.1425	3.65
Far West	0.0004	0.0012	2.84
Southeast	0.0764	0.2734	3.58
Southern Plains	0.0794	0.1380	1.74
Total U.S.	0.1993	0.5650	2.84
MLA/CCP Effective Average Payment Rate (Cents/Lb) *	1.61 (= 6.42 * 0.25)	5.49 (= 13.73 * 0.40)	3.41
MLA/CCP Acreage Impacts (Mil Acres)			
Corn Belt	0.0023	0.0137	5.96
Central Plains	0.0001	0.0151	147.22
Delta States	0.0872	0.3867	4.43
Far West	0.0022	0.0037	1.67
Southeast	0.0927	0.7307	7.88
Southern Plains	0.1157	0.3983	3.44
Total U.S.	0.3002	1.5482	5.16
Crop Insurance Average Benefit (Dollars/Ac)	$19	$19	1.00
Crop Insurance Acreage Impacts (Mil Acres)			
Corn Belt	-0.0002	-0.0003	1.52
Central Plains	0.0120	0.0219	1.83
Delta States	0.0596	0.1018	1.71
Far West	0.0012	0.0013	1.06
Southeast	0.2372	0.4609	1.94
Southern Plains	0.3728	0.4279	1.15
Total U.S.	0.6826	1.0135	1.48

* Effective Rates Calculated by Multiplying Average Rates by Dr. Sumner's "Coupling" Factor.

C. Sumner Model Adopts Non-Linear Responses Contrary to FAPRI

63. In Exhibit Bra-313, Dr. Sumner provides further documentation regarding the analysis of decoupled payments and crop insurance. The new documentation suggests an entirely different methodology than presented in Annex I.

64. The documentation provided in Annex I suggests that cotton area is determined by the equation:

$CTPLT_i = \alpha_0 + \alpha_1 * CTENR_i/PD + A*(\text{Vector of Competing Crop Returns}_i)/PD + \varepsilon_i$

where cotton expected net returns CTENR are determined as
(Lagged Farm Price + max(0, Loan Rate – Lagged Loan Repayment Price)) * Expected Yield – Variable Costs + b_{pfc} * PFC + b_{dp} * DP + b_{mla} * MLA + b_{ccp} * CCP + CIS.

65. Based on this documentation, analyzing the impacts of no decoupled payments would be done by simply setting the decoupled payments to zero. However, in Exhibit Bra-313, equations (4)-(6) suggest a very different methodology for deriving impacts. Dr. Sumner reports to use the following approach:

Percentage difference in acreage due to program
= (Expected program payments/(Expected program payments + (cotton market & market loan net revenue))) * Acreage elasticity.

Acreage impacts would be derived by multiplying the percentage difference in acreage by the baseline level of acreage.

66. The new methodology yields acreage impacts that vary depending on the level of returns from the market and marketing loan. This methodology explains how Dr. Sumner is able to derive varying impacts in a scenario where the change introduced into the system is constant, such as the crop insurance scenario.

D. Sumner Formulation Ignores Presence of Other Programs and Therefore Exaggerates Impacts

67. Dr. Sumner's formulation for isolating the impacts of each individual program produces exaggerated results. It is logical to assume that Dr. Sumner's baseline acreage represents his most likely view based on the presence of all U.S. cotton programs. As such, determining the acreage impact of each individual program should be done by comparing returns from the program in question with total returns, where total returns are defined as

(Lagged Farm Price + max(0, Loan Rate – Lagged Loan Repayment Price)) * Expected Yield – Variable Costs + b_{pfc} * PFC + b_{dp} * DP + b_{mla} * MLA + b_{ccp} * CCP + CIS.

68. Dr. Sumner's approach of comparing returns for the program in question to returns from the market and marketing loan ignores the presence of other programs. Since returns from the market and marketing loan are *less* than total returns, then the acreage impacts for a given program based on Dr. Sumner's formulation will be larger. The following table uses data for the Southern Plains in 2005 to illustrate the differences. Following Dr. Sumner's documentation of Exhibit Bra-313, the acreage impacts of decoupled payments and crop insurance total 671 thousand acres. If the methodology was based on total revenue, then the estimated acreage impact is 543 thousand acres. Full details of the calculations are presented in the file FINAL US2003CropsModel Correl 1 (Exhibit US-115).

