Expert Review
of

Methodology for Establishing Rates for Yield Exclusion

as presented in the report

"Review of Adjustment in Actual Production History to Establish Insurable Yields: Determination of Actuarially Sound Premium Rates"

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Prepared for

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Executive Summary

The subject of the present review is the report entitled "Review of Adjustment in Actual Production History to Establish Insurable Yields: Determination of Actuarially Sound Premium Rates" prepared by Sumaria Systems, Inc. for USDA Risk Management Agency (hereafter referred to as "Sumaria Report").

Sumaria Report provides feedback on the methodology proposed by the RMA to determine premium rates for the coverage based on APH yields with yield exclusion (YE) provision. Yield exclusion provision gives producers an option to exclude any recorded or appraised yield for any crop year in which the per planted acre yield in the county is at least 50 % below the simple average per planted acre yield during the previous ten consecutive crop years (Sumaria Report).

Exclusion of low yield experience results in an increase in the calculated APH average yields, with the net effect being the same as if the producer chose to insure at a higher coverage level, other things being equal. The Sumaria Report uses the term "effective coverage level", i.e. the coverage level the producer would have to choose *without* yield exclusion to get the same production guarantee in absolute terms. The question then is how to adjust premium rates in order to reflect this increase in guarantee and thus associated risk of indemnities paid on the policy.

The proposed rate-making procedure can be reduced to three steps: (1) calculate the effective coverage level for the YE policy by dividing the implied production guarantee by the average APH yield without yield exclusion; (2) estimate corresponding coverage level differential (CLD) by either linearly interpolating between or linearly extrapolating beyond the CLDs established for the existing coverage levels; and (3) multiply the estimated CLD by the base premium rate for the 65% coverage.

Sumaria Report reviews the proposed methodology and finds it reasonable and appropriate. The report further recommends that

1. the RMA follows the approach they have proposed in computing effective coverage levels for policy units making use of Yield Exclusion in determining the yield guarantee;
2. the RMA adopts the proposed procedures for deriving effective coverage level differentials and premium rates for policy units making use of Yield Exclusion;
3. the RMA evaluates the feasibility of incorporating marginal premium rate caps such that the additional premium for any coverage interval cannot exceed the corresponding increase in liability;
4. the RMA re-evaluates the coverage level differentials and the behavioral component after two years of YE experience has been collected and continues capturing the data needed to refine current actuarial procedures;
5. the RMA adjust experience at the individual record level to the smaller of the 65% common coverage level or the effective coverage level prior to compilation in StatPlan, thus preserving the actual indemnity experience in the base ratemaking process as much as possible
6. the RMA continues its current methods for adjusting compiled data at the StatPlan level to the 65% common coverage level.

Based on evaluation of the proposed methodology for establishing rates for APH policies with yield exclusion as presented in Sumaria Report, the reviewer concurs with Recommendations 1 (calculation of effective coverage rates) and 4 through 6 (data collection and analysis) of the Report.

However, the reviewer strongly disagrees with Recommendation 2 regarding the wholesale adoption of the proposed rate-making methodology. Based on the stochastic simulation analysis conducted by the reviewer, ***the assumption of linear dependence between the coverage levels and coverage level differentials is flawed.*** Since the proposed extrapolation method for determining premium rates for effective coverage levels above 85% is implicitly based on this flawed assumption, it leads to estimates of premiums that are substantially lower than they should be, thus undermining actuarial soundness of the program.

Instead, it is reviewer's recommendation that the proposed rate-making approach is adopted only for the effective coverage levels below 85%. For the effective coverage levels above 85%, a two-prong approach is suggested.

First, it is recommended that either cubic or quadratic extrapolation procedure is used to estimate coverage level differentials. In simple terms, instead of drawing a straight line through two highest known CLDs at 80% and 85% coverage levels and then using it to project CLDs for coverage levels above 85%, either a quadratic function is drawn through *three* highest known CLDs (at 75%, 80%, and 85% coverage levels) or a cubic function is drawn through *four* highest known coverage level differentials (at 70%, 75%, 80%, and 85% coverage levels). In the specific case analyzed by the reviewer, cubic extrapolation procedure resulted in reasonably accurate estimates of premiums (with less than 5% error) for the range of coverage levels up 110%.

Second, it is recommended that the RMA imposes a temporary cap on the effective coverage levels resulting from the yield exclusion provision in the APH policies so as to reduce the error in premium estimates based on extrapolation. The cap would be gradually increased as new data on actuarial experience for higher effective coverage levels becomes available (as per Recommendation 4 of Sumaria Report) and extrapolation procedure could be adjusted. For example, if such a cap were initially set at 110% effective coverage level, a cubic extrapolation procedure based on known CLDs at 70%, 75%, 80%, and 85% coverage levels could be used to provide a reasonably accurate approximation to the premiums for the range of effective coverage levels between 85% and 110%. Once sufficient data exists to re-estimate the coverage level differentials up to, say, 95% coverage level, the cap on effective coverage level could be increased to 120% with the now known CLDs for 80%, 85%, 80%, and 95% coverage levels used for cubic extrapolation, and so on.

Lastly, it is the reviewer's opinion that Recommendation 3 of Sumaria Report is moot at least in the context of the original proposal. Since the proposed linear extrapolation procedure results in premiums that are too low, capping them would only make the situation worse. For the actual premiums, marginal increases in premiums do not exceed corresponding increases in liability even for the coverage levels up to 300%. Therefore, even if an alternative extrapolation procedure is adopted, the proposed rate capping mechanism would not be triggered as long as the extrapolation is used only over the range where it produces estimates reasonably close to the actual rates.

