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Integrating the top-down approach in a simulated trading program

Stephen P. Huffman, Scott B. Beyer and Michael H. Schellenger
*Department of Finance and Business Law, University of Wisconsin Oshkosh,
Oshkosh, Wisconsin, USA*

Abstract

Purpose – The purpose of this paper is to illustrate the effectiveness of integrating a portfolio simulation-based trading program with the top-down approach to fundamental analysis in a security analysis course. The simulation allows for the application of class material using a combination of group and individual projects.

Design/methodology/approach – Students enrolled in the class completed a survey about the integrated approach and the required simulated trading.

Findings – Over 87 per cent of students agreed that the economic analysis provided more educational value as a group project than as an individual project, while over two-thirds of the students disagreed that the trading simulation had more education value as a group project.

Research limitations/implications – Although the authors focus on the top-down approach, the concepts of technical analysis, hedging, and income generation could be more formally incorporated into the trading simulation.

Practical implications – The outline of how to integrate a trading simulation into the top-down approach, using a combination of group projects and a cumulating project completed by each student, can be used as a guide for how to make the top-down approach a more meaningful task.

Social implications – The integration of the portfolio simulated trading program with the top-down approach makes the course more applied and more enjoyable for both the students and the faculty.

Originality/value – The paper outlines how to integrate a trading simulation and the top-down approach and reports the finding that students preferred the group approach to economic analysis and individual projects for the simulation and the company analysis.

Keywords United States of America, Universities, Students, Securities markets, Simulation, Top-down approach, Simulated trading, Security analysis

Paper type Research paper

I. Introduction

We find that using a simulation-based trading program is an effective method for students to apply the top-down approach to fundamental analysis in our security analysis course. We extend the integration of market simulations into academic curricula, discussed by Altmyer (2000), by designing a series of trading assignments that incorporate the decisions from each of the components of fundamental analysis. Using a course management system (e.g. Blackboard) provides opportunities for

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students to share the results of their research and analyses with other students and to use that information to manage their own simulated portfolios. The culminating experience for each student is to present his/her company analysis to the class and see the response of other students to that presentation in terms of stocks that are purchased or sold in their simulated portfolios.

Overall, our methodology accomplishes the following three objectives:

- (1) formally integrate the top-down approach into a portfolio simulation by utilizing the vast availability of exchanged traded funds (ETFs);
- (2) use student groups as a method to reduce student time, while maintaining the breadth of the top-down approach; and
- (3) require students to make trades in simulated portfolios based on their agreement or disagreement with the recommendations and/or information provided by their peers.

We find that forming groups can reduce the workload for students in doing economic, market, and sector analysis. In a survey of our students (enrolled in security analysis courses during spring 2009 and spring 2010), we found that less than 25 percent thought that the company analysis should be done as a group project. Over 73 percent of the students agreed and an additional 14 percent strongly agreed that the economic analysis “had more educational value as a group project than as an individual project” (similar results were found for the market and sector analyses), but less than 20 percent indicated that the portfolio simulation should be a group project. Therefore, we find that integrating the portfolio simulated trading program with the top-down approach makes for a more meaningful class experience when group projects are used for the economic, market, and sector analysis and each individual student manages his/her own portfolio and presents his/her own company analysis.

In the next section, we describe the benefits of using the simulation-based trading. Then we describe the portfolio requirements for integrating the top-down approach into the simulated trading program. Next, we discuss the formation of groups for the first three components of the top-down approach. After we describe the three group projects and how each student is required to trade in response to the group presentations, we describe the requirements for the company analysis. Finally, we discuss our students’ responses to survey questions related to the integration and the use of groups, and present our concluding remarks.

II. Benefits of simulation-based trading

The simulation-based trading programs allow students to participate in the investment decision-making process and to gain valuable trading experience with securities. That is, the simulated purchase and sale of securities allows students to apply what is taught in the classroom. One method to evaluate students’ trading is to compare the performance of their actively managed portfolio to a passive (i.e. buy-and-hold) portfolio. Applying the simulation program in an academic course creates numerous class discussions based on students’ market observations relative to their portfolios. For example, students can observe and debate the impact of information releases on their respective portfolios (i.e. are markets efficient?).

The simulation-based trading programs allow students to compare various investment paradigms (e.g. fundamental analysis and technical analysis).

Although there could be a portfolio that trades only using technical trading rules, the focus of this paper is the top-down approach of fundamental analysis.