E. United States Has Difficulty Replicating Sumner Results - Even After Adopting Sumner Methodology

69. The estimates prepared by the U.S. are substantially smaller than those reported by Dr. Sumner in the file FINAL US2003CropsModel WORKOUT.xls (submitted on November 18). The discrepancies are particularly large over the 2003-07 period. Dr. Sumner reports an average acreage impact due to decoupled payments and crop insurance of 3.1 million acres over the 2003-07 period. Estimates by the U.S. using Dr. Sumner's formulas find an impact of only 1.2 million acres. The inability to even remotely replicate Dr. Sumner's estimates casts serious doubts about the validity of his results. Dr. Sumner's calculations appear to be as arbitrary as his economic logic.

70. Brazil may cite the fact that the elasticity with respect to net returns is lower than the estimates published in Table I.3 of Annex I. While the United States is not able to verify the discrepancy, the elasticities used in the U.S. calculations are based on data provided in the file FINAL US2003CropsModel WORKOUT.xls. Specifically, the elasticity in each year is determined by the formula (α_1 / Value of price deflator)*(Value of net returns / Value of cotton acres), where a1 is the coefficient on cotton net returns in the regional cotton acreage equation. The value of net returns and cotton acres are based on regional numbers in each year. This formulation is consistent with Dr. Sumner's documentation presented in Exhibit Bra-313.

Example of Southern Plains Acreage Impacts, 2005

Program	(1) Market Revenue	(2) Program Revenue	(3) = (2)/((1) + (2)) % of Market + Program Revenue	(4) Elasticity	(5) Planted	(6) = (3)*(4)*(5) Estimated Impact	(7) Sumner Impact
Direct Payments	$109.04	$6.08	5.28%	0.28	6.046	0.090	0.145
CCP's	$109.04	$20.02	15.51%	0.28	6.046	0.265	0.416
Crop Insurance	$109.04	$24.67	18.45%	0.28	6.046	0.316	0.446
Total Area Impact						**0.671**	**1.007**

Example of Southern Plains Acreage Impacts, 2005

Program	(1) Total Revenue	(2) Program Revenue	(3) = (2)/(1) % of Total Revenue	(4) Elasticity	(5) Planted	(6) = (3)*(4)*(5) Estimated Impact	(7) Sumner Impact
Direct Payments	$159.81	$6.08	3.80%	0.28	6.046	0.065	0.145
CCP's	$159.81	$20.02	12.53%	0.28	6.046	0.214	0.416
Crop Insurance	$159.81	$24.67	15.44%	0.28	6.046	0.264	0.446
Total Area Impact						**0.543**	**1.007**

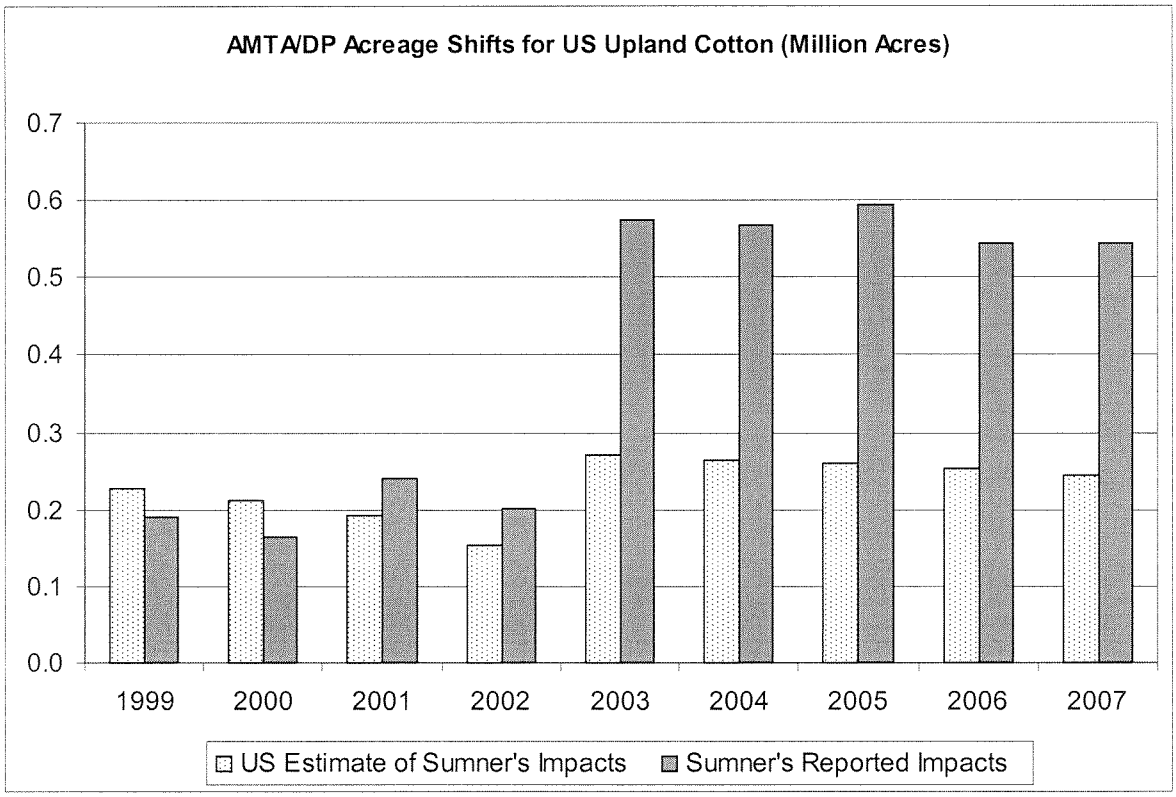
	1999-2002 Average Acreage Impact (Million Acres)			
	AMTA/DP	MLA/CCP	Crop Insurance	Total
Sumner Reported Impact	0.199	0.300	0.683	1.182
Estimate of Sumner Approach Using Market Returns	0.197	0.286	0.636	1.119
Estimate of Sumner Approach Using Total Returns	0.166	0.243	0.587	0.996