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The following abbreviations are used in the report:

APH policy/plan refers to Actual Production History policies
CLD refers to Coverage Level Differential
RMA refers to the Risk Management Agency
NASS refers to the National Agricultural Statistics Service

Overview

The subject of the present review is the report entitled "Review of Adjustment in Actual Production History to Establish Insurable Yields: Determination of Actuarially Sound Premium Rates" prepared by Sumaria Systems, Inc. for USDA Risk Management Agency (hereafter referred to as "Sumaria Report").

Sumaria Report provides feedback on the methodology proposed by the RMA to determine premium rates for the coverage based on APH yields with yield exclusion (YE) provision. Yield exclusion provision is established in Section 11009 of the 2014 Farm Bill and allows producers an option to exclude any recorded or appraised yield for any crop year in which the per planted acre yield in the county is at least 50 % below the simple average per planted acre yield during the previous ten consecutive crop years (Sumaria Report).

Exclusion of low yield experience results in an increase in the calculated APH average yields. However, excluded yields are still recorded in the StatPlan database and used to determine rate yields. Therefore, yield exclusion does not change the estimated distribution of yield, but rather increases the baseline yield level used to calculate production guarantee. Thus the net effect of yield exclusion is the same as if the producer chose to insure at a higher coverage level, other things being equal. The proposed RMA methodology and Sumaria Report refer to this as "effective coverage level", i.e. the coverage level the producer would have to choose *without* yield exclusion to get the same production guarantee in absolute terms. The question then is how to adjust premium rates in order to reflect this increase in guarantee and thus associated risk of indemnities paid on the policy.

The RMA proposed a procedure that mimics the methodology currently in place to determine premium rates for the trend adjusted (TA) policies. Trend adjusted policies also result in effective increase of the production guarantee. Therefore, the associated premium setting methodology provides a reasonable basis for the rate adjustment procedures for the APH policies with yield exclusion.

Without repeating large sections of Sumaria Report and underlying RMA documents, the proposed procedure can be distilled to three steps: (1) calculate the effective coverage level for the YE policy by dividing the implied production guarantee by the average APH yield without yield exclusion; (2) estimate a corresponding coverage level differential (CLD) by either interpolating between or extrapolating beyond the CLDs established for the existing coverage levels (for effective coverage levels less than or more than 85%, respectively); and (3) multiply the estimated CLD by the base premium rate for the 65% coverage.

Sumaria Report reviews the proposed methodology and finds it reasonable and appropriate. The report further recommends that

1. the RMA follows the approach they have proposed in computing effective coverage levels for policy units making use of Yield Exclusion in determining the yield guarantee;
2. the RMA adopts the proposed procedures for deriving effective coverage level differentials and premium rates for policy units making use of Yield Exclusion;
3. the RMA evaluates the feasibility of incorporating marginal premium rate caps such that the additional premium for any coverage interval cannot exceed the increase in liability;
4. the RMA re-evaluates the coverage level differentials and the behavioral component after two years of YE experience has been collected and continues capturing the data needed to refine current actuarial procedures;
5. the RMA adjust experience at the individual record level to the smaller of the 65% common coverage level or the effective coverage level prior to compilation in StatPlan, thus preserving the actual indemnity experience in the base ratemaking process as much as possible
6. the RMA continues its current methods for adjusting compiled data at the StatPlan level to the 65% common coverage level.

Methodology

The reviewer's primary concern with the proposed methodology is the use of extrapolation of coverage level differentials for the effective coverage levels outside of the range of 85% coverage level, which is currently the highest available for the APH policies without YE. In order to evaluate the potential error in calculation of premiums, the reviewer conducted a stochastic simulation analysis using an empirical yield distribution based on historical yield data.

In particular, yield data for corn in Kossuth County, IA, for the period from 1968 to 2013 were obtained from NASS. This is the largest corn producing county in the largest corn producing state in terms of total harvest. Yield data were detrended using a simple linear trend and adjusted to their 2013 equivalents. The detrended yields were then used to construct the kernel-smoothed yield distribution (see, for example, Ker and Goodwin, 2000). The mean of the distribution was used as a proxy for the APH yield.

Using the constructed distribution (Figure 1, Appendix), actuarially-fair premiums were calculated as expected indemnities for coverage levels ranging from 0% to 300% of the mean (in 5% increments) along with corresponding liabilities and premium rates (Figures 2 and 3, Appendix). Without loss of generality, premiums and liabilities were expressed in units of yield. This does not affect the results of the analysis, since conversion to dollar amounts can be achieved by multiplying all relevant variables by a fixed nonrandom price. Furthermore, the main variables of interest are ratios and thus would not be affected by conversion from yield units to dollars.

In order to replicate the proposed rating procedure, coverage level differentials (CLDs) were calculated as ratios of the actual premium rates to the premium rate at the base coverage level (65%). The CLDs for 80% and 85% were then used as a basis for linear extrapolation beyond the 85% coverage level as per the methodology proposed by the RMA and reviewed in Sumaria Report. The extrapolated CLDs, as well as corresponding premium rates and premiums were then compared to the actual CLDs, premium rates, and premiums implied by the original distribution (Figures 4 through 6). The results of the analysis are discussed below. Figures are included in the appendix.

