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Trading Commodity Futures and Options in a Student-Managed Fund

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Abstract
Student-Managed Investment Fund (SMIF) programs and classes often involve the active management of a stock or equity fund. Complementing these is a unique fund, similar to a commodity pool, that invests directly in agriculture futures and options contracts. This paper presents a trading course that is offered where the class proposes and executes trades in the POET Student-Managed Agricultural Commodities Fund, which is owned by the South Dakota State University (SDSU) Foundation. The course objectives are to: (1) enhance market analysis skills, (2) master trading tools and techniques, and (3) advocate for prudent risk management in trading. Trading drills are used to gain competency in a speculative setting that requires detailed understanding of order entry and exit timing, price levels, and various order types. Real trades are considered including buying and selling futures, options, and combinations of agriculture-related contracts in a margin account. While many of the executed trades are "textbook examples" of how trading should work, the nuances provide teachable moments. The curriculum and fund characteristics are described here to inform other programs that may want to consider adopting a similar course.

1 Introduction

There are several ways for students to learn about investing. Attending lecture-based classes is one approach. Participating in an investment club may include exploring various investments and competing in a trading simulation. Student-Managed Investment Fund (SMIF) classes offer experiential and active learning through the management of a stock or equity fund. Bruce and Greene (2014) provide a broad overview of SMIF approaches and other ideas for incorporating experiential learning. Complementing these is a unique fund, similar to a commodity pool, that invests directly in agriculture futures and options contracts. Such a course, AGEC 484—Trading in Commodity Futures and Options, is taught by faculty in the Ness School of Management and Economics (NSME) at South Dakota State University (SDSU). The course is an agricultural economics elective, popular with agricultural business majors and those in other majors in the College of Agriculture, Food, and Environmental Sciences.

The course had been listed for many years and was historically run as a trading pool, where the students formed a partnership and pooled together capital to serve as seed money for trading (and paid tuition). The general experience with that approach was usually a lack of capital needed to make representative trades. Early losses would also greatly constrain making additional trades later in the semester. The general layout followed that of producer clubs (see Jones 1993 and Yost 2011) and of similar classes (see Parcell and Franken 2009; and Schroeder, Tierney, and Kiser 1995). Students always appreciated the experiential learning of placing trades. However, the partnership format meant enrollment was limited, and administering the course became increasingly difficult.[1] Thus, the course had not been taught for several years despite continued demand from students for the course.

[1] To be a trading pool, the students had to form and join a partnership with capital contributed by themselves. A partnership needs to be recreated each time the class is offered. The number of partners is capped at 15 members.

The objective of this article is to describe a SMIF-style course that directly incorporates trading commodity contracts in a margin account. The fund development and overall curriculum are described here to inform other programs that may want to consider adopting a similar course. The objectives of the course are to: (1) enhance market analysis skills, (2) master trading tools and techniques, and (3) advocate for prudent risk management in trading. An endowed fund is not necessary to have this type of course, but having one influences how the students approach trading. Various trading drills are also discussed as they provide a foundation for making real trades. The trades themselves are interesting in their scope, scale, and process.

Unlike the pooled settings, students in the course propose and execute trades in the POET Student-Managed Agricultural Commodities Fund, which is owned by the SDSU Foundation, following the efforts of an enlightened donor. The POET Fund is distinct from Isengildina-Massa and Ramsey (2019), which only invests in exchange traded funds. While the use of options is not unique to a SMIF (Saunders 2014), the NSME may have the only one that strictly focuses on commodities. Due to the risks associated with futures and options, especially outright futures positions, risk management is critical to the survival and success of this type of fund. This also creates a unique environment for experiential learning in commodity futures and options.

The POET Fund has become a key aspect of AGEC 484, a three-credit undergraduate elective course in the NSME curriculum. The course meets Monday-Wednesday-Friday from 11:00 to 11:50 CST, which corresponds to the release time of major fundamental publications, such as *World Agricultural Supply and Demand Estimates* and *Crop Production* reports. The course is taught in the First Dakota National Bank e-Trading Education Lab with ten Bloomberg terminals and nine regular computers. The course follows a lecture format at the beginning of the semester and transitions to student-led trade proposals, group discussion, and voting. There are lectures reviewing futures, introducing or reinforcing options on futures, aspects of fundamental and technical analysis, and practical trading techniques. The trades may include buying and selling futures, put options, call options, and combinations of agriculture-related contracts. Enrollment in the course was high enough to warrant adding a fall semester section and at times expanding the cap from eighteen to twenty-seven students.

