

Feasibility of the Producer Accumulator Contract in Corn and Soybean Markets

Chad Te Slaa

South Dakota State University

Department of Economics

Contact Information:

chad.teslaa@sdstate.edu

1501 W. LaQuinta St.

Sioux Falls, SD 57108

Profile – Chad Te Slaa

I am pursuing a Master's degree in economics at South Dakota State University. My thesis is entitled "Performance of the Producer Accumulator Contract in Corn and Soybean Commodity Markets." My advisors are Dr. Lisa Elliott and Dr. Matt Elliott. I intend to complete all the requirements for my Master's program by June 2017. My interest in economics, particularly in agricultural economics, stems from my background helping my father operate a fourth-generation corn and soybean farm in Rock Rapids, IA.

My thesis research focuses on the risk reduction and performance of the producer accumulator contract applied to corn and soybean commodity markets. Our study focuses on performance of the accumulator from the producer's perspective. INTL FCStone currently offers producer accumulator contracts to Midwestern farmers through cooperatives and commodity purchasing firms. We investigate the average price, reduction in price risk, risk adjusted return, and bushels accumulated when adopting the producer accumulator from 2008-2017.

The research uses a theoretical pricing model to historically value producer accumulator contracts in corn and soybean markets. We test the Cox-Ross-Rubinstein binomial model, Longstaff-Schwartz method, and Finite Difference method that best fits a smaller sample of observed INTL FCStone offerings of the producer accumulator. We then price the zero-cost accumulation strikes for more than 10,000 synthetic producer accumulator contracts and conduct performance back testing.

I quantified profitability and risk reduction for the producer accumulator using our synthetic producer accumulator contracts. In addition, we establish eight alternative agricultural marketing strategy portfolios for performance comparison. Comparing the risk reduction and profitability of the producer accumulator portfolio to other marketing strategies provides a frame of reference for results of the accumulator in managing producer risk. For each strategy portfolio, we quantify average portfolio price, average daily portfolio standard deviation, and average daily portfolio Sharpe ratio; specific to the producer accumulator, we quantify bushel accumulation. Recommendations are provided to producers for optimal use of the producer accumulator in corn and soybean commodity markets using our back-testing results.

Mentor Information:

Dr. Lisa Elliott

DePuy Military Hall

1150 Campanile Ave

Brookings, SD 57007

Dr. Matt Elliott

Box 2236, DePuy D6

1150 Campanile Ave

Brookings, SD 57007

Dr. Lisa Elliott and Dr. Matt Elliott are my advisors for this research. Dr. Lisa Elliott is a Commodity Marketing Specialist & Assistant Professor and Dr. Matt Elliott is an Agribusiness Specialist & Assistant Professor. They directly developed the Managing the Margin Extension Workshops at South Dakota State University. In the Spring of 2017, I presented my preliminary findings in the “Managing the Margin Workshop” developed by Dr. Lisa Elliott and Dr. Matt Elliott. Both advisors have reviewed my extension proposal and assisted in feedback.

Feasibility of the Producer Accumulator Contract in Corn and Soybean Markets

Situation

In 2015, South Dakota produced 799.77 million bushels of corn and 235.52 million bushels of soybeans (NASS, 2016). Producers market these bushels via cash sales and/or grain marketing strategies that utilize futures and options. Most recently, new generation grain contracts have emerged that use combinations of futures and options. These contracts can be complex for producers to understand or know the expected performance in reducing risk and enhancing producer returns. Moreover, producers may be reluctant to adopt marketing risk management practices that enhance their returns and improve their risk because of the complexity and unknown performance of these contracts. Consequently, only 20% of producers use hedging, 38% use forward contracts, and 18% use production contracts (Barry & Micheels, 2005).

Little is known about the actual performance of these innovative grain marketing contracts, so my research is aimed at shedding light on this issue. Specifically, my research will focus on the producer accumulator contract, which has gained immense popularity with producers and grain merchandisers, but its performance and pricing is more difficult to determine because of the complex rules and consisting of over-the-counter barrier options. The accumulator is an over-the-counter derivative product that originated in Hong Kong equity markets in 2002. Accumulator contracts were introduced to the commodity futures market by INTL FCStone Trading, and were first offered to corn and soybean producers in 2005. The producer accumulator is currently offered across the Midwest through local cooperatives and commodity purchasing firms such as CHS, ADM and Cargill. Originally, the dual intent of commodity purchasing firms and local cooperatives in applying the accumulator contract to commodity markets was to offer an alternative grain marketing product, and to increase the amount of pre-dated grain sales originated from corn and soybean operations.