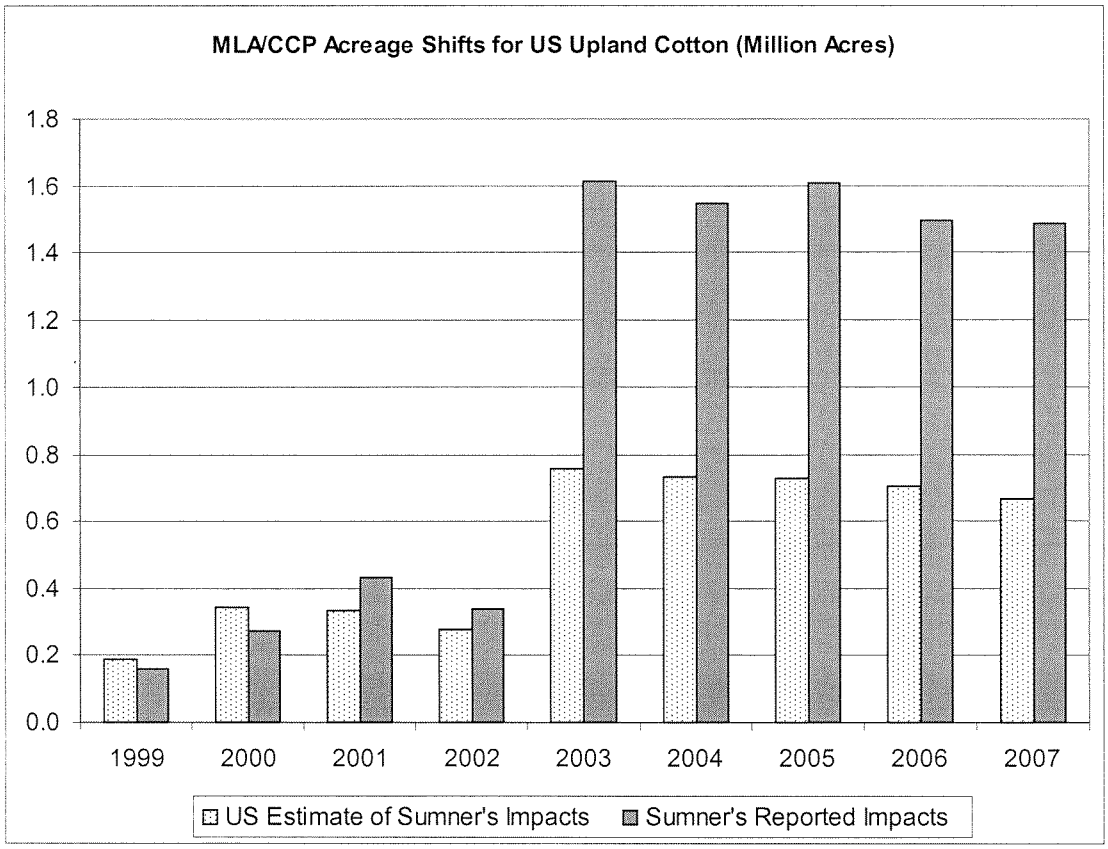
	2003-2007 Average Acreage Impact (Million Acres)			
	AMTA/DP	MLA/CCP	Crop Insurance	Total
Sumner Reported Impact	0.565	1.548	1.013	3.127
Estimate of Sumner Approach Using Market Returns	0.258	0.718	0.553	1.529
Estimate of Sumner Approach Using Total Returns	0.179	0.591	0.432	1.202