2 POET Fund

The POET Fund was started in 2018 and enhanced in 2019 by generous donor gifts. The donor understood the equity needed to facilitate trades and cover margin exposure. SDSU communicated with the Commodity Futures Trading Commission (CFTC) prior to starting the fund because of the historical treatment of similar classes as trading pools. The class functions as an Educational Marketing Club, thus positions must be closed by the end of the semester. The fund is owned by the SDSU Foundation, which opened a corporate account with margin trading. An introducing broker helped communicate with the futures commission merchant when setting up the account. The class *thought* they would be able to trade for real following the receipt of the initial gift in early 2018. However, it took several attempts to get the paperwork correct to open a margin account. Once started, the ongoing performance is supposed to keep the fund operational. Trading started for real in Spring 2019 with a corn futures position.

The fund follows a brief set of investment guidelines, modeled after SMIF guidelines (see Bruce and Greene 2014) with some influence from CFTC regulations. As the fund is not soliciting funds from nor interacting with the public it does not require formal regulatory disclosures. The fund allows students to gain knowledge of the practical aspects of trading commodity contracts. The students seek to achieve risk-adjusted returns or returns commensurate with the risk of trading futures and options, while preserving capital for future students. To protect other assets of the SDSU Foundation, ongoing trading costs and any losses incurred are limited to equity in the fund. The portfolio consists of commodities directly and indirectly related to agriculture, with exposure limits by commodity and security.

The fund uses a full-service introducing broker to oversee the account. The primary broker is an SDSU alumnus, and the firm has experience with hedging and speculating customers in the agricultural commodity space. With the brokerage account arrangement, the capital that can be at risk is limited to 50 percent of the total equity in the account at a given time. In addition, the broker is familiar with the investment guidelines and sees that those limits are not exceeded. The brokerage account is set up with access to the main data of the CME Group, but not other exchanges. The fund pays market rates for full-service, broker-assisted speculator trades. As such, the broker is on-call for any trade questions and order placement. The brokerage firm serves as an objective or fiduciary third party between the class and the SDSU Foundation. The firm has experience with speculative aspects (e.g., STOP orders and spreads) that are outside the normal scope of experience for most hedging students (and their instructors). The firm also places and monitors orders, which is necessary with complex exit plans.

Unlike in paper-trading drills, there seems to be a psychological difference trading real money. When asked to reflect on the difference, the students cite the additional preparation done when proposing real trades. The students take the responsibility seriously or invest more effort when it is not just a homework assignment or a game. They do not want to be the class that "lost" money or ruined the opportunity for future classes. They seem risk-averse and often must be cajoled into making the first trade of the semester. They are treated as analysts who are tasked to manage the fund ("business") as opposed to a "gamer" in a paper-trading environment. They also take pride when positive outcomes add to the fund. Several groups of students have also competed in the CME University Trading Challenges. Those students also report perceiving paper trading and real trading as different. With homework and paper trading, there is not a high cost of making a mistake.

Like other SMIF courses, the students are trying to perform well in the fund when compared to the overall commodity market. The fund has a limited trading horizon (a semester), but some benchmarks are useful. Informally, the class is exposed to the Bloomberg Commodity Index, the S&P GSCI Commodity Index, and the Barclay Agricultural Traders Index. Invesco DB Agriculture Fund (DBA), which holds a portfolio of long commodity futures positions, has been a tractable and transparent benchmark. As shown in Figure 1, the fund performance has ranged from a loss of 9.1% to a gain of 2.8% (after commissions and fees). The fund returns have not been as variable as DBA returns. However, the portion of capital deployed has been low, and the portfolio needs to be restarted each semester. U.S. Treasury 4-Week T-Bills serve as a risk-free benchmark asset class. Relatively low interest rates have made interest earnings a low priority.

