

Renewable Energy Commodity Trading Educational Program

Report 10: Interim Report on Delivery of Educational Program Activity

Date: Aug 30, 2018

This report is an interim report on Educational Programs. It is intended to precede Report 11 which is "Delivery of Educational Programs Activity (due Mar 31 2019).¹

As an interim report, it is an early and preliminary version of Report 11, which will summarize the [proposed] educational programs. Specifically, Report 11 will be:

"Delivery of the initial educational programs, a semester long upper-class/graduate course dedicated to renewable energy trading on the NDSU campus (20 students per year) as well as an online to other North Dakota University System campuses (10 students per year per campus) interested in receiving the course.

Report of Activities:²

First, one of our research papers has been submitted and accepted at a profession meeting. The abstract is in the appendix.

The preliminary scope of the educational course is as below, noting this will be refined in Report 11.

The preliminary organization of the syllabus is attached.

¹ These include:

- Report 1: Initial detailed work plan outlining key performance benchmarks and timeline
- Report 2: Final Report for State of Practice Activity
- Report 3: Interim Reports for Dataset Development and Curriculum Alternatives Activities
- Report 4: Interim Reports for Teaching models & Simulation Modeling & Infrastructure/Technology Installation Activities
- Report 5: Final Reports for Dataset Development, Curriculum Alternatives, Teaching Models, Simulation Modeling & Infrastructure/Technology Installation Activities
- Report 6: : Interim Report on Program Delivery Activity Oct 2015
- Report 7: Final Report on all Exhibit A Activities
- Report 8 A detailed summary of activities under this project, including seminars, research reports etc.
- Report 9: Several analytical models are at varying stages of completion on the topic of contracting for corn and for ethanol. These include: Earlier developed teaching materials in ppt form; Xls models to analyze risks of different contracting strategies: A current XLS report on ethanol contract strategies. This is called "Ethanol Margin Model."

These are not repeated here.

Plans: In preparation of Report 11, the syllabus will be refined and expanded and put in the form necessary for the NDSU/NDUS approval.³

³ For reference, a currently approved syllabus at NDSU is attached. This is the content and format required for approval at NDSU. This particular course is on "Commodity Marketing" which will closely coincide with the renewable fuels marketing and trading class.

AGECON 4__/6__
Renewable Energy Trading

3 Credits

Instructor: tbd

Teacher Assistant: tbd

Pre-req/Co-Req: Tbd

Text: tbd

Purpose: The purpose of this course will be to provide an overview of the renewable energy market, including important economic and institutional attributes, and a detailed description of the marketing and trading mechanisms used in this industry.

Venue: This course will be taught in the NDSU Commodity Trading Room. This is a state of art room that includes 34 work stations each with access to DTN, GeoGrain, Thomson Reuters and Bloomberg, in addition to other sources of information and analytical tools.

The room will be used to illustrate sources of information on the renewable energy sector, markets, and also to conduct routine trading sessions on ethanol, corn, and other derivatives.

Data/Models This course will draw upon data sets and xls models on trading, budgets, position reports etc, that have been prepared to accompany this course. These will be available on BlackBoard.

Organization of Course: The course is organized around lectures, labs/assignments and trading modules. Periodically throughout the course, trading assignments will be provided and live trading will be conducted using the NDSU Commodity Trading Room (Barry 124).

Topics [number in () indicates approximate weeks (3 hours per week) for each topic:

- 1) Renewable energy: Overview (1)
 - a. Growth
 - b. Technology
 - c. Cost of processing
 - d. Margins
 - e. Policies impacting the industry

- 2) Data Sources and Interpretation (1)
 - a. Industry data

- b. Government data
 - c. Market data
 - d. Other
- 3) Economics of manufacturing in Renewables (1)
 - a. Costs
 - b. Technological transformations and relations
 - c. Prototypical budgets
- 4) Market mechanisms used in the Renewable sector (3)
 - a. Futures markets
 - b. Options markets and pricing
 - c. Cash markets
- 5) Trading Instruments (1)
- 6) Risk Management (3)
 - a. Hedging
 - b. Contracting with growers
 - c. Contracting with ethanol
 - d. Hedging and risk management strategies
- 7) Ethanol Crushing Margins and Strategies (1)
- 8) Marketing and Trading Management (2)
 - a. Trading organization
 - b. Position reports
 - c. Risk Policy
 - d. Other
- 9) Logistics and renewables (2)
 - a. Overview
 - b. Mechanisms
 - c. Strategy
 - d. Evaluations

Managing Risk in Ethanol Processing Using Formula Pricing Contracts
Drs. Bullock and William W Wilson
Paper to be presented (submitted) at the NC134 Annual Meeting

Ethanol manufacturers confront substantial risk in the normal course of crushing including risks related to input prices (corn and natural gas), output prices (including ethanol, DDGs, and other residual by-products), in addition to RINS, and extraction rates. These are substantive and are typically absorbed by the ethanol manufacturer. While hedging mechanisms exist for some of these inputs and outputs, there is a notable amount of risk that is largely absorbed by the ethanol manufacturer.