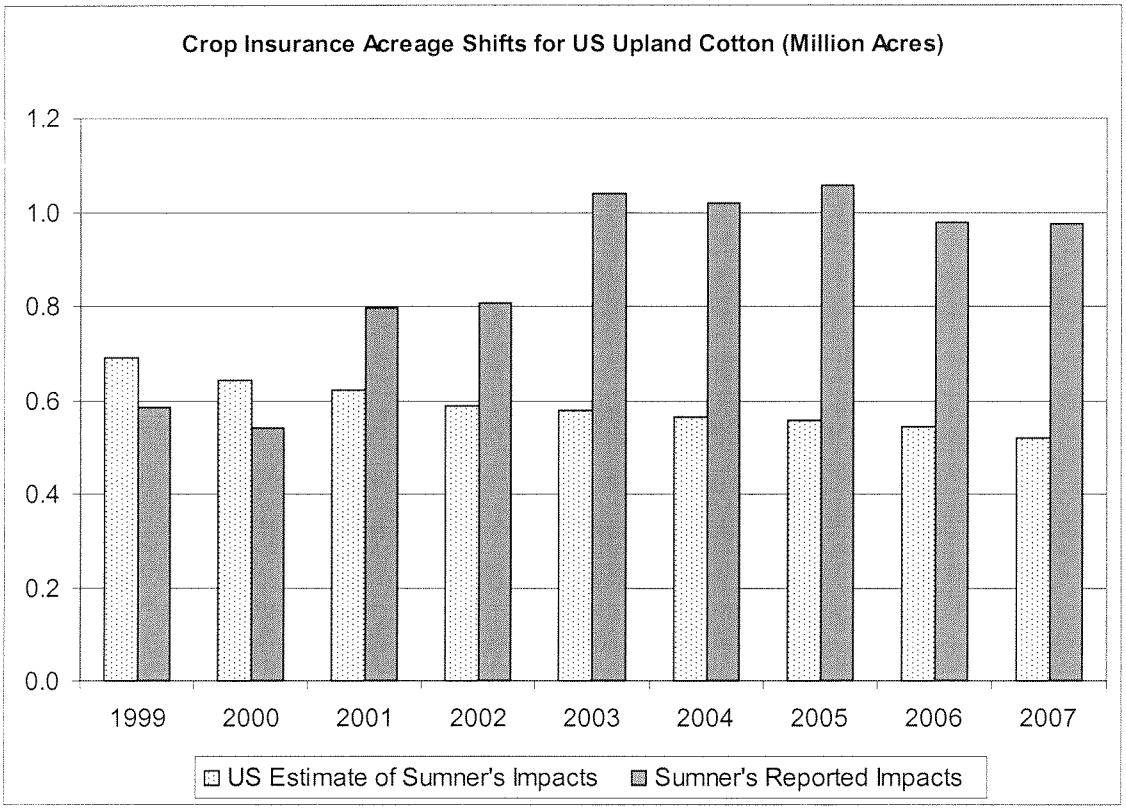
71. The following charts provide a year-by-year comparison between Dr. Sumner's reported impacts and estimates prepared by the United States. The formulas use to generate these estimates follow the documentation provided by Dr. Sumner. In cases where the information was incomplete, reasonable assumptions were made to facilitate the calculations. Complete details are provided in the file FINAL US2003CropsModel Correl 1[25].

72. Estimates by the United States for the 1999-2002 period are reasonably close to those offered by Dr. Sumner. However, there are large discrepancies over the 2003-07 period. It is inexplicable how the impact between the two periods can be so different. The differences cannot be explained by Dr. Sumner's method of incorporating alternative "coupling" factors.

[25] Exhibit US-115.


