

in the WIU Commodity Futures Technical Package is based upon the formula in the Compu-Trac Reference Guide (The Technical Analysis Group 1982).

Welles J. Wilder, Jr., granted the author permission to use the formula for RSI defined in his copyrighted book (Wilder 1978). The formula for RSI in the WIU Technical Package is based upon that formula.

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Microcomputer Graphics As An Instructional Aid In A Commodity Futures Course

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Abstract

Microcomputer graphics software programs are a potentially effective teaching aid for the discussion and understanding of complex and dynamic systems such as the commodity futures market. The Ag. Disk Market Charting Software Program was used in the undergraduate commodity futures course during the Spring 1984 semester at the University of Nevada, Reno. By using the Ag. Disk software and Apple II microcomputer, students could see on the CRT screen different price trends as derived by different technical market analysis procedures. A student questionnaire was given to determine what students liked and disliked about the Ag. Disk program and if they thought this was a positive learning experience. All students rated the microcomputer graphics exercises as an effective educational tool. Students especially liked being able to see futures price charts on the CRT screen and the ease in changing price chart configuration parameters. By using different configuration parameters, different price charts were derived and different trading plans were developed.

Introduction

Often it has been said that a picture is worth a thousand words. This popular saying usually applies to explaining intricate or complex theories, relationships, or an occurrence by using a picture, painting, or drawing. If the theory, relationship, or occurrence were explained orally or in writing, the oral presentation or prose would be quite lengthy and involved. Also, the author or speaker would wonder if the audience understood the subject matter that was intended to be conveyed by the lengthy written or oral presentation.

This popular saying also applies to education. Visual aids have long been used by instructors in the classroom. Pictures, flashcards, and educational films

are examples of visual aids most prevalently used in the past. In agricultural economics, graphs have a long history as an instructional method to teach the theories of supply and demand and general market equilibrium. However, with development of microcomputers and various software packages, use of microcomputer graphics as an instructional tool is now possible. Using spreadsheet and graphics software packages, the dynamics of an economic system can be portrayed on the screen of a microcomputer.

Studies have investigated educational qualities of microcomputers for instruction and testing (Mozes and Everly, 1979; Osburn et al., 1981; Thatch, 1983; Doying et al., 1983). Also, microcomputers have been used as gradebooks which can easily chart the progress of a student through a particular course (Tice, 1981; Burton, 1984). As an educational tool in agricultural economics, agricultural production economics and farm and ranch management are two areas where development and use of educational microcomputer software has centered (Sonka and Batte, 1981; Litzenberg, 1982; Johnson et al., 1984). However, use of the microcomputer and its graphics packages as an educational tool in agricultural marketing or more specifically in a commodity futures market course has not been addressed. It is the primary objective, therefore, of this paper to investigate uses of a microcomputer graphics software program as an educational aide in a commodity futures course.

Fundamental and Technical Analysis

A major objective of the commodity futures course is to teach students to track and forecast movement of individual commodity futures contract prices and develop trading plans accordingly. In forecasting movement of commodity futures prices, two analysis procedures are used: one, fundamental analysis, and two, technical analysis. Fundamental analysis forecasts the movement of commodity futures prices based on supply and demand relationships. In order for students to forecast commodity futures price movements using fundamental analysis they must combine production and consumption data for the selected commodity and other relevant economic data with economic theory. The use of econometrics, specifically regression analysis in an undergraduate class, has been quite useful in teaching fundamental analysis.

Technical analysis, on the other hand, forecasts movement of commodity futures prices based on the belief that familiar price patterns tend to repeat themselves. Technicians use several price charting tools such as bar charts, point and figure charts and moving averages.¹ By using these charting techniques to follow price trend of the commodity futures contract, trading positions in the futures market can be derived. In the classroom, a large portion of lecture time is spent explaining mechanisms of deriving and charting bar charts, point-and-figure charts, and moving averages

and how to use these technical analysis tools in developing a trading plan.

Before the advent of the computer, students spent a large portion of their study time just calculating and charting by hand bar charts, point-and-figure charts, and moving averages. Little time if any could be spent in developing a trading plan from the hand calculated technical analysis tools, and no time was available to investigate how changes in the computation of bar charts, point-and-figure charts, and moving averages could effect one's trading plan. However, with the advent of microcomputers and graphics software packages, sensitivity in the calculation of these technical analysis tools can be seen on the screen of the microcomputer or a printout, and alternative trading strategies can be developed.

Graphics Package for Analysis

In fall of 1983, the University of Nevada, Reno like many other agricultural colleges received a grant from the Harris Corporation to purchase Ag. Disk microcomputer software. One software package obtained was the Ag. Disk Market Charting program (Schleifer and Alderman, 1981). The software is compatible with the Apple II microcomputer, the microcomputer used in the Department's microcomputer lab.