Alternatives to conventional hedging strategies involve varying types of contracting. These include fixing components of the underlying price independently (e.g., DDGs, ethanol, etc.), or fixing all of the elements of the ethanol price including the ethanol processing margin. The latter is sometimes referred as 'component' or 'formula' pricing. Simply, the ethanol price is specified as a formula based upon a negotiated margin or 'crush'. Under this contracting arrangement, the buyer has the option to fix each price element during any future period at the concurrent market value; however, the margin and extraction rate are negotiated up front between the buyer and seller. While formula pricing and component pricing may appear novel, they have been adopted in other agricultural processing industries. As examples, component pricing is used for most of the semolina sales to pasta manufacturers, and between flour millers and bakers, as well as some soybean and oilseed crushing companies for sales to their customers, in addition to the transactions between maltsters and brewers. These are all quite mature industries with larger and sophisticated market participants, making such contracting strategies readily implementable.

The literature in this sector has evolved though it is somewhat limited. Earlier studies described traditional hedging mechanisms in soybean (Andreas 1978; CME Group 2015; Hieronymus 1971; Kolb and Overdahl 2007; Williams 1978) and flour milling (Bean 1978; English 1978; Hieronymus 1971; Lake 1978). More recent studies have analyzed varying aspects of canola crushing and contracting (Wilson and Dahl 2014), as well as wheat milling (Wilson and Preszler 1992, 1993). One of the few studies on risk management in ethanol (Awudu, Wilson and Dahl 2016) determined optimal hedge ratios and markets for different instruments and distributions.

The purpose of this study is to analyze formula and component contracting strategies between ethanol manufacturers and buyers. It is highly relevant. Ethanol, compared to the other agricultural processing industries, is relatively new, is high scale, and has substantial indigenous risk. The buyers and sellers are large and otherwise would have sophisticated approaches to pricing and risk management. There is substantial risk which can be partially absorbed through traditional mechanisms. However, the ethanol seller absorbs a consequential amount of residual risk and may capture a risk premium for doing so. Component pricing, though not now used, is very

relevant and would allow a further way to mitigate risks, ultimately shifting a portion of the risk to the buyer.

We develop a Monte Carlo simulation model of a typical ethanol dry mill in the Midwestern United States. The model is based upon an operating budget for a minimum efficient size plant that buys corn and energy inputs and sells ethanol and the resultant by-products (DDGS, corn oil, etc.). Distributions and correlations of the relevant random variables are derived using time series methods (where the data is available) and technical information from a wide variety of studies (Eidman 2007; Rendleman and Shapouri 2007; Wood et al. 2012). The model is simulated for alternative ethanol contracting strategies including no hedging or contracting, hedging in conventional instruments, and varying specifications of component contracting strategies. Margins, risks and risk premiums are derived and compared across strategies using sensitivity analysis, stochastic dominance, and stochastic efficiency measures.

References

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- English, E. 1978. "The Use of the Commodity Exchange by Millers." In A. E. Peck, ed. *Views from the Trade*. Board of Trade of the City of Chicago, pp. 143–148.
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- Lake, F. 1978. "The Millers Use of the Commodity Exchange." In A. E. Peck, ed. *Views from the Trade*. Board of Trade of the City of Chicago, pp. 155–162.
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Wilson, W.W., and T. Preszler. 1993. "Quality and price competition in international wheat trade: A case study of the United Kingdom wheat import market." *Agribusiness* 9(4):377–389.

Wood, C., P. Aubert, K.A. Rosentrater, and K. Muthukumarappan. 2012. "Techno-Economic Modeling of a Corn Based Ethanol Plant in 2011." In *2012 ASABE Annual International Meeting*. 2012 ASABE Annual International Meeting. Dallas, Texas: ASABE. Available at: http://lib.dr.iastate.edu/abe_eng_conf/97.