3 Trading Drills and Platforms

Trading drills are class exercises or homework assignments used to gain competency in a speculative setting that requires detailed understanding of order entry and exit timing, price levels, and various order types. Trading drills also reinforce hedging tools and tactics covered in the prerequisite course, for example, buying put options. The layout of the typical drills is shown in Table 1.

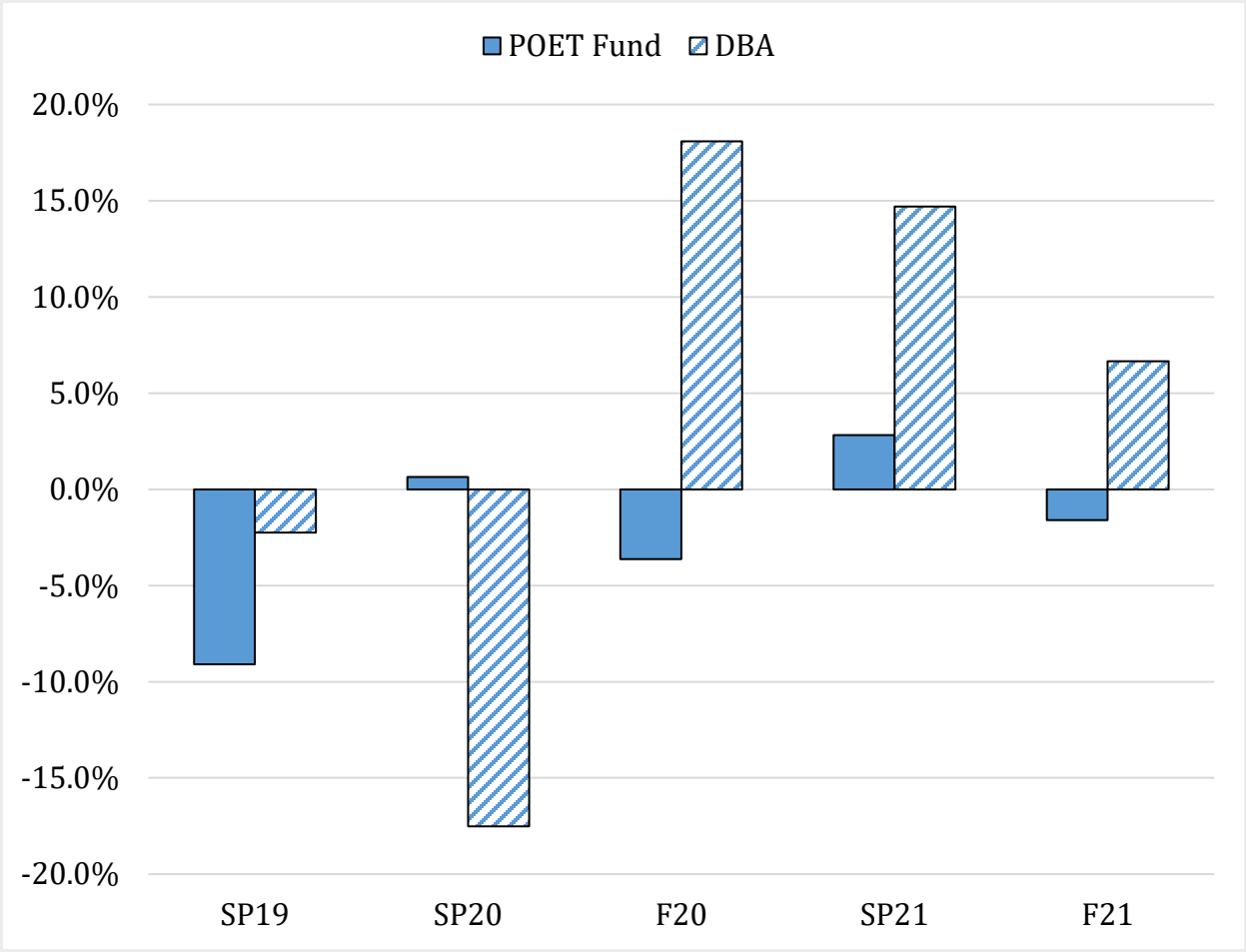

Figure 1. Relative Performance During Various Semesters

Table 1. Trading Drills Used for Homework Exercises

1. Selling futures (practice only)
2. Buying futures (with exit)
3. Buying put options (practice only)
4. Buying call options (with exit)
5. Portfolio competition
6. Hedging application
7. Futures or options spread