Since the individual yields tend to be more variable than aggregated county yields, the analysis was repeated with yield data expanded around the mean in order to simulate higher variability of the distribution (up to 50% increase in standard deviation). In order to check the robustness of the results with respect to the choice of distribution, the analysis was also repeated using a normal distribution of yields with the same mean and standard deviation as the yield data sample. Lastly, in order to cross-validate the results, the same analysis steps were performed for Texas corn (same crop, higher variability of yields) and Texas cotton (different crop). In all cases, the results (not reported), while quantitatively different, led to the same qualitative conclusions as the baseline analysis.

Items in Section C.4. Description of Work

(1) Actuarial soundness

(A) Is adequate, credible, and reliable rate-making data available? Is it likely that the data will continue to be available? Is the data vulnerable to tampering if the proposed policy is approved?

The methodology proposed by the RMA and reviewed in Sumaria Report relies on existing RMA data and current data collection practices. Since the latter has been thoroughly reviewed and the collected data is used for all rating purposes by the RMA, it is the reviewer's opinion that the rate-making data is adequate, credible, reliable, and not vulnerable to tampering. Furthermore, the data will continue to be available as long as the RMA maintains its current data collection practices. However, the reviewer concurs with Recommendation 5 made in Sumaria Report, which is to record the actuarial experience with APH YE policies at the effective rather than nominal coverage level in order to reduce the loss of information contained in data. Building up the database of such experience will help to improve the accuracy of rate making methodology particularly for the effective coverage levels in excess of the currently available 85%.

(B) Are the explicit and implicit assumptions used in the rating process reasonable?

The rating methodology presented in Sumaria Report relies on two implicit assumptions, namely (1) that the CLDs for coverage levels below 85% can be reasonably approximated by a linear function between the nearest available coverage levels (e.g. 65% to 70% or 75% to 80%) and (2) that the CLDs for coverage levels above 85% can be reasonably approximate by a linear function based on CLDs for the two highest available coverage levels (i.e. 80% and 85%).

The results of the stochastic simulation analysis conducted by the reviewer indicate that, while the first assumption is reasonably justified and produces sufficiently accurate estimates of the CLDs, the second assumption is erroneous and results in alarmingly high errors in calculation of CLDs and, consequently, premium rates and premiums for coverage levels exceeding 85%.

Figure 4 (Appendix) shows actual (calculated) coverage level differentials vs. those linearly extrapolated from the range between 80% and 85%. Corresponding premium rates and premiums are shown in Figures 5 and 6, respectively. Actual and extrapolated premiums are also reported in Table 2 in Appendix.

All three graphs indicate a substantial difference between the actual and extrapolated values particularly as the coverage levels increase. The following table shows the error in the estimates of premiums based on extrapolated values of CLDs. The errors are calculated relative to the extrapolated values, i.e. as
(Actual Premium – Extrapolated Premium)/Extrapolated Premium.

Effective Coverage Level	% Error in Premium Estimates		
	Linear Extrapolation	Quadratic Extrapolation	Cubic Extrapolation
80%	0.00%	0.00%	0.00%
85%	0.00%	0.00%	0.00%
90%	16.04%	5.28%	0.19%
95%	42.44%	14.18%	-0.27%
100%	77.15%	25.20%	-1.23%
105%	119.73%	37.74%	-2.20%
110%	166.94%	49.66%	-4.13%
115%	213.68%	58.61%	-7.87%
120%	254.78%	63.09%	-13.58%
125%	286.75%	62.77%	-20.86%
130%	309.59%	58.82%	-28.74%
135%	325.23%	52.78%	-36.42%
140%	335.59%	45.72%	-43.48%
145%	341.96%	38.29%	-49.80%
150%	345.36%	30.85%	-55.38%

Table 1. Errors in premium implied by extrapolated coverage level differentials for different extrapolation procedures.

For linear extrapolation (second column), the actual and extrapolated premiums coincide at 80% and 85% coverage levels by construction, but the extrapolated premiums severely underestimate actual premiums for higher coverage levels. The actual premium is nearly twice higher than the extrapolated at the 100% effective coverage level (the example used in Sumaria Report), while at the 150% effective coverage level, the actual premiums are almost 4.5 times higher than the premiums based on linear extrapolation of CLDs.

As an alternative, quadratic and cubic extrapolation procedures were investigated. For the former, a quadratic function

$$\beta_2 Coverage^2 + \beta_1 Coverage + \beta_0 = CLD$$

was constructed based on CLDs at coverage levels of 75%, 80%, and 85%. For the latter, the cubic function

$$\beta_3 Coverage^3 + \beta_2 Coverage^2 + \beta_1 Coverage + \beta_0 = CLD$$

was constructed based on CLDs at coverage levels of 70%, 75%, 80%, and 85%. Since three points uniquely define a quadratic function, and four points uniquely define a cubic function, both procedures are exact and require solution of a system of three and four linear equations, respectively. The CLDs for the effective coverage levels beyond 85% can be then calculated by substituting the corresponding coverage levels into the equations above.

The premiums based on quadratic and cubic extrapolation procedures are shown in Figures 7 and 8, respectively (Appendix). Corresponding errors in premiums are shown in the last two columns of Table 1 above.

The quadratic extrapolation procedure does much better job approximating actual premiums than the linear extrapolation. However, the premiums are still underestimated, and the relative error remains fairly high particularly as the coverage levels increase.

The cubic extrapolation procedure actually *overestimates* the premiums at higher effective coverage levels, but it appears to be much more accurate than the linear and quadratic extrapolation for a range of effective coverage levels close to 85% (up to 110% in this particular case).

Clearly, the level of accuracy provided by each extrapolation procedure is conditional on the underlying distribution and cannot be predicted in advance if the distribution is not known. However, it seems that allowing for some form of nonlinear dependence between the coverage levels and coverage level differentials vastly improves the accuracy of premiums based on extrapolation beyond the currently available coverage levels.