AGEC 444
Advanced Commodity Trading
FALL 2019
3 credits
Revised 10/17/2018

Add: Attendance requirement

Instructor: Dr. William W. Wilson
Barry 634

William.Wilson@ndsu.edu

Phone: 231-7472

Office Hours: Monday and Friday 3:30-4:30, or by appointment

TA: Jessica Fleck (jessica.fleck@ndsu.edu) and Jesse Klebe (jesse.klebe@ndsu.edu)

Office: Tuesday, Wednesday, Thursday from 1:30-4:30 in the CTR, or, by appointment

Bulletin Description: Capstone course for commodity marketing option. Advanced work on topics related to marketing of crops and other commodities and makes extensive use of the Commodity Trading Room. Prereq: STAT 331 or ECONO410. Coreq: AGECE 339⁴

Course Learning Objectives: Students who successfully complete this course will:

1. Understand and be able to apply a framework for analyzing commodity marketing decisions.
2. Apply advanced models to commodity trading for purposes of both speculation and price risk hedging.

Emphasis will be on understanding, interpreting and analyzing futures, options and cash markets and market/contracting mechanisms, as well as logistics related to these industries.

The course will make extensive use of the Barry Hall Commodity Trading Room (CTR) which has live work stations, each with access to several current information (i.e., DTN, Bloomberg, Thomson Reuters, Trading Technologies, Grainhedge.com) and analytical technologies. This will provide exposure to market information, data extraction and analysis, linking xls files, as well as live trade simulations and simulated hedging and risk management strategies. The focus will be on commodity markets broadly defined, with an emphasis on agricultural commodities.

Topic Overview:

1. Mechanics and mechanisms for futures and options trading
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⁴ For perspective on relevance of these prerequisites, this is a senior-level course and will be taught at that level. Thus, we will be using some basic statistical concepts (i.e., regression, variance, covariance), and basic linear programming models. Concurrent registration of AE 339 will suffice. We will not be using higher level applications of these methods. It is expected that you can use the basic technique and have access to computer programs to apply the techniques. I will not be teaching the technique in this class.

2. Hedging
 - a. Mechanics
 - b. Margins
 - c. Position reports
3. Basis and Spreads and Risks
4. Hedging II: basis and spreads and hedging
 - a. Intermonth Spreads and hedging
 - b. Cash contracting
 - i. Basis, dpes, HTAs, cash plus, accelerator, and other hybrid contracts (ala Jesse) etc
 - ii. Specialty grain contracts
5. Cash Contracting and Risks
6. Marketing strategies
 - a. Processors (oilseed crushing, ethanol, flour milling)
 - b. Farmer marketing plan
7. Option pricing models and advanced trading
8. Logistics, Rail and Barge and quality
 - a. Mechanisms
 - b. Strategy Evaluation
9. Control Mechanisms and Trading

Topic Overview (CTR Lab) --tentative:

1. Log in protocols, extracting data
2. Commodity Challenge
3. Technical analysis
4. Trade simulation using Trading Technologies: 1, 2, 3
5. Geograin: Spatial markets and hedge simulation
6. Basis data: extraction and projections
7. Hedging 1: position reports
8. Risk analysis: using the normdistr command to evaluate risks
9. Dynamic linkages
10. Grower marketing strategies (Bullock)
11. Processor hedging: position reports (ethanol, wheat flour milling, soybean/oilseed crushing)
12. Spatial markets, arbitrage and competition
13. Rail/barge pricing and car ordering

Schedule: Schedule of topics and labs is attached

- Weekly activities: Generally,
 - Tuesdays/Thursdays for lectures;
 - Thursdays (most) will include labs/trading sessions in the CTR
- Supervised labs will be in Barry 124 on the following dates/times. This will be time available for students to work on their weekly assignments.
 - Tues. (Jessica F) : 1:30-4:30
 - Wed. (Jesse K) : 1:30-4:30

- Thurs. (Kaleb S) : 1:30-4:30

Assigned readings: These will be assigned on a routine basis during class and will be comprised of materials from the texts, the www, and selected readings on the bb.