Early in the semester students are assigned a futures trade to execute, for example, selling a contract then buying it back. This allows them to become familiar with any trading platform used and to practice the basic process of trading. Then, a graded drill is assigned where students are asked to pick an expected price direction and place a futures trade consistent with those expectations. They must correctly pick the price direction for the exit order, a limit order above or below the entry price. A stop order may also be required to assure that risk is limited. Drill feedback at this stage is critical. There is often disparity in prior knowledge, and this is a useful point in the learning process to fill in any knowledge gaps and assure real trade proposals cohere with expectations.

After another practice drill, an option drill is assigned where the students select an expected price direction and buy an option accordingly. Thus, if they expect the futures price to increase, they should buy a call option. They then select a price objection (or premium objective) and place a corresponding

limit sell order as an exit strategy. Drill feedback is critical here also to assure that students understand the mechanics of trading options. An additional drill instructs students to build a portfolio of several futures and options across different commodities. Other drills are used as needed to explore other aspects (such as spreads, straddles, or hedge scenarios) or to serve as a nudge to see how a particular trade strategy may play out.

Trading drills and exercises are completed by simultaneously learning different trading platforms. Starting in SP20, the students made extensive use of the CME Group website and their Trading Challenge platform. Students are generally familiar with the CME Group site, but an account is needed to access a Practice Account and certain features. The CME Group is contacted to set up Private Challenges that the students join. The instructor is the facilitator of the challenge and can see the completed trades of the participants. The CME Group site also has an extensive set of education resources that can round out or complement the curriculum. Usually, one challenge is used for preliminary drills, then another challenge is started for the portfolio drill.

Other platforms have included ThinkorSwim, Commodity Challenge, and Interactive Brokers.[2] The instructor interface and ease of use vary across platforms. ThinkorSwim was widely used in SP18 and SP19 for trading drills. Commodity Challenge is very useful for crop hedging exercises and has been adopted in other NSME courses. Interactive Brokers has been extensively used by the NSME Investment Club and in an Investments course. In AGEC 484, it has been used extensively for more complex drills as it allows for paper trading across an extensive set of securities, allows the instructor to see open orders (e.g., limit orders), and allows students to see trade confirmations and brokerage statements.

Even though the course meets in the trading lab, there can be more students than terminals. Demand for lab time varies, so having the ability to complete assignments outside of class is facilitated by using different platforms. Having an app version means the students can use their smartphones (or similar device) and complete drills remotely, eliminating excuses for not having continuous access to the trading lab. When in the lab, students have a wealth of market information available, but no ability to trade directly via the Bloomberg terminals. The terminals make it easy to isolate contracts by expiration month to observe seasonal patterns masked when looking at a nearby price chart. The terminals can also be used to track the portfolio and perform analytical tasks such as back testing.[3] Toward the end of the semester, the students turn in a program trade idea of their choosing that they back-test and verify so that it can be implemented.

4 Real Trading Experience

Hedges learned in other courses have fixed exit plans, generally tied to a spot market transaction. For example, a crop producer may sell futures to hedge new-crop corn and lift the hedge at harvest. Speculation has no natural exit date. Trades may offset at any time before maturity. Speculation has no natural exit price. Limit orders may be used at a desired level, and they work on futures and option premiums. Stop orders may be used to contain losses, but only on futures positions. Trading drills prepare the students to place trades, but analysis is needed.

An early assignment is a soft trade pitch. Students select a commodity to analyze and provide a general overview for the class. This naturally leads to a discussion of contract months, trading expiration dates, delivery periods, liquidity, and so on. It also starts students thinking about price directions and/or reasons for potential price changes. Trade proposals gradually become the primary use of class time and may have a fundamental, technical, or arbitrage focus. Students can vet proposals outside of class using

[2] The Thinkorswim platform, formerly accessible through an educator module titled TD Ameritrade U, can be accessed at tdameritrade.com. The other platforms can be accessed at commoditychallenge.com and interactivebrokers.com.