(C) Are the technical analyses (e.g., stochastic and other simulations) correct? Do they provide credible, relevant results??

Sumaria Report does not provide any technical analysis beyond specific examples illustrating the application of the adjustment procedure proposed by RMA. There are no factual errors in these examples. However, they do not adequately address the validity of the proposed rate-making methodology.

(D) Is the data used for the analyses appropriate, reliable, and the best available?

The Sumaria Report does not appear to use any data other than a hypothetical example developed by the RMA. It is the reviewer's opinion that this example does not provide adequate basis for evaluation of the proposed methodology.

(F) Are the proposed premium rates likely to cover anticipated losses and a reasonable reserve?

No. Based on the reviewer's analysis, the proposed adjustment procedure for establishing premium rates for effective coverage levels in excess of currently available 85% would severely underestimate expected losses. Furthermore, the difference between the actuarially fair premium rates (i.e. expectation of anticipated losses) and the premium rates based on linear extrapolation of coverage level differential tend to increase with the higher effective coverage levels (see Figure 5 in Appendix and Table 1 above). Over time, collecting premiums at the rates based on linear extrapolation procedure would result in loss ratios exceeding 1 and severe shortfalls of the reserves.

(G) Is the actuarial methodology appropriate for the insured risks?

With the exception of extrapolation of CLDs above 85% coverage level, the proposed actuarial methodology is appropriate for dealing with the APH YE policies. Treating APH YE policies as having higher effective coverage level is reasonable and reflects the increase in risk associated with the new policies. Furthermore, interpolation of CLDs between available coverage levels provides adequately accurate estimates of the premium rates. However, the linear extrapolation procedure designed to deal with the lack of data on actuarial experience at the effective coverage levels above 85% appears to be based on erroneous assumption and results in highly inaccurate premium estimates particularly as the effective coverage levels increase above 100%.

(2) Other considerations

Recommendation 3 in Sumaria Report suggests that the RMA incorporates marginal premium caps on premiums for APH YE policies based on the rule that the marginal increase in premiums does not exceed marginal increase in liability for any 5% interval in coverage level. Given the results of stochastic simulation analysis presented above, it is the reviewer's opinion that establishing caps on premiums in any form is a moot point at least in the context of the original proposal. Since the premiums based on linear extrapolation of CLDs already underestimate actual premiums, establishing any caps on the (extrapolated) rates at any effective coverage level above 85% would only worsen the problem. The quadratic extrapolation procedure outlined above also results in premium estimates that are too low and thus does not call for rate caps either. Cubic extrapolation procedure does lead to premium estimates that are higher than the actual ones and thus may need to be capped at some coverage levels.

Note, however, that for the actual premiums, the marginal increase in premiums over any 5% coverage level interval never exceeds the corresponding increase in liability (Figure 9, Appendix). Therefore, as long as premium determination is based on an extrapolation procedure that leads to premiums below or close to the actual premiums, the premium capping scheme recommended in Sumaria Report would never be triggered.

Discussion and Recommendations

Based on evaluation of the proposed methodology for establishing rates for APH policies with yield exclusion as presented in Sumaria Report, the reviewer concurs with Recommendations 1 (calculation of effective coverage rates) and 4 through 6 (data collection and analysis) of the Report.

However, the reviewer strongly disagrees with Recommendation 2 regarding the wholesale adoption of the proposed methodology. Instead, it is the reviewer's recommendation that the proposed rate-making approach is adopted only for the effective coverage levels below 85%. For the effective coverage levels above 85%, a two-prong approach is suggested.

First, it is recommended that either cubic or at least quadratic extrapolation procedure is used to estimate coverage level differentials. While the nonlinear extrapolation is not as intuitive as the linear procedure proposed by the RMA, implementation of either cubic or quadratic extrapolation procedure is computationally trivial and can be programmed in Excel or any statistical package in a straightforward way.

Second, it is recommended that the RMA imposes a temporary cap on the effective coverage levels resulting from the yield exclusion provision in the APH policies so as to reduce the error in premium estimates based on extrapolation. The cap would be gradually increased as new data on actuarial experience for higher effective coverage levels becomes available (as per Recommendation 4 of Sumaria Report) and extrapolation procedure could be adjusted. For example, if such a cap were initially set at 110% effective coverage level, the cubic extrapolation procedure presented above (based on known CLDs for 70%, 75%, 80%, and 85% coverage levels) could be used to provide a reasonable approximation to the premiums for the range of effective coverage levels between 85% and 110%. Once sufficient data exists to re-estimate the coverage level differentials up to, say, 95% coverage level, the cap on effective coverage level could be increased to 120% with the now known CLDs for 80%, 85%, 80%, and 95% coverage levels used for cubic extrapolation, and so on.

Lastly, it is the reviewer's opinion that Recommendation 3 of Sumaria Report is moot at least in the context of the original proposal. Since the proposed linear extrapolation procedure results in premiums that are too low, capping them would only make the situation worse. For the actual premiums, marginal increases in premiums do not exceed corresponding increases in liability even for the coverage levels up to 300%. Therefore, even if an alternative extrapolation procedure is adopted, the proposed rate capping mechanism would not be triggered as long as the extrapolation is used only over the range where it produces estimates reasonably close to the actual rates.