AMTA/DP Acreage Shifts for US Upland Cotton (Million Acres)
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
US Estimate of Sumner's Impacts
Sumner's Reported Impacts


MLA/CCP Acreage Shifts for US Upland Cotton (Million Acres)
1.8
1.6
1.4
1.2
1.0
0.8
0.6
0.4
0.2
0.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
US Estimate of Sumner's Impacts
Sumner's Reported Impacts



VI. Sumner Modifications to FAPRI Model Described in Bra-313 Contain Errors

73. In Exhibit Bra-313, equation (2) on page 2 states that real net revenue for crop i in year (t-1) is a function of the price in (t-1) and the loan rate in (t-1), and other variables. It is this specification for real net revenue that determines acreage in year t, as described in equation (1). The combination of these two equations indicates that the loan rate in t-1 helps determine acreage in period t. In other words, Dr. Sumner's equation seems to assert it is last year's loan rate, and not the one in effect for this year's crop, that determines this year's plantings. Not only is this completely illogical, but it is in direct conflict with acreage equations previously developed by both FAPRI and USDA. The United States cannot determine if this equation reflects a lack of knowledge of the model, a broader deficiency in economics, or some previously unknown modification of the FAPRI or CARD models.

74. Dr. Sumner's documentation presented in equation (2) is inconsistent with equations contained in the files US CROPS MODEL 2002.xls (provided by Dr. Bruce Babcock on November 26) and FINAL US2003CropsModel WORKOUT.xls (provided by Brazil on November 18). Equation (2) defines real net revenue for crop i by taking the higher of the lagged farm price and the lagged loan rate, then multiplying by trend yield and subtracting variable costs. He further explains that this formulation applies to all crops except cotton and rice, where the marketing loan benefit depends on the difference between the loan rate and the AWP. However, in the two electronic versions of the crops model, which have been provided by Dr. Sumner and Dr. Babcock,[26] the formulation of expected net revenue is not consistent with Dr. Sumner's documentation. According to the electronic versions, all crops incorporate the marketing loan benefit by taking the difference between the loan rate and the loan repayment price. The United States and the Panel are left to

[26] File US CROPS MODEL 2002.xls (provided by Dr. Bruce Babcock on November 26) (Exhibit US-116) and FINAL US2003CropsModel WORKOUT.xls (provided by Brazil on November 18) (Exhibit US-115).

wonder why there is a discrepancy between Dr. Sumner's documentation and the models that have been provided.

75. Exhibit Bra-313 and Annex I provide different and conflicting methodologies for incorporating the impacts of crop insurance and decoupled payments. According to equation (1) of Annex I, the formula for determining expected net revenue has been modified to include per-acre decoupled payments and crop insurance benefits. These net returns then determine cotton planted acreage. However, in equation (1a) of Bra-313, Dr. Sumner indicates that net revenue only considers returns from the market and the marketing loan. He then incorporates the impacts of decoupled payments and crop insurance by adding some arbitrary acreage impacts into the equation. As explained earlier,[27] the approach presented in Exhibit Bra-313 only serves to exaggerate his acreage impacts.

76. In equation (7), Dr. Sumner documents the equation specification for US cotton exports. His documentation indicates that exports in year t are a function of production in t-1, and other variables. Dr. Sumner's model suggests that last year's production directly determines this year's exports. This is both illogical and a departure from the specification included in the FAPRI framework.

VII. Overall Price Responsiveness of the Annex I Model

77. The overall price impacts generated by a model are determined by the underlying supply and demand elasticities within the system. If overall supply and demand are more elastic, or more responsive, then an external shock to the system will generate a smaller change in price than a system that is more inelastic.

78. In the case of the scenarios examined by Dr. Sumner, the external shocks to the model are the elimination of various aspects of the US cotton program. According to Dr. Sumner's analysis, the removal of the US cotton program leads to a reduction in planted area, production, and subsequently exports onto the world market. The reduced supplies into the world market generate an increase in world price, with the magnitude of the price increase determined by the overall elasticities embodied within the models for foreign production and consumption.