The producer accumulator functions as an averaging contract that is time-path dependent due to weekly bushel pricing over the duration of the contract. It offers pricing benefits to producers' contingent upon their acceptance of certain stipulations based on the price time-path of the underlying futures contract. For producers, the incentive includes an offer to sell corn or soybean bushels above the current CBOT futures price. To obtain the incentivized futures price, producers must agree to the conditions associated with crossing the accumulation strike price and the terms affiliated with breaching the knock-out barrier.

The producer accumulator suffers from low price transparency due to its over-the-counter structure. In equity markets, accumulator contracts have been referred to as accumulator or I-Kill-You-Later. The general assumption of the accumulator is that it is an unfair risk management strategy. Prior accumulator research focuses on the buy side or consumer's perspective for accumulators in equity, currency, and commodity markets. Historical research fails to fill the void from the sell side or producer's perspective regarding recommendations for employment of the producer accumulator in corn and soybean commodity markets. Because of the scarcity of public research and its exotic nature, grain merchandisers at commodity purchasing firms and cooperatives, university extension specialists, agri-business lenders, and producers may not fully understand the effects of the producer accumulator contract on producer risk management. Our research and extension program is aimed at incorporation of the producer accumulator into producer risk management practice and employing recommendations in corn and soybean markets.

The producer's decision on whether to adopt the producer accumulator as a risk management strategy depends on the producer's ability to understand the underlying pricing rules and the resulting risk reduction, average price per bushel, quantity of bushels accumulated, and risk adjusted return. Our research will fill the knowledge gap by informing producers with the proper information and research results to decide if the producer accumulator is a viable agricultural marketing strategy to employ. Producers will also benefit from understanding the opportunity cost of implementing the producer accumulator as we compare risk reduction, average price, and risk adjusted return with a long futures portfolio and alternative agricultural marketing strategy portfolios. We expect that producers, grain merchandisers at cooperatives and grain purchasing firms, university extension specialists, and agri-business lenders will use our research to further understand the risks and benefits associated with pricing bushels under the producer accumulator contract.

Information to Share

Given our back-testing results for the producer accumulator portfolio and alternative strategy portfolios, we address the issue of the producer accumulator's ability to manage risk, performance relative to other agricultural strategy portfolios, and the optimal time of contract employment. We find the average price for the producer accumulator to slightly underperform the long futures portfolio in corn and marginally outperform in soybeans. However, the accumulator significantly reduces risk compared to the long futures portfolio. Back-tested producer accumulator portfolios produced average daily portfolio Sharpe ratios exceeding all other simulated risk management strategies in corn and soybeans on an average annual and average aggregate basis from 2009-2017. Thus, based on the average daily portfolio Sharpe ratio, the producer accumulator portfolio offers corn and soybean producers the best risk adjusted return.

Back-testing results are quantified for contracts beginning during growing season months, between April and September, and non-growing season months, between October and March. Average price of producer accumulator contracts and long futures portfolios beginning during the growing and non-growing seasons are similar, higher average daily portfolio Sharpe ratios and lower portfolio risk occurred during the non-growing season, non-growing season accumulator contracts accumulate 9.25% more bushels in corn and 21.30% more bushels in soybeans than contracts starting during growing season months. With these findings, we suggest producers implement the producer accumulator during non-growing season months for best results.

Our research illustrates that the best average price for producer accumulator contracts, when incorporating a trend variable, occurs for accumulator contracts beginning following an uptrend in price. The greatest average daily portfolio Sharpe ratio and lowest average daily portfolio standard deviation occurs when accumulator contracts begin after a neutral trend. Bushels accumulated were highest for contracts starting after a downtrend in price for corn and soybeans. Thus, to decide which trend to follow when implementing the producer accumulator contract, we suggest that producers consider their risk preference and primary goal for contract use.

Target Audience

The primary target audience for the Feasibility of the Producer Accumulator in Corn and Soybean Markets is corn and soybean producers with medium to large scale operations in South

Dakota. As the number of acres farmed increases, importance of grain marketing increases (Barry & Micheels, 2005). Farms using production or marketing contracts include: 11% of all farms, 3.6% of rural residence farms, 16% of intermediate farms, and 41.7% of commercial farms (MacDonald et al., 2004). Hence, we focus medium to large scale operations as these stakeholders are more likely to implement the producer accumulator contract. With increased implementation and a larger quantity of bushels to market, medium and large scale producers are more affected by market volatility. Thus, it is important for them to have a fair understanding of the profitability and risk reduction associated with the producer accumulator contract.