[3] Bloomberg terminals use mnemonics for functions on their platform. Commonly used are Multi-Asset Risk System (MARS) to assess risk and return of the portfolio holdings and Back Testing (BT) to evaluate potential technical trading strategies and optimize trading parameters.

email and online discussion threads, or through other interactions. Trades are made following a majority approval by the class (or a quorum thereof) and can be adjusted if warranted.

After lectures and any class details are handled, the mantra becomes "What do you like?" This follows Peter Lynch's writings about his early trading days. Students respond initially with known commodities (e.g., buy corn), a fundamental reason, or a technical signal that has caught their attention. They may read that ethanol production has increased, potentially signaling an increased demand for and higher price of corn. This could be supported with an observation that the Relative Strength Index (RSI) is yet still at a relatively low level. They then use professional discourse to convince their classmates to adopt a trade. As the class gains experience, a follow-up question is invariably "Why?" This encourages students to provide a more detailed rationale for any trade, which makes both good and bad trade outcomes easier to absorb.

The instructor orders trades with the introducing broker. Generally, the trades are vetted with the broker for reasonableness. The instructor is set up with a limited power of attorney. This allows for electronic access to a trading platform and the ability to place trades. The instructor can then place trades directly with this setup. If/when done, the communication with the broker is documented to maintain accountability of both parties for the SDSU Foundation.

Trades vary in motivation, scope, risk level, and return expectations. Typically risk management of futures positions is through stop orders or coverage with options. Futures and options positions generally have a limit order as an exit plan. Contract months are chosen to avoid delivery situations. The margin account, by its nature, limits exposure as an unmet margin call would generally result in liquidating positions. The trades gradually build a portfolio that will consist of futures and options contracts. Students serve as compliance and/or risk managers, monitoring trades and investment policy parameters. Generally, this is two students each semester that can be called upon for student-guidance. These students are consulted on trade proposals to see that they are not too risky. They may be consulted if a trade needs to be modified before being filled, generally because of an incomplete entry or exit strategy. They double check any trades to assure they were placed correctly. Following SMIF protocols, having students serve as sector leaders has been explored, but not implemented. A student could be the point person, for example, for grains and oilseeds trades. This could help maintain exposure to different sectors or limit too much exposure from direct trades and spread trades. The sectors are not as well-defined as in the equities markets.

Some of the trades from Spring 2020, shown in Table 2, reflect the scope of trades possible. With hindsight, the results are often "textbook examples" of how trades should work. When a futures position is correctly placed, a limit order is tripped exiting the position (such as the lean hogs trade). When the forecasted direction of a futures price is incorrect, or the range between the current price and the stop price is too narrow, then a stop order is tripped, exiting the position (such as the corn position). Generally, puts and calls are initially bought, then sold with understandable gains or losses depending on the price move (such as the soybean meal and milk options positions, respectively). Spreads are challenging as they are attractive from a margin perspective, but they are not commonly used by producer-hedgers (such as the live cattle position). The limit and stop levels show the completeness needed when there are risk limitations and no clear hedge date to dictate offsetting a position.

Often trade proposals are abandoned. Sometimes there is not enough interest to get a "second" on an idea. At times there are not enough votes in support of a trade. Following a discussion with the broker, an otherwise reasonable idea may be cancelled. The class stayed out of lean hogs futures one year because it was quite volatile. Another time a milk strangle was tabled after the broker pointed out it was already in the settlement period and not likely to increase in value as expected, which led to revisiting the analysis and finding a flaw in how the data were interpreted.

Table 2. Interesting Trades Executed During Spring 2020

Contract	Rationale	Entry	Exit	Net
Lean Hogs Futures	Consistent drop after report	Sell at 71.60	LIMIT at 69.60	$800
Soybean Meal Call Option	Indications of increasing demand	Buy at 7.15	Sell at 6.50	($65)
Corn Futures	Potential feed demand	Buy at 3.4275	STOP at 3.3275	($512.50)
Milk Put Option	Indications of decreasing demand	Buy at 0.35	LIMIT at 1.35	$2,000
Live Cattle Futures Spread	Expect reversion to long run	Buy Jun–Dec at -9.125	STOP at -11.625	($1,090)

Notes: Entry points may be close to the market when there is time to place trades during class or pitched with some leeway if placed later. The exit points were executed, and generally had a counter strategy in the other price direction. The net figure does not include commissions and fees.