The top-down approach to security analysis customarily involves evaluating four components, in the following order (our requirements for each component and the reports and presentation are described in Appendix 1): global economies, major markets (regions and/or categories), sector (or industry) analysis, and an individual company analysis. Our approach requires students to make trades, over 12 trading weeks, in their simulated portfolios that correspond to projections made about each of the four components, as described in Appendix 2. After establishing a pre-determined asset allocation using ETFs (Table I), students then are required to make additional trades based on the analysis presented by other student groups. For example, the economic analysis requires that the students trade based on projections for world GDP, interest rates, exchange rates and commodities. If a student's projection is for interest rates to decline, then the student should purchase ETFs with higher levels of interest rate risk.

III. Initial portfolio and group projects

Although there are other portfolio simulations available, we use the Stock-Trak portfolio simulation because of its ease of use and real time trading features. Another program could be employed with similar success. Stock-Trak allows students to trade stocks, bonds, mutual funds, stock options, currencies, commodities, and futures contracts on a wide variety of assets and indices. Stock-Trak provides instructors with numerous pricing packages from "up to ten trading weeks" to "up to 36 trading weeks," with maximum trades ranging from 20 to 300 trades. We selected the 12 week service, with up to 200 trades for the active portfolio and up to 20 trades for the required passive portfolio. Many aspects of the trading in Stock-Trak can be customized. For example, the instructor can restrict day trading and establish minimum purchase price limits. The instructor also can change the commission charged, the interest rates on cash held, and the interest rate charged on margin accounts. Allowing the instructor to change these parameters (and others not mentioned) provides the opportunity to include different aspects of financial topics in the simulated portfolio experience and to introduce "shocks" to the portfolio.

After establishing the parameters of the portfolio simulation in trading week 0, we outline the required trades in each week, the timing of group presentations, and finally, the company presentations. (We provide a more detailed outline of the required trades for each trading week in Appendix 2.) In trading week 1, the basic set-up requires that students

Asset class	Target (%)	Minimum (%)	Maximum (%)
US large-cap. stocks	40	30	75
US small-cap. stocks	10	0	25
Non-US stocks	20	0	25
Fixed income	20	15	60
Real estate	3	0	10
Commodities	3	0	10
Currencies	3	0	10
Cash and equivalents	1	0	15

Table I.
Target asset allocation

create a passive portfolio and an active portfolio. The assignment for the first week is for students to create identical trades for both portfolios, of \$1 million, using exchange traded funds, ETFs, for broad indices. The objective is for each student to research and use ETFs to match the target asset allocation that we provide, as seen in Table I.

IV. Formation of groups

The analysis of each of the four components in a top-down approach (as described by most investments texts, including Reilly and Brown, 2009), by each individual student enrolled in the course, could become an overwhelming task for both the student and the instructor. However, by dividing the scope of the analysis across all students in the class through the formation of component groups, the work load is reduced, as each student is able to use information gathered and evaluated by other students. One disadvantage of using group projects is the potential for free-riders. Management of the free-rider effect is discussed in Huffman *et al.* (2011). Using a course management system (e.g. Blackboard) to post information gathered by component groups makes the task more manageable and provides an additional incentive for students to do quality work, as each student depends on the quality of the analysis provided by classmates. In Panel A of Table II, we present the results of a survey of our students from the spring 2009 and spring 2010 terms. Our students ranked the company analysis as the component that provided “the most educational value” of the four components of the top-down approach. That is, 55.1 percent of the students enrolled in 2009 and 2010 ranked the company analysis as the most valuable component, whereas 12.2, 20.4, and 12.2 percent of the students ranked the sector analysis, market analysis and economic analysis, respectively, as the most valuable component.

A. First group project: global economic analysis

At our university, we have 14-week semesters, with a total of 42 contact hours per course. In addition to our business pre-core classes (math, economics, statistics and accounting), prior to taking the security analysis course, students are required to pass an essentials of finance course and an introductory investments course. The instructor reviews the top-down approach, the basics of ETFs, and related sources of information during the first week of the security analysis course. In the second week of the course, we introduce the global economic analysis, by reviewing the components of GDP and sources of economic data (see Appendix 2 for a summary of each week’s topic and required trades). Students are required to experiment with different types of market orders (e.g. stop-loss orders and short selling) and to purchase mutual funds, which effectively requires the students to borrow funds for their portfolios.