From the main program menu of the program, students can select which technical chart they desire to use and immediately develop the chart on the CRT screen. If the chart is the one desired, the output can be sent to the printer, and the student can take the printed output home for further analysis.

Ag. Disk Market Charting Program

During the spring 1984 semester, the Ag. Disk Market Charting program was used in the undergraduate commodity futures marketing course. Of the students who took the course only one had taken a previous commodity futures market course and was familiar with technical analysis. Also, approximately one quarter of the class had never used a microcomputer and required additional instruction in the general operation of an Apple II microcomputer.

The class was divided into two member teams who were responsible for collecting commodity futures price data for a specific commodity and contract month. Students in the class were not all agriculture majors. Business students comprised the class majority, with one mining student also enrolled. Because of the diverse student background, different commodities and contract months relevant to their interests were used by the two member student teams.²

Each team was responsible for developing a commodity futures data bank for their specific commodity beginning with price quotes from October 1, 1983. Each team was also responsible for updating their com-

modity futures price data disk. Homework was assigned to develop either a bar chart, point-and-figure chart, or moving average following pertinent lectures for their selected commodity futures contract using the Ag. Disk Market Charting program. By using the Ag. Disk Market Charting program, different number of days or combination of days can be used to calculate different bar charts, point-and-figure charts and moving averages. By examining and comparing the results of these different charts, students could see the sensitivity of chart formation from using different chart configuration parameters, i.e. different numbers of days, or combination of days, on the CRT screen and computer printouts. Students were responsible for determining a "best" trading strategy based on their interpretation of each chart. Students also had to explain why different trading plans were developed if different chart configuration parameters were used.

Student Evaluation

To ascertain how students felt about the Ag. Disk Market Charting program as an instructional tool, a questionnaire was given to each student in the undergraduate commodity futures market course. Results are shown in Table 1. A similar analysis of the Ag. Disk Market Charting program was made by professional commodity futures traders in *Futures* magazine where Ag. Disk Market Charting program and other available charting programs were compared (Grant, 1984). The following discussion compares student results to comments of professional traders regarding certain features of the Ag. Disk Market Charting program.

Over fifty percent of the class rated the user's guide for the Ag. Disk Market Charting program as very good to excellent. The only student complaint about the user's guide was that the user must go back and forth between different chapters of the user's

Table 1. Student Evaluation of the Ag. Disk Market Charting Microcomputer Software Program.

Category	Rating of Specific Item				
	-- (Percentage of Total Responses) --				
	1	2	3	4	5
	Very Poor	Poor	Good	Very Good	Excellent
How Do You Rate the User's Manual			36.3	45.5	18.2
How Do You Rate the Screen Documentation			45.5	54.5	
How Do You Rate the Computational Speed of the Program		9.1	36.4	54.5	
How Do You Rate the Performance of the Program			27.3	63.6	9.1
How Do You Rate the User Friendliness of the Program			18.2	63.6	18.2
How Do You Rate the Ease of Data Input		27.3	18.1	45.5	9.1
Was the Program Useful As a Learning Tool			18.2	45.5	36.3

manual to complete an initial graph and obtain a printout. Students suggested that an example problem be shown so the user has step-by-step procedures available to compile the data, run a graph, and make printouts. The high rating of the user's manual by the students agrees with that of the professional traders.

Documentation

An important attribute of any microcomputer software program is the screen documentation. This attribute was rated good to very good by the students. When the user's guide and screen documentation are combined, the Ag. Disk program documentation, as a whole, was rated very good.

Over seventy percent of the students rated performance of the program as very good to excellent. Most students found the "zoom" option of the program to be very useful. This option allows the user to define a certain screen area for analysis. By using the zoom feature, the price chart can be enlarged where there is less difference between the price range but more distance between daily highs and lows. This feature helps students to identify price trends and changes in trends more easily. An additional feature that the students liked was the price trend plotting option. By using the cursor of the microcomputer, starts and ends of a price trend can be identified and drawn. Students indicated that the price trend plotting feature gave them a greater understanding of resistance and support lines for technical analysis trading.

The only negative comment about the Ag. Disk Market Charting program was the difficulty in inputting and updating price data. Also, this was a common weakness of the Ag. Disk program identified by professional traders. The user of Ag. Disk must input data for development of a commodity futures price data bank and update the price data disk by hand. This rather tedious exercise has been recognized by Ag. Disk management as a serious defect in their program. Ag. Disk is currently reprogramming their software so that commodity price data can be retrieved by telephone from a private data bank source.

