

**Subject:** comments on price volatility factor methodology  
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Munich RE appreciates the opportunity to comment on captioned SUMARIA study which discusses the rating methodology regarding the price component in RMA's revenue protection policies.

Given the observation that RMA's volatility factor, derived from implied volatilities computed from agricultural commodity exchanges, has, over the past 20 years, not been an adequate measure for actually observed price changes between planting and harvest, and has contributed, over the past 3 years, to inadequate revenue protection rate levels, Munich RE provides the following comments regarding the adequacy and use of implied volatility for revenue protection rate making purposes:

1. Adequacy of the BSM as the core of RMA's revenue protection rate making methodology regarding price volatility

1.1 By using the information contained in option markets, the crop insurance and revenue protection rate making system becomes dependent on the current status of financial markets. Such spill-over effects introduce additional risks that do not originate from the fundamentals of crop markets.

1.2 The BSM assumes market participants, that, like in a real market, can go into or out of the market depending on their perception of current prices or price trends. However, since it is in the interest of the crop insurance system that all stakeholders participate on a continuous basis, not as opportunistic risk takers depending on the price on a specific date, one of the main assumptions underlying the BSM is by construction invalidated.

Both observations can be detrimental to the stability of the agricultural insurance sector and question the adequacy of the BSM. Counter measures need to be put in place or the BSM needs to be modified or replaced.

2. Since the US Federal Crop Insurance System is designed as public-private partnership with the objective to be sustainable for all participants over time, alternative methods to the BSM should be considered.

We follow the argumentation of SUMARIA that, for an (sub)annual period, alternatives to the BSM are hard to be justified. Long-term participants in the US crop insurance system, however, will by necessity be confronted with the inherent limits of predictability by the BSM, one because they are bound by the annual contract (SRA) between the government and the insurer (AIP), and second because they need to make significant investments to be able to participate in the US crop insurance system. In consequence, risk takers (AIPs, reinsurers) are forced to consider additional risk loadings in order to justify their investment over say 3-5 years minimum. The effect of higher long-term risks is also observable in capital markets, where volatility curves tend to trend upward in most of the cases. Given this need of additional risk loadings, an alternative estimate for price volatility needs to be considered. Due to the lack of an adequate market measure of long term price risks, an estimate based on historical (static) price variability presents a reasonable alternative methodology to the BSM, and would provide market participants a more reliable, average pricing basis.

3. If a BSM type of volatility was continued to be used, at least the following adjustments need to be considered:

3.1 The seasonality in the second moment implies, that risk (i.e. variance) will not accumulate linearly over time, as in the BSM. The study of Egelkraut et al., as cited by Summaria, gives a first constructive idea of how to solve this issue. In consequence, the non-linear risk trend needs to be reflected by an additional rate component.

3.2 Historical price events with relevance to revenue protection have shown to be in the tail of the distributions. ATM volatilities by definition lack information about the likelihood of extreme events. However, the tail information available by the option prices is not used. The study of Summaria itself gives plenty evidence, that higher moments are relevant. They discard using higher moments due to thinly traded markets. Using actively quoted options to extract the skew, while maintaining the calculation of ATM volatilities from traded options, can remedy this problem.

Thank you for your consideration of our comments.

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