We form groups for the global economic analysis by dividing the students into four Global Groups (because the class size is between 28 and 32 students, each group has seven or eight members). We assign several countries/regions to each Global Group based on geography and/or the type of economy (e.g. North American group, European group, Asia group and Emerging Markets group). Each group is required to justify their forecast of real GDP for the world economy as well as for their assigned region/economy and countries. For example, the emerging market group needs to discuss, at a minimum, the BRIC countries (Brazil, Russia, India and China). Justification for forecasts requires discussions about each region’s political environment, regulatory environment, monetary policy, fiscal policy, GDP components, inflation, interest rates (short-term

Panel A – student rankings of the four components of top-down fundamental analysis from most educational (value of 1) to least educational (value of 4)

Ranking	Economic analysis	Equity market analysis	Sector analysis	Company analysis
1	12.20%	20.40%	12.20%	55.10%
2	20.40%	24.50%	38.80%	16.30%
3	28.60%	20.40%	34.70%	16.30%
4	38.80%	34.70%	14.30%	12.20%
Average ranking	2.94	2.69	2.51	1.89

Panel B – evaluation of educational value of: group projects, Stock-Trak simulation and presentations

Survey questions: 2009 results are in top row 2010 results are in bottom row	Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
The analysis of the economy has more educational value as a group project than as an individual project	0.0	4.0	8.0	72.0	16.0
The analysis of equity markets has more educational value as a group project than as an individual project	0.0	4.0	12.0	64.0	20.0
The analysis of sectors/industry has more educational value as a group project than as an individual project	0.0	4.0	12.0	68.0	16.0
The company analysis has more educational value as a group project than as an individual project	8.3	41.7	29.2	12.5	8.3
The portfolio simulation has more educational value as a group project than as an individual project	16.0	56.0	8.0	12.0	8.0
The five minute PowerPoint presentation of each student's company analysis was too short	12.5	75.0	8.3	4.2	0.0
The five minute PowerPoint presentation of each student's company analysis was too long	16.0	60.0	24.0	0.0	0.0
	8.0	58.3	20.8	12.5	0.0

Table II.
Combined survey results
of 25 spring 2009 and
24 spring 2010 students

and/or long-term), currency exchange rates, and other relevant economic and non-economic factors. In addition to evaluating the growth and potential growth of economies across numerous regions of the world, we require students to evaluate the economies of specific countries. Global Groups are given two weeks to complete and post their work.

After each Global Group posts and presents its major findings and projections to the class in trading week 3, each student is required to evaluate the information and make trades that reflect his/her agreement or disagreement with the group's economic outlook and recommendations in trading weeks 3 and 4. For example, if a group predicts that the value of the US dollar will weaken relative to the euro, and a student agrees with this prediction, the student could begin to increase holdings of the euro and ETFs that track European countries. Predictions of US interest rates also would influence the type of bonds that students would hold in the fixed income portion of their portfolio. For example, if a student concludes that long-term bond rates will fall, then the student could increase his/her active portfolio's holdings of long-term bonds or exchange traded notes or ETFs that track longer duration bond indices.

B. Second group project: market analysis

We form groups for the market analysis by dividing the students into six Market Groups (given the class size, each group has about five members). Each Market Group is assigned at least two market indices. One assigned equity index is a major world index and the other index is an equity index corresponding to Morningstar's Investment Style. That is, the US market is divided into: large-cap. value, large-cap. growth, mid-cap. value, mid-cap. growth, small-cap. value, and small-cap. growth. The second index is a major international index, such as: the Nikkei 225, Hang Seng, FTSE100, DAX, MSCI-EAFE, and MSCI Emerging Market.

In addition to making forecasts for their assigned indices, each group must forecast the value of the S&P 500 for the end of the term and for the end of the year. Variations of the discounted dividend model are used to estimate growth rates and determine market equity premiums. Students also are encouraged to include other variables in their analysis that they think are relevant to making market forecasts. Market Groups must complete and post their work during the fifth week of trading.

After each Market Group posts and presents its major findings and projections to the class during trading week 5, each student is required to evaluate the information and make trades that reflect his/her individual market outlook in trading week 5. For example, if a group predicts that small-cap. value stocks will increase over the next three months, and a student agrees with this prediction, the student then sells the ETFs tracking a broad market index (e.g. Standard and Poor's 500) and purchases an ETF that tracks a small-cap. value index (e.g. an iShares ETF that tracks the Morningstar small-cap. value style trades with the ticker JKL).