Recommended Textbooks:

1. Kolb and Overdahl, Understanding Futures Markets⁵
2. On line reference: ON line: <http://www.cmegroup.com/company/futures-fundamentals.html>
3. Other useful references
 - a. Bittman, J. Trading and Hedging with Agricultural Futures and Options.
 - b. Lorton and White, The Art of Grain Merchandising Silver edition, Lorton and White, Stipes Publishing.
 - c. Carter, C. *Futures and Options Markets: An Introduction*
 - d. Kub. E. *Mastering the Grain Markets*

Class Materials: Announcements, discussion questions and assignments will be provided in class, daily. Numerous materials are distributed during this class. These will be distributed once in class, after which they will be unavailable

Blackboard: All other materials (lectures, readings, etc.) will be available on BB

One-drive Some materials will be distributed for use in class on One-Drive

Other Readings (available on-line and/or on the bb or One-drive):

Commodity Challenge. See Topic references

Hybrid Cash Grain Contracts <http://www.ngfa.org/hybridbk.pdf>

MGE Home page "MGE Futures and Options Workbook available at MGE website at: <http://www.mgex.com/documents/MGEXFuturesOptions12-07.pdf>

NFA Opportunity and Risk: An Educational Guide to Trading Futures and Options, available at <http://www.nfa.futures.org/investor/OppRisk/OppRisk.pdf>

CME Group. Look for on-line pdfs, and webinars; at http://www.cmegroup.com/education/events/forms/commodity_options_on_futures_education_archive.html

CBOT Home Page Available at <http://www.cbot.com/cbot/www/page/0,1398,14+60+143,00.html>

- 1) [A Hedger's Self Study Guide](#)
- 2) [An Introduction to Trading CBOT Agricultural Futures and Options](#)
- 3) [Understanding Basis](#)
- 4) [Buyer's Guide to Managing Price Risk](#)
- 5) [Strategies for Managing Price Risk](#)

⁵ Same as used in AE491: Except more chapters and topics will be used.

Grading: Letter grades will be on a curve generally relative to the highest score in the class. A, B, C, D, F will be allocated as A \geq 90; B 80 -89; C 70-79; D 60-69 and F <60% of the highest score in the class.

Assignments	25%	
Exam(s)		Approximate date to be refined
Term I	15%	Sept 27
Term II	15%	Oct 25
Term III	15%	Nov 29
Final Exam	15%	Friday, Dec 14 at 10:30 am
Commodity Challenge	5%	
TT 5 points	5%	
Class participation	5%	
Total	100%	
<i>Adjustments to base grade</i>		
Internship presentation	+1%	5 min summary of intern experience
Missing class/discussion questions (per incidence)	-2%	
Mpls Field Trip	+2%	Approx early Nov
Series 3 exam	+3%	
CME Institute On-Line Course	+2%	
Bloomberg Certificate	+3%	Taken during 444, or, prior
Shuttle elevator tour and presentation	+2%	Organized in 444, or, on your own

**No provisions exist for missed exams. If you have an excusable conflict, tell me by August 23.*

Attendance: Attendance in classes is expected and important. (The term “class” includes class, online class, laboratory, field trips, group exercises, or other activities.) However, there are instances in which students are unable to attend class and in which those absences will be excused. These instances are described in policy 333 (<https://www.ndsu.edu/fileadmin/policy/333.pdf>). Absences not covered by this policy are excusable at the discretion of the instructor. However, class policies regarding class absence are provided below. (Note: NDSU Student Health Service does not provide students with excuses for class absences or tardiness due to illness or injury.)

This class is highly interactive and being in class is essential. In class:

- Announcements will be made including dates, etc.
- Assignments will be distributed (only)
- There will be discussion questions throughout the semester; and Discussions on your trading activities.

- Students missing class (unexcused) discussions will accrue deductions and graded relative to the overall class, and up to 5% (see grading)

It is the student's responsibility to participate in these functions. Hence, points are allocated for participation.

Class Participation: There will be multiple ways to earn class participation points including:

1. Responding to discussion questions
2. Asking questions of guest speakers
3. Presenting materials to class (students with grain marketing interns, and/or job shadow programs)
4. Others

***Be sure to check with TA (Jessica Fleck) to make sure participation is recorded at the end of each lecture if applicable.

Assignments: There will be about 1 assignment per week. A total of about 15 will be distributed and available, and generally, these will be distributed a week or two prior to being due. All assignments will be due as specified. If not turned in at that time, the score for that assignment will be 0 (simply, do one of the others). These will be worked on independently and/or typically during Thursday's lab session.