The last question in the questionnaire asked students to evaluate educational qualities of the Ag. Disk Market Charting program. All students rated the Ag. Disk program as good to excellent as an educational experience. Students found it exciting that they were using current and actual commodity futures price data to chart and make trading plans. Students felt that this approach added more relevance to their homework exercises than when the instructor artificially generates price quotes for a fictitious contract. Also, many students commented that seeing graphs of actual prices on the CRT screen and in printouts reinforced their understanding of these technical tools and showed them that these technical analysis tools were not 100 percent correct in predicting commodity futures price trends.

Conclusions

In education, a picture often can convey detailed and complex subject matter to a student better than a lengthy lecture. This is especially true when teaching technical analysis for commodity futures trading. In the spring 1984 semester, the undergraduate commodity futures class at the University of Nevada, Reno, conducted an experiment using Ag. Disk Market Charting Microcomputer software program. This program was employed to compute and plot various technical analysis charts of two member student teams assigned commodity futures contracts. Students found the program to be educational and relevant because current commodity futures prices were used. A precaution for teachers using the Ag. Disk Market Charting program is to insure that students understand underlying procedures and mathematics used in developing bar charts, point-and-figure charts, and moving averages. This is accomplished by giving students sufficient homework to compute these technical analysis charts by hand before they use the microcomputer software program.

Footnotes

¹Computational derivation and trading analysis for bar charts, point-and-figure charts and moving averages are discussed in a book by Kaufman (1978).

²Each two member team was assigned a specific contract to follow during the semester. The contracts used were Chicago Mercantile Exchange (CME) Feeder Cattle May contract, CME Feeder Cattle August contract, CME Live Cattle August contract, Commodity Exchange (CMX) New York Gold June contract, CMX Gold August contract and International Monetary Market at CME, Chicago Treasury Bills June contract.

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Microcomputer Education In Landscape Architecture Design/Build Practice

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Abstract

The landscape architecture program at WSU is incorporating the microcomputer into a third-year construction course which teaches the student business management skills through micro-computer application in a landscape architecture design/build practice. The course is designed to teach popular software packages in the management of a landscape architecture design/build practice thereby training students in computer applications while teaching them business management skills.

The landscape architecture program in the College of Agriculture and Home Economics at Washington State University (WSU), Pullman, is offering students the opportunity to become familiar with computer technology and to learn popular commercial software packages. **Micro-Computer Education in Landscape Architecture Design/Build Practice** also gives the student a full range of learning experiences in the management of a landscape architecture design/build small business.

During the recent economic recession, the multiple-level/management structure of a landscape architecture design/build practice not only survived, but flourished. The landscape architecture design/build practice incorporates under one roof the project functions of design, construction documentation and contracting. This effective combination is a new management scheme. Historically, design and construction documentation combined as the traditional structure of a landscape architecture firm, while con-

tracting was coordinated through sub-contracting out the work to landscape contractors and builders (Weinberg, Hasegawa/Elliot).

In the WSU landscape architecture program there has been an increased demand for training in management aspects of a design/build practice and in computer applications. The faculty has begun to meet this demand through the course **Micro-Computer Education for Landscape Architecture Design/Build Practice**. This course combines the instructional fundamentals for computer literacy while developing applied and creative uses of the micro-computer to the management of a landscape architecture design/build practice.

Lab Facilities

The course utilizes a micro-computer lab facility at Washington State University which was recently established as an adjunct computer lab supported by Resident Instruction in the College of Agriculture and Home Economics. The lab consists of 14 IBM-PC micro-computers with color monitors and Epson FX-80 dot matrix printers. The room is also equipped with a marker board for instruction purposes and an overhead screen which projects the instructor's station monitor for student observation. Additional hardware for the lab which would increase the effectiveness of this course includes a digitizer and a plotter that can be used for computer-aided design.

Teaching Methodologies

The student audience for this course is undergraduate landscape architecture majors in their third year of study. The lab time is one three-hour lab per week for 12 weeks. Each lab covers one lesson which includes a brief lecture on procedure, lesson handouts, and hands-on computer time. During computer time, the instructor gives individual guidance which further aids the student's learning processes. The majority of the lab time is therefore designed to give the students optimum time to practice the course assignment.

The students do not write programs, but use existing programs on the market that allow them to learn professional practice management through the computer which includes business letter writing, material cost and data inventory, plant inventory for design, customer records, cost estimation, bidding and contracting, and design graphics for more advanced computer-aided design.

The programs the lab utilizes are compatible with the IBM-PC. **Wordstar**, **MailMerge**, **CalcStar**, **DataStar**, **Formgen** and **Regen** are manufactured by MicroPro International Corp. of San Rafael, California. These programs are used for the major portion of the course. **PC Crayon**, manufactured by PCsoftware of San Diego, California, is used at the end of the course to introduce 2-D graphics. **MicroCad**, manufactured by Computer-Aided Design of San Francisco, California, introduces the student to 3-D computer-aided design. The "user friendliness" of the programs

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