C. Third group project: sector/industry analysis

We form groups for the sector analysis by dividing the students into 12 Sector Groups (each group has two or three members). Although we assign each group a sector using Morningstar defined sectors, other definitions will work just as well. We require that each group evaluate their sector using Porter's (1980, 1985) Competitive Forces model and that the group also incorporate data from other sources (e.g. Value Line industry summaries) into their analysis. The primary objective is for each Sector Group to predict the short-term and long-term growth prospects for their assigned sector. Each group also is required to select the sector that group members expect to have the highest growth during the current year. We require this analysis to be completed and posted during the eighth week of trading.

After each Sector Group posts and presents its major findings and projections to the class in trading week 8, each student is required to evaluate the information and make trades that reflect his/her sector outlook. For example, if a student concluded that the health care sector is overvalued and the financial sector is undervalued, the student should buy an ETF for the financial sector (e.g. XLF) and short an ETF that tracks the health care sector (e.g. XLV).

V. Company analysis: an individual project

Each student is required to write a company analysis and make a brief presentation. The company analysis presentations take place during trading week 10. The CFA Institute's template for the Investment Research Challenge is used as the basis for our company analysis, as provided in Appendix 3. We augmented the template with a few

additional requirements. We use the Wright (2010) article as a guide to writing the company analysis. We also provide students with examples from the CFA Institute's web site. Each student is required to make a five-minute presentation to the group (also outlined in Appendix 3). At the end of each day of company presentations, students are required to purchase three stocks and to short at least two stocks from the stocks that are presented that day (usually, two days are necessary for each student enrolled to present). In the period after the simulated trading ends, the students submit a final portfolio simulation report and discuss their trading experiences to the class. We provide an outline of our required final report (and a guideline for the presentation) for simulated trading in Appendix 4.

VI. Educational value of each component

At the end of the spring 2009 and spring 2010 terms, students enrolled in the course completed a survey, which included questions about the integrated approach. In Panel B of Table II, we report that 88 percent of the students from the 2009 course and 87.5 percent from the 2010 course either agreed or strongly agreed that the economic analysis provided "more educational value as a group project than as an individual project." Although similar results were found for the market and sector analyses, the results for the company analysis and the use of Stock-Trak are quite different. Specifically, in 2009 (2010), 72 percent (66.7 percent) of the students strongly disagreed or disagreed that the portfolio simulation had more education value as a group project. We found that half of the students either disagreed or strongly disagreed that the company analysis would have more educational value as a group project; however, there were some neutral responses. Finally, over 80 percent of the students (enrolled in 2009 and 2010) disagreed or strongly disagreed that the five-minute company presentation was too short. Thus, a five-minute presentation seems to have been sufficient for the students to evaluate the company being presented to the class and to make their buy or sell decision.

VII. Conclusions

Using a trading-based simulation can add significant value to many finance courses. Simulation allows for the application of material covered in class. This paper focuses on the top-down approach, but the concept of hedging and income generation by using derivative securities also could be incorporated into the project. Similarly, technical analysis techniques could be incorporated. The integration of the portfolio simulated trading program with the top-down approach makes the course more enjoyable for both the students and the faculty and stimulates more meaningful class discussion.

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Further reading

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(The Appendices follow overleaf.)

Requirement	General description of each requirement
Economic analysis	Each assigned group forecasts real growth rate of GDP for the current year and the following five years. Specifically, all groups must make a GDP forecast for the world economy and the assigned economy (i.e. North America, Europe, Asia and the Emerging Markets). In addition to the GDP forecast, justification for the forecast is required and must include discussions of the political environment, regulatory environment, monetary policy, fiscal policy, GDP components, inflation, interest rates (short-term and long-term), currency exchange rates and other relevant economic and non-economic factors. Each group presents key findings, recommendations, and sources of information to the class
Market analysis	Each assigned group forecasts the value of S&P 500 for the end of the term and for the end of the current year, and does the same for two additional (assigned) market indices. One of the assigned indices is a major foreign market equity index, and the other index is based on Morningstar's investment style grid; that is, large-cap. growth, large-cap. value, mid-cap growth, mid-cap value, small-cap. growth, and small-cap. value. The group report must justify the forecasted values and include discussions of the market risk premium, growth rates, and other relevant factors (e.g. liquidity). Each group presents key findings, recommendations, and sources of information to the class
Sector analysis	Each assigned group forecasts the growth and index value of the assigned Morningstar sector for the end of the term and the end of the current year. Key industry/sector issues should be cited and used to support the forecasted value. Each group must forecast the sector that will be the best performer for the current year. Each group presents key findings, recommendations, and sources of information to the class
Individual company analysis	Each student selects a company from his/her assigned Morningstar sector to evaluate. The project requires a format used by CFA Institute's Investment Research Challenge, which includes estimating a target price (see outline in Appendix 3)
Individual company presentation	Each student makes a five-minute presentation of his/her key findings and buy/sell/hold recommendation, and includes a one-page summary of his/her stock in the discussion area of the course management system. All students (including those presenting) are required to select three stocks from the individual company presentations to purchase and two stocks to short in their actively managed portfolio for each day that there are student presentations. Given the class size, there are usually two days of presentations (i.e. students are required to purchase six stocks and short four)
Final portfolio simulation report	Each student writes a final portfolio simulation report that summarizes the active portfolio's trades and performance relative to the passive portfolio and to the S&P 500 index. A more detailed description is provided in Appendix 4
Portfolio simulation presentation	Each student presents to the class his/her: (1) worst trade, (2) best trade, (3) most important insight gained from participating in the portfolio simulation