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Appendix

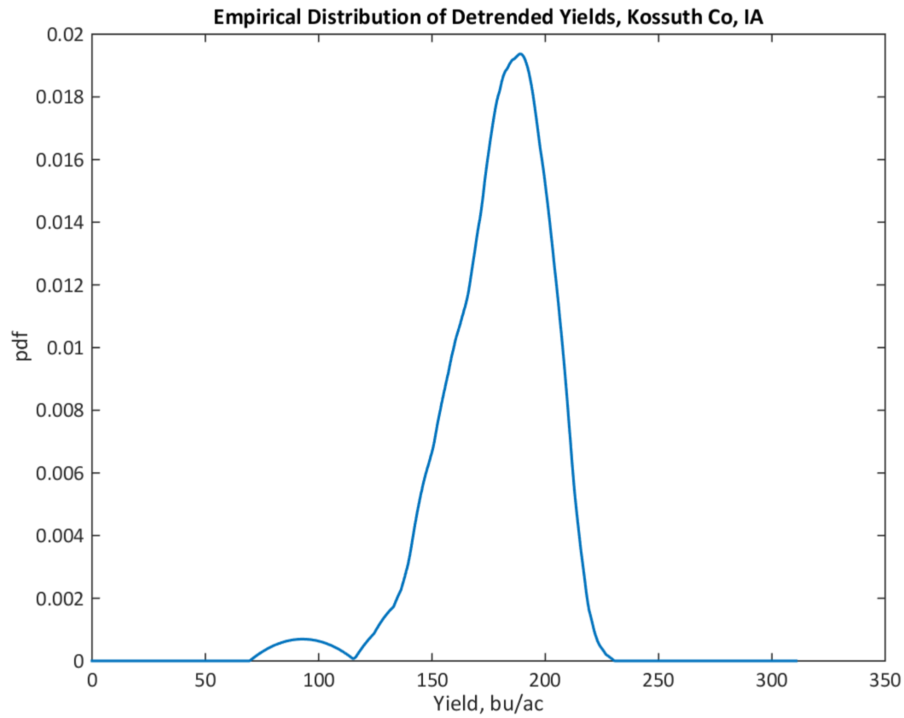

Figure 1.

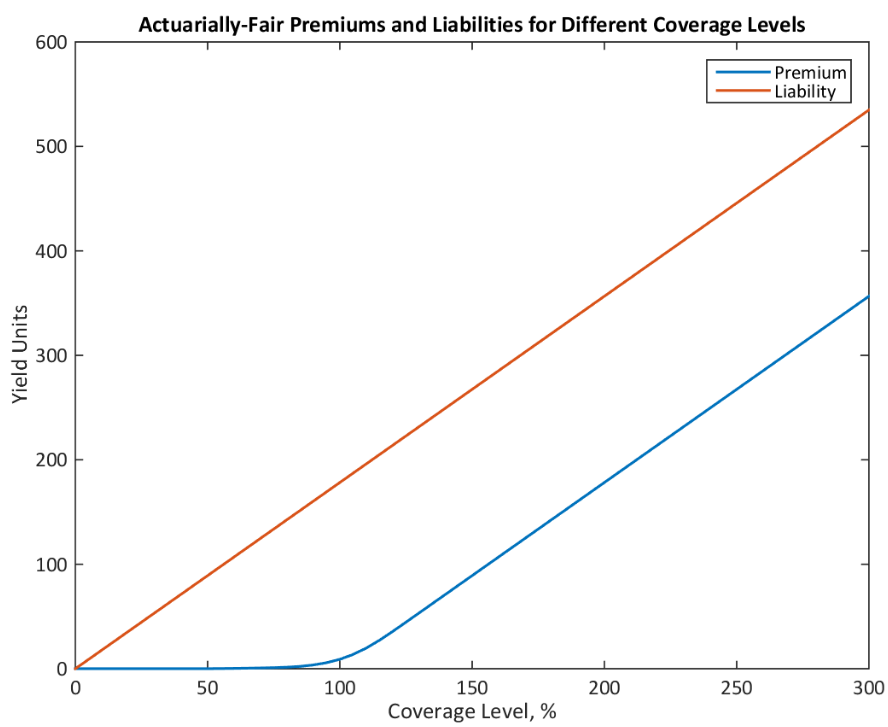

Figure 2.

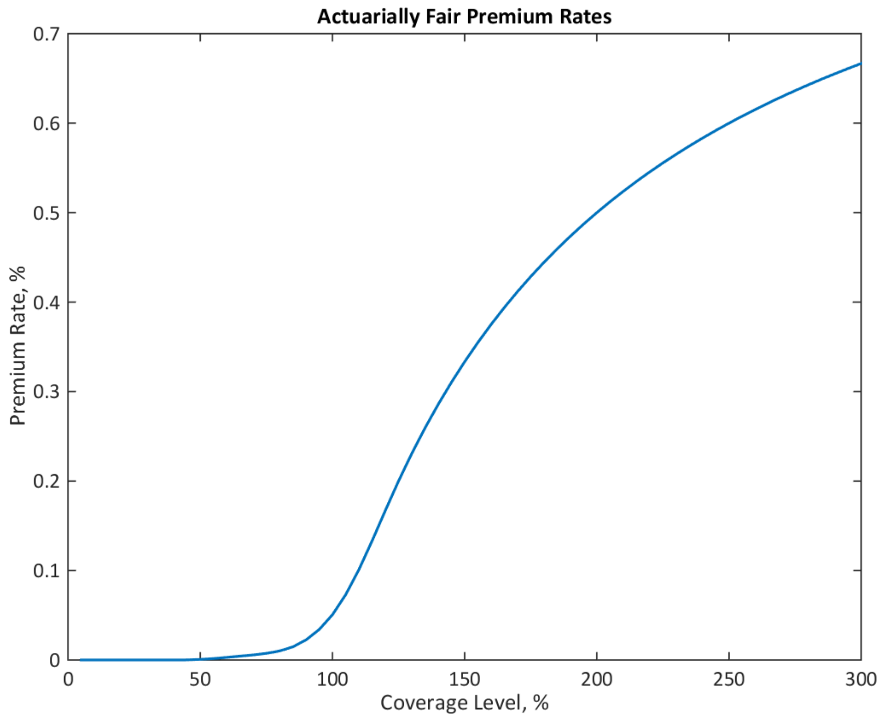

Figure 3.