The following are policies regarding assignments that will be enforced:

1. You will be required to do 10 assignments (out of about 15), though, you are responsible for the materials in each, and grades will be based on the assignments with the top 10 grades.
2. Late assignments will not be allowed.
3. Copying another student's work will not be tolerated. Working together is encouraged, however, copying of text, graphs or spreadsheets will result in assignments returned, and additional requirements will be imposed.
4. Style: All assignments must contain acceptable style, both in terms of text and graphical presentation. Text must be labeled appropriately by parts; headings and sub-headings must be consistent; graphs must be appropriately labeled, titled etc.

Unacceptable style will result in a reduction in grade and assignments will be returned for revisions

CTR Login Protocols: See BB under CTR for login instructions and hints on maneuvering/using each of these tools.

Commodity Challenge: This a computer based hedging game that will be played throughout the semester, starting August 23

Trading on Trading Technologies: This will be conducted on Trading Technologies. The format of the assignment may be revised due to 1) timing of the class relative to market opening; and 2) TT has converted to a WWW based system, which would facilitate trading remotely.

I expect that, on Thursdays, we will conduct a 20-min trading exercise using Trading Technologies Simulation. Typically,

- Students will be assigned a position to take/cover
- Students should craft a strategy prior to the commencing of trading
- Trading will ensue for 30 min
- Students will summarize and turn in their results
- Grades will be assigned in part on results

Other planned class activities (to be announced during semester) and for which extra credit will be available:

Minneapolis field trip. Sometime during late October, we may plan a 1-day field trip to Minneapolis. This is not required and would be available for extra credit. If you are unable to attend the field trip, you can pursue other extra credit opportunities which are listed. The purpose of this will be to expose students to the Minneapolis Grain Trade and likely visits will be to the MGE, ADM, Cargill, CHS and possibly others. Details later. Most likely will be early Nov. (9 or 16) this will be coordinated with the AgBus club.

Series 3 Lisc: The NFA (National Futures Association) administers a licensing program. That directly of interest and valuable to commodity trading is the Series 3. Though not required in this class, students wanting to pursue careers in this field, should take that test during this term as 1) much of the material taught is relevant to this test; and 2) it is a valuable certificate for your resume.

Randy Martinson from *Martinson Risk Management*, or, *ProGressive Agriculture* (ask for Joan) could be sponsors. Interested students should contact Dr. Wilson and arrangements would be made to execute this.

See. National Commodities Futures Exam.

<http://www.securitiesexam.com/products/series3.html>

CME Institute: On-line course and certificate. See : <https://institute.cmegroup.com/learn/course-catalog> points will be allowed but, discuss this with the professor prior to proceeding..

Shuttle Train tour/report: Students can arrange a tour of a shuttle elevator, as a group, and make presentation of what you learned. Confirm details with the professor.

Bloomberg University Certificate in Commodities: Bloomberg has created a Bloomberg University. From this, a certificate that can be earned. To do so, students have to watch four fundamental videos and one video specialized in commodity. After

watching all videos, you will be able to take one fundamental test and one commodity test.

To complete these, navigate through Bloomberg University by typing BU once you log into Bloomberg. You will accomplish all these in Bloomberg University.

Each video will take about 30 minutes to watch. Each test includes about 15 questions

Veterans and military personnel: Veterans or military personnel with special circumstances are encouraged to speak with the instructor to make appropriate arrangements and accommodations.

Students with special requirements: Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. The instructor may ask for verification and that, plus other assistance, can be requested from Disability Services in NDSU Library Suite 17 (231-8463). <http://www.ndsu.edu/disabilityservices/>.

Academic Honesty: All students taking any course in the College of Agriculture, Food Systems, and Natural Resources are under the Honor System (<http://www.ag.ndsu.edu/academics/honor-system-1>). The Honor System is a system that is governed by the students and operates on the premise that most students are honest and work well when their honesty, and the honesty of others, is not in question. It functions to prevent cheating as well as penalize those who are dishonest. It is the responsibility of the students to report any violations of the honor pledge to the instructor, honor commission or the Dean of the College of Agriculture, Food Systems, and Natural Resources.

All work in this course must be completed in a manner consistent with NDSU University Senate Policy, Section 335: Code of Academic Responsibility and Conduct (<http://www.ndsu.edu/fileadmin/policy/335.pdf>).

Students with special requirements: Any students with disabilities or other special needs, who need special accommodations in this course are invited to share these concerns or requests with the instructor as soon as possible. Assistance is also available from Disability Services in 212 Ceres Hall (231-8463). <http://www.ndsu.edu/disabilityservices/>