79. The following table provides a comparison of aggregate supply and demand elasticities for foreign area and mill use. Based on individual country elasticities, the response of aggregate foreign area and consumption can be calculated based on weights derived from recent historical data. The elasticities reported in Table I.3 of Annex I are used to derive the aggregate elasticities of the Sumner-CARD international cotton[28] model provided by Brazil on November 13. These are compared to published research from Dr. Seth Meyer at FAPRI-University of Missouri, which reports more responsiveness in both area and consumption.[29]

Comparison of Model Elasticities

	Meyer – FAPRI		Sumner - CARD	
	Short Run	Long Run	Short Run	Long Run

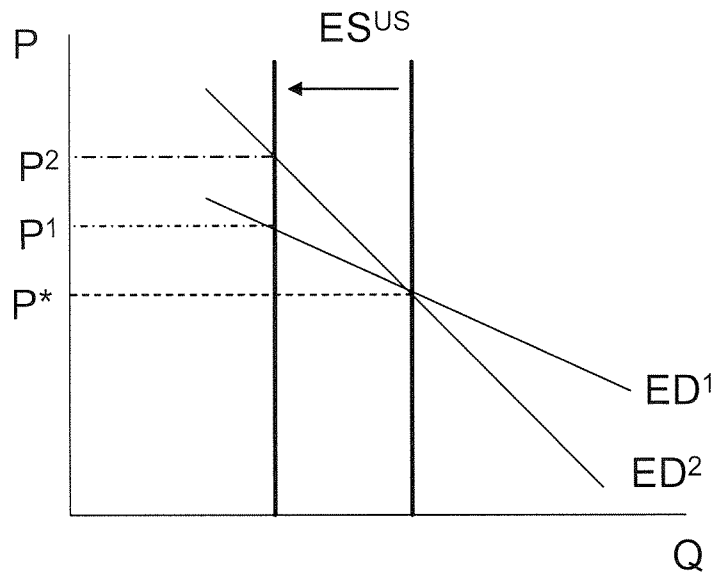
[27] Section V.c of this document.

[28] File WDCT2002 Meltdown WORKOUT.xls, provided by Brazil on November 13, 2003. (Exhibit US-115.)

[29] Seth D. Meyer, *A Model of Textile Fiber Supply and Inter-Fiber Competition with Emphasis on the United States of America,* Food & Agricultural Policy Research Institute, University of Missouri, 2002.

Foreign Area	0.45	0.78	0.24	N/A
Foreign Mill Use	-0.37	-0.49	-0.25	N/A

80. The net trade position of countries outside of the US is one of a net importer. Since their consumption exceeds their production, their excess demand (ED) is defined as demand (D) – supply (S). The responsiveness of their excess demand (ED) is approximated by the elasticity of the domestic demand less the elasticity of their domestic supply. In the case of the Meyer model, the elasticity of excess demand is -0.37 – 0.45 = -0.82. For the Sumner model, the elasticity of excess demand is -0.25 – 0.24 = -0.49. This fundamental difference has a direct impact on the price impacts generated by the model, as evidenced by the following chart. The line ED1 represents an excess demand curve with more price responsiveness, while ED2 is an excess demand curve with less elasticity. The intersection of excess demand outside of the United States with excess supply (ESUS) from the United States generates an equilibrium price. When there is a reduction in the excess supply from the United States, the elasticity of excess demand, which is reflected by the slope of the line has a direst impact on the change in price. Dr. Sumner's choice of international supply and demand elasticities leads to exaggerated price impacts.



VIII. Conclusion

81. The Sumner models, as presented by Brazil, are so laden with faulty theory on program impacts and so deviate from the FAPRI standards that they cannot provide any foundation for the Panel's analysis of the effect of challenged United States programs with respect to upland cotton. Not only does the Sumner model contain major differences from previous FAPRI work, it also appears to be internally inconsistent as the United States has noted changes in described methodology from the original Annex I submission to later submissions, such as Exhibit Bra-313 and subsequent documentation.

82. Virtually all of the concerns of the United States cited in this critique are directed toward Brazil economic manipulation that exaggerates acreage impacts of the United States upland cotton program.

- Brazil's impacts attributed to decoupled programs deviate from traditional FAPRI analysis.
- Brazil's impacts attributed to crop insurance program are not supported by FAPRI analysis.
- Brazil's impacts attributed to the export credit guarantee program have no demonstrated economic foundation.
- Brazil's Annex I results used baselines that were inexplicably lower than even FAPRI's preliminary November 2002 baseline.
- Brazil's non-linear approach to results deviated from the traditional FAPRI methodology.
- Many of Dr. Sumner's adaptations contain errors.

83. In the final analysis, Brazil does not rely on the FAPRI model to prove its case, it relies on its manipulation of that model to ensure it obtains the desired results.