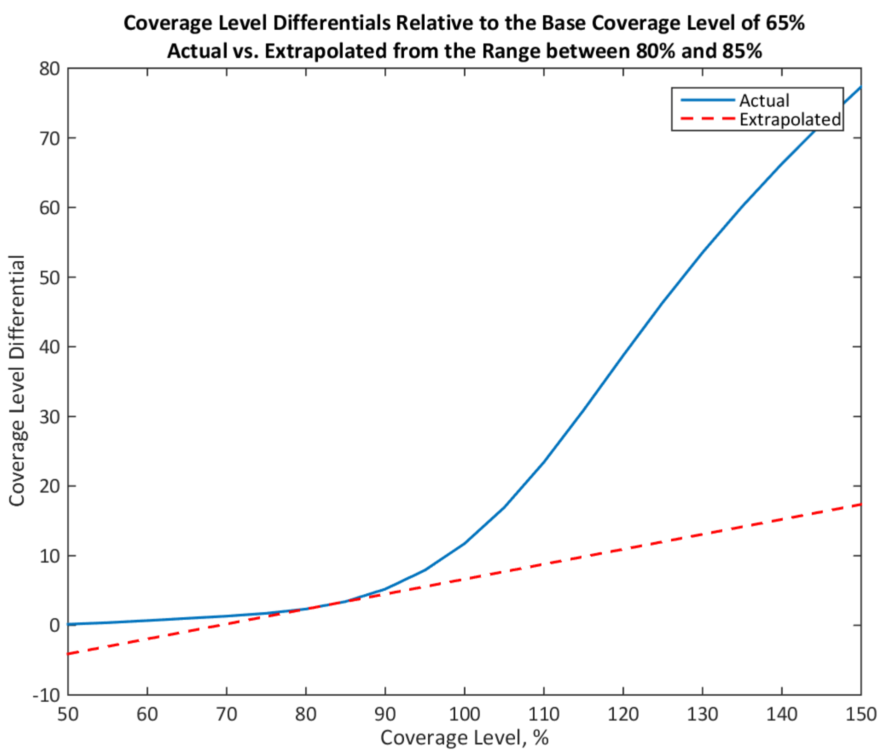

Figure 4.

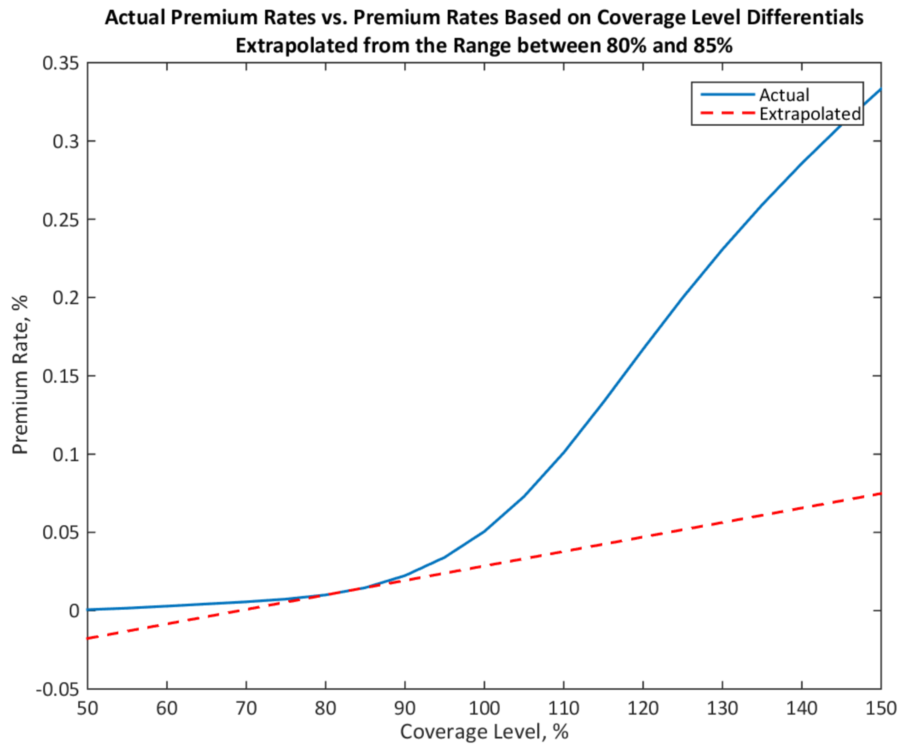

Figure 5.