Goals of Program and Program Evaluation

- 1) Short Term
 - a. Goal – Spread information to corn and soybean producers regarding producer accumulator profitability and risk reduction to increase understanding and awareness via presentation at SDSU’s “Managing the Margin Workshop” in the Spring of 2018 and an article series posted on the SDSU extension iGrow website.
 - b. Evaluation – Implement a clicker survey questionnaire following my workshop presentation and record the number of viewings of the article series on the SDSU extension iGrow website.
- 2) Medium Term
 - a. Goal – Corn and soybean producers analyze our research to determine the feasibility of incorporating the producer accumulator as a risk management tool.
 - b. Evaluation – Email feasibility survey to producers, grain merchandisers, university extension specialists, and agri-business lenders one year after posting article series on the SDSU iGrow website.
- 3) Long Term
 - a. Goal – Increase corn and soybean producer understanding of risk reduction and profitability leading to higher adoption of producer accumulator contracts in producer risk management plans.
 - b. Evaluation – Email adoption survey to producers, grain merchandisers at local cooperatives and elevators, university extension specialists, and agri-business lenders three years after posting article series on the SDSU iGrow website.

Distribution of Information – “Feasibility of the Producer Accumulator Contract in Corn and Soybean Markets”

- 1) Write a series of articles discussing the research results of producer accumulator risk reduction and profitability performance in corn and soybeans for the SDSU extension iGrow website.
- 2) Perform a presentation showing the research results of producer accumulator risk reduction and profitability performance in corn and soybeans at the “Managing the Margin Workshop” in Spring 2018 at SDSU in the E-trading Lab.
- 3) Design a pamphlet displaying the research results of producer accumulator risk reduction and profitability performance in corn and soybeans. Allocate pamphlets to corn and soybean producers, grain merchandisers, university extension specialists, and agri-business lenders.

- 4) Launch a link to the pamphlet posted on the SDSU extension iGrow website to access the electronic pamphlet and my thesis entitled “Performance of the Producer Accumulator in Corn and Soybean Commodity Markets.”

Program Action – Logic Model

INPUTS	OUTPUTS - Activities	OUTPUTS - Audience	OUTCOMES – Short Term	OUTCOMES – Medium Term	OUTCOMES – Long Term
What we invest	What we do	Who we reach	Learning	Action	Conditions
Perform research on the profitability and risk reduction of the producer accumulator contract in corn and soybean commodity markets	<p>Write a series of articles discussing the research results for the SDSU extension iGrow website</p> <p>Perform a presentation showing the research results of producer accumulator risk reduction and profitability performance in corn and soybeans at the “Managing the Margin Workshop” in Spring 2018 at SDSU in the E-trading Lab</p> <p>Design a pamphlet displaying the research results</p> <p>Launch a link to the pamphlet posted on the SDSU extension iGrow website to access the electronic pamphlet and thesis</p>	<p>Corn and soybean producers across South Dakota and the Midwest</p> <p>Extension programs at universities in the Midwest</p> <p>Grain merchandisers at commodity purchasing firms, local cooperatives, and local elevators</p> <p>Agricultural lenders at financial institutions in the Midwest</p> <p>Agricultural publications</p>	<p>Producer accumulator contract performance in corn and soybean commodity markets – Spread information to corn and soybean producers regarding producer accumulator profitability and risk reduction to increase understanding and awareness</p>	<p>Producer accumulator contract performance in corn and soybean commodity markets – Corn and soybean producers analyze our research to determine the feasibility of incorporating the producer accumulator as a risk management tool</p>	<p>Producer accumulator contract performance in corn and soybean commodity markets – Increase corn and soybean producer understanding of risk reduction and profitability leading to higher adoption of producer accumulator contracts in producer risk management plans</p>

Resources

Barry, P. J. & Micheels, E. (2005). How Midwestern Farmers Rate Risk Management Practices. *Journal of the ASFMRA*. 1-7. Accessible at <http://purl.umn.edu/190705>

MacDonald, J. M. & Perry, J. & Ahearn, M. C. & Banker, D. & Chambers, W. & Dimitri, C. & Key, N. & Nelson, K. E. & Southard, L. W. (2004). Contracts, Markets, and Prices: Organizing the Production and Use of Agricultural Commodities. *USDA*. Accessible at <https://www.ers.usda.gov/publications/pub-details/?pubid=41704>

National Agricultural Statistics Service (NASS). (2016). Crop Production 2015 Summary. *USDA*. Washington D.C. Accessible at <https://www.usda.gov/nass/PUBS/TODAYRPT/cropan16.pdf>