At the end of each semester, the students prepare a report to stakeholders summarizing trading activity and fund performance. They start with individual observations about major factors that influenced the markets, for example, strong exports, weather events, or changing economic conditions. They then look back at trades they were involved in and write a brief reflection on how the trade worked out or what may have been done differently. Depending on the semester, this has varied from a general discussion in class to a discussion board post to email communications with the instructor. It is a time to assess how well the students understood the trades and provide feedback or thoughts on improvements going forward. A final report is then synthesized into a two-page synopsis of the factors and the trades. The fund performance, gross, and net returns after commissions and fees, is compared to different benchmarks. The report is then shared with the SDSU Foundation, any donors, and future classes.

Being an instructor for this type of course is challenging. You may have to encourage trade ideas and generate excitement in the process. You may have to see that the investment policy is followed, which means vetoing some ideas as too risky or outside of the scope of the fund, (e.g., day-trading ideas). At times you may be the only one willing to provide a counter-argument to an idea. You also may have to professionally clarify, redirect, or correct situations where the ideas proposed do not cohere or are not internally consistent. For example, someone may say they expect the price to fall and propose buying a call option.

Being an instructor for this type of course is rewarding. Student engagement in this course and the SMIF course is higher compared to other classes. The nature of the course allows instructors to connect with the students based on their interests and experience. Students' curiosity raises the bar on the instructor's theoretical and practical knowledge in commodity markets and trading. Thus, the instructor needs to keep abreast of all economic and market developments. Natural gas, lumber, rice, and various option spreads were not in the NSME repertoire until explored as potential trades. Instructors can interweave different contracts so the students will have solid analogies to build on when they enter their careers. Both students and the instructor evolve as all learn continuously, the latter of which is not

necessarily true for many courses.

5 Place in the Curriculum

The course has a prerequisite course, AGEC 354—Agricultural Marketing and Prices, which requires either principles of microeconomics or principles of macroeconomics. In AGEC 354, the intent is to give students an overview of what can affect commodity markets, an understanding of basis, and knowledge of how to hedge using forward and futures contracts. Students are also introduced to options as hedging tools. Thus, AGEC 484 builds directly on the foundation from the prerequisite. Distinct from other courses, there is little coverage in AGEC 484 of basis nor the theory of storage. The emphasis is on applying price analysis and forecasting techniques. This allows the course to complement AGEC 454—Economics of Grain and Livestock Marketing, with its hedging applications, as well as FIN 420—Student-Managed Investment Fund, where students manage a stock portfolio actively and a balanced index ETF-based portfolio of stocks and bonds passively (with assets under management of over half a million dollars) from the perspective of a long-term investor. These courses are components of a minor in Commodity Risk Management.

The topics covered in AGEC 484 complement the trading drills and a progression from lectures to real trading (Table 3). The textbook, Carter (2018), serves as a common reference for the class. There is extra emphasis on order types and various U.S. Department of Agriculture (USDA) reports. Heavy emphasis is placed on options, both practical and conceptual, which also distinguishes AGEC 484 from other classes. There is a review of put and call options. Black's option pricing model is explored and used to explain premiums and to back out implied volatility. The various option Greeks are also explored. Delta is useful when discussing price targets and the likelihood of an option being in the money. Theta is useful when discussing the holding period for a position and the cost of having optionality. Vega was useful for discussing changes during the COVID-19 pandemic. As stressed by Purcell and Koontz (1999, p. 248), "Volatility to the options trader is as important as basis is to the hedger." Much of the content is covered during the first half of the semester. The second half of the semester has time for spread trades, benchmarks, and regulation.