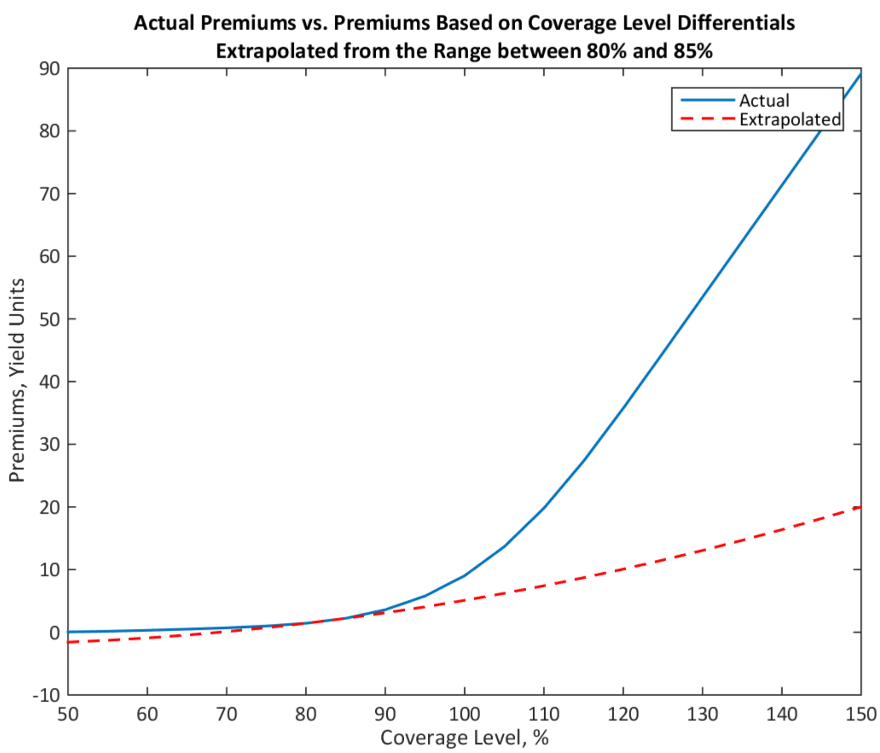

Figure 6.

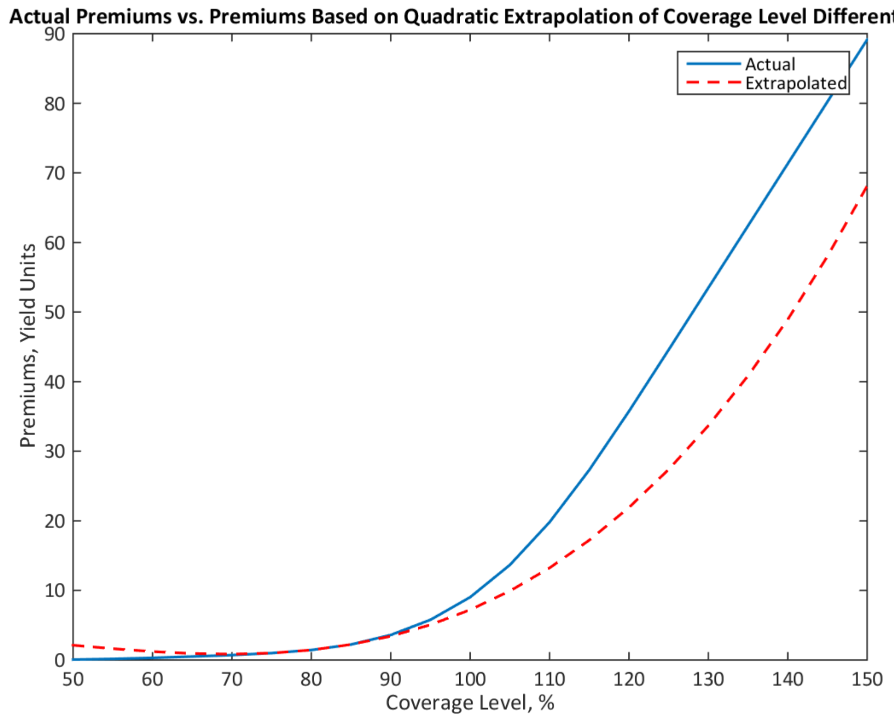

Figure 7.

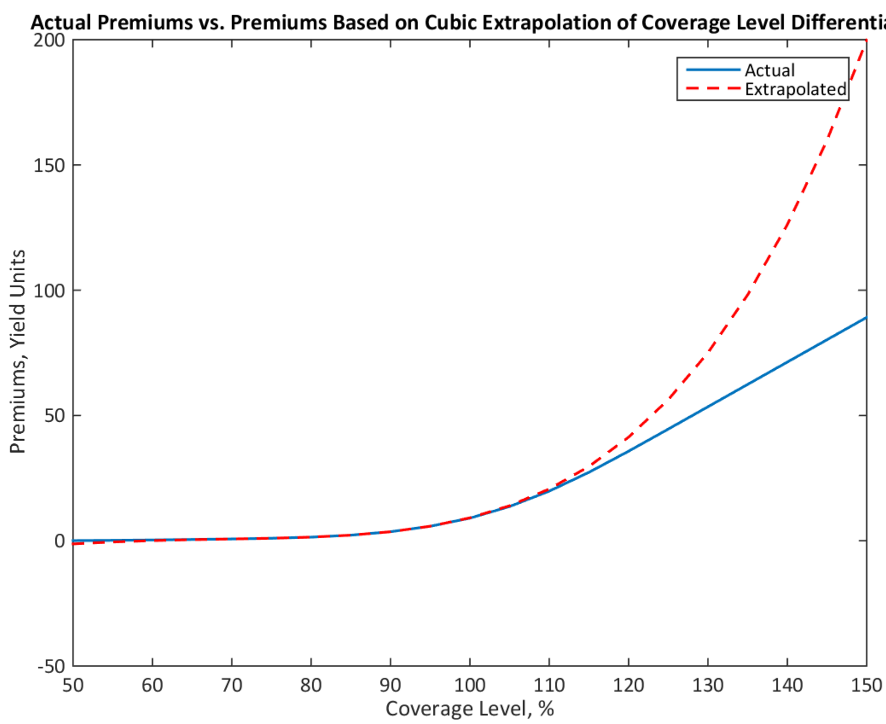

Figure 8.