There are several key distinctions between this type of course and other traditional courses: experiential learning, the dynamic nature of market, and open-endedness. All three characteristics require an experienced or knowledgeable instructor and/or a partnering broker because the course spans agriculture, economics, and finance. The instructor will need to instill confidence in students and

Table 3. Topics Covered in AGEC 484

Review of futures
Overview of options
Order types
Fundamental analysis
USDA reports
Put and call options
Option pricing
Technical analysis
- Midterm -
Spread trading
Program trading
Commodity funds
Regulation
- Final -

empower them in decision making. Specifically, experiential learning emphasizes immersion in the role of being a commodity analyst in an ever-changing market compared to the more passive role of a student. The dynamic nature of market, under which the class operates, affords unlimited opportunities to learn as opposed to the more defined structure in traditional courses. The open-endedness means that there will be no correct answer ex ante to any questions related to trading as opposed to the mostly known answers to questions in traditional courses. Students might be uncomfortable making decisions or tend to over-analyze situations because of market uncertainty or a lack of confidence. The course experience makes them competent trading and instills confidence for their future endeavors.

The emphasis on experiential learning seems to attract students to the course. AGEC 484 is popular with those returning to farming and ranching operations. Such students really want to know how to trade the contracts they may use in future hedging situations. The course has also drawn interest from students interested in brokerage or trading careers. When demanded, it has been possible to cover aspects such as preparation for the Series 3 examination. Following the Investment Policy, the trades are supposed to have a root in those used by agribusinesses. This means that a trade should have a hedge analogy and not be a day trade. At the same time, the format of the POET Fund requires some knowledge and techniques associated with speculative aspects of trading. As a result, the students learn more about different aspects of trading than they would in a focused hedging course.

To date, assessment of learning has focused on a pre- and post-class Likert scale metrics (e.g., a 1–5 scale about level of marketing knowledge) that the students self-report. At the beginning of the semester, students are asked to rate their marketing knowledge on a scale from 1 to 5. If they struggled with AGEC 354, they are likely a 1. If they aced AGEC 354, they are likely a 2. Other related coursework, an internship, or extensive experience would be reasons to rate themselves as a 3 or 4. This allows for some targeting teaching as those with more knowledge can be challenged, and those struggling can be helped more. The instructor shares a goal of moving everyone up at least a level by the end of the semester. Across five semesters, the rating has averaged 2.36 at the beginning and 3.68 at the end, indicating the students self-report knowing more after the semester. In addition, the formal course evaluations generally reflect a positive experience for students. Ramsey and Isengildina-Massa (2020) offer other ways to assess this type of course.

There is a graduate section taught concurrently in the spring semester, AGEC 584. This would be an elective for students pursuing an M.S. in Economics in the NSME and other programs. The students have a supplemental reading list with higher-level articles and industry resources to complement the textbook and trading exercises. The graduate students generally use the Bloomberg terminals more than the AGEC 484 students. In addition, they explore commodity index funds and related contracts. Hull (2016) is a suggested textbook. The number of students tends to be small, so they are integrated into the regular class for trading and homework.

In the spirit of continuous improvement, the course has been modified over time. Initially the class was set up in a hybrid format, only meeting in person on Thursdays. However, in SP19 two of those Thursdays were snow days. More frequent interaction was demanded by students informally and in formal course evaluations. The class now meets three times a week. There is regular interaction with the broker, as well as interaction with other brokers/analysts and other agribusinesses, that continue to inform the content and trades. The outline is not rigidly structured. Thus, the class was able to adapt to inverted markets in S21 and has been able to address topics of interest to a specific class. Whole class periods can be devoted to discussing a particular trade, the importance of a specific USDA report (e.g., Cattle on Feed) or a particular approach (e.g., a synthetic put). The outcome is a student that is competent in trading and confident in how and why they are trading.

6 Concluding Thoughts

While AGEC 484 meets the needs of NSME students, the course could be adapted in other programs. The course provides a deep dive into the practical aspects of commodity trading. The drill exercises and focus on options may complement other courses. By placing trades in drills and in the POET Fund, the students increase their comfort level with trading. The scope could be tailored for a different program. The focus has been on major row crops and livestock, but that could be adjusted for grains only, soft commodities, metals, and so on. The scope could be broadened to be more targeted toward Series 3 aspects. The endowment certainly helps—more is preferred to less. Limited wealth has meant some trades have not been feasible. Having the experiential aspects allows for a complement to lecture- and textbook-focused courses. The content is very current and fluid, as contract specifications change, margin levels change, and software packages change. The art is finding a balance between covering the necessary concepts and incorporating the dynamic aspects of the market.

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