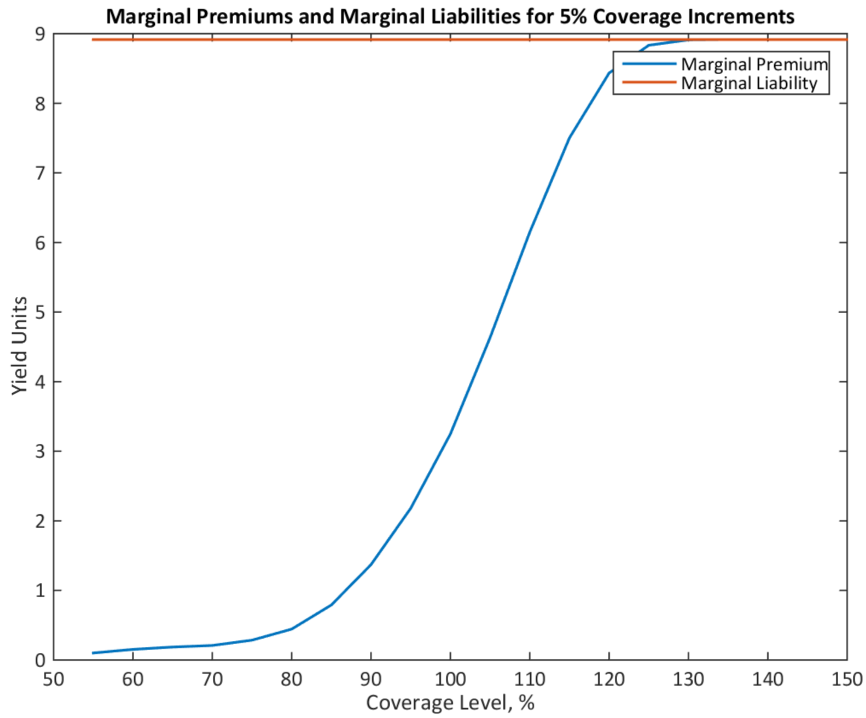
Marginal Premiums and Marginal Liabilities for 5% Coverage Increments
Marginal Premium
Marginal Liability
Yield Units
Coverage Level, %
0
1
2
3
4
5
6
7
8
9
50
60
70
80
90
100
110
120
130
140
150

Figure 9.

Effective Coverage Level, %	Linear Extrapolation		Quadratic Extrapolation		Cubic Extrapolation	
	Premium, Actual	Premium, Extrapolated	Premium, Actual	Premium, Extrapolated	Premium, Actual	Premium, Extrapolated
70	0.70869	0.10352	0.70869	0.84375	0.70869	0.70869
75	0.99392	0.72955	0.99392	0.99392	0.99392	0.99392
80	1.4381	1.4381	1.4381	1.4381	1.4381	1.4381
85	2.2291	2.2291	2.2291	2.2291	2.2291	2.2291
90	3.6003	3.1026	3.6003	3.4198	3.6003	3.5935
95	5.7808	4.0585	5.7808	5.0631	5.7808	5.7963
100	9.0293	5.097	9.0293	7.2119	9.0293	9.1413
105	13.663	6.218	13.663	9.9191	13.663	13.971
110	19.811	7.4214	19.811	13.237	19.811	20.665
115	27.313	8.7073	27.313	17.22	27.313	29.645
120	35.748	10.076	35.748	21.919	35.748	41.367
125	44.581	11.527	44.581	27.389	44.581	56.329
130	53.492	13.06	53.492	33.681	53.492	75.065
135	62.407	14.676	62.407	40.848	62.407	98.15
140	71.323	16.374	71.323	48.944	71.323	126.2
145	80.238	18.155	80.238	58.022	80.238	159.85
150	89.153	20.018	89.153	68.133	89.153	199.81

Table 2. Actual premiums vs. premiums based on extrapolation of coverage level differentials (CLDs). All premiums are expressed in units of yield. Linear extrapolation is based on actual CLDs at 80% and 85% coverage levels. Quadratic extrapolation is based on actual CLDs at 75%, 80%, and 85% coverage levels. Cubic extrapolation is based on actual CLDs at 70%, 75%, 80%, and 85% coverage levels.

Qualifications of the Reviewer

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Education

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M.S. Applied Economics and Computers, 1993
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Employment

Associate Professor, Agricultural Economics, Texas A&M University, 2009–present

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Fields of Expertise

Risk Management, Crop Insurance, Weather Derivatives, Stochastic Modeling, Dynamic Programming, Economic Modeling, Alternative Fuels

Selected Publications

Power, G.J., Vedenov, D.V., Anderson, D.P., and Klose, S. "Market Volatility and the Dynamic Hedging of Multi-Commodity Price Risk" *Applied Economics*, **45**(27), 2013: 3891–3903

Power G.J., Vedenov, D.V., and Hong, S.W. "The Impact of the Average Crop Revenue Election (ACRE) Program on the Effectiveness of Crop Insurance." *Agricultural Finance Review* (2009).

Vedenov, D.V. and Power, G.J. "Risk-Reducing Effectiveness of Revenue vs. Yield Insurance in the Presence of Government Payments." *Journal of Agricultural and Applied Economics*, 40, 443–459 (August 2008).

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