Table AI.
Requirements for the integration of the top-down approach in a simulated trading program project

Trading week	Group/student presentation	Topics discussed in class	Security	Type trade	Required trades
0		Top-down approach Discounted dividend model Demonstration of Stock-Trak using ETFs		None; buy stocks on individual companies, including stocks on foreign exchanges and ADRs	
1		Types of market orders Margin trades Short-selling	ETFs	Purchase \$1,000,000 of securities to match the asset allocation targets in Table I for both the active portfolio and the passive portfolio	
2		Economic analysis and sources of information Compare mutual funds to ETFs	ETFs Mutual funds	Buy mutual funds so that the portfolio needs to borrow funds (e.g. margin account) Place stop-loss orders and short a sector ETF to decrease exposure to that sector, based on a current news item	
3	Economic: world GDP Best region	Importance of quantitative and qualitative analysis	Levered ETFs Inverse ETFs	Use ETFs to change exposures to world economies to match expectations/forecasts	
4		Futures trading Market indices (size versus value/growth)	Bonds Futures	Buy/short individual bonds and use futures trading to change exposures based on expectations from economic analysis for: interest rates, currencies and commodities	
5	Market: S&P 500 Best index	Implied growth calculations Equity market risk premium S&P data	ETFs Futures	Use equity-market index futures contracts to change exposure to major equity-market indices	
6		Industry analysis and sources of information		Rebalance portfolios to be within the asset allocation target ranges	
7		Spring/winter break		No required trades	(continued)

Table AII.
Weekly trading
requirements

Table AII.

Trading week	Group/student presentation	Topics discussed in class	Security	Type trade	Required trades
8	Sector: best sector	Valuation models for individual companies Forecasting methodologies	ETFs, options on ETFs Levered ETFs Inverse ETFs Stocks/ETFs Futures options	Use ETFs (or options on ETFs) to over- or underweight sectors by using short selling (or levered or inverse ETFs)	
9		Growth duration model and the H-model Sources of individual company information Individual student's company presentations (Appendix 4) Foreign stocks and ADRs		Establish straddles, collars, as well as bull and bear spreads on individual stocks or ETFs Buy individual stocks by selling the type of ETF that corresponds to the stock that is purchased Buy three stocks and short two stocks based on individual student presentations Buy stocks on individual companies, including stocks on foreign exchanges and ADRs	
10	Company		Stocks ADRs Stocks		
11					
12		Return performance measures and analysis Efficient markets compared to behavior finance	Derivatives	Unwind all derivatives positions Trading ends on Friday	
13 and 14	Stock-Trak presentation				Each student compares the risk-adjusted returns of his/her active portfolio to his/her passive portfolio (and the S&P 500). Each student's presentation also includes a discussion of his/her worst trade, best trade, and most important insight gained from the portfolio simulation (Appendix 4). Exams and other relative topics

Appendix 3. Outline of individual company valuation report and presentation

The valuation project and presentation requires the valuation of a company using a modified version of the template used for the CFA Institute's Investment Research Challenge. The basic requirements/outline is as follows:

- Company highlights and investment summary (Morningstar investment style – size/value/growth).
- Comparison of valuation models (DCF, FFCE and PE models compared to Morningstar Fair Market Value).
- Business description.
- Industry overview and company's competitive positioning, including a SWOT and/or Porter analysis.
- Financial analysis (ratio analysis).
- Pro forma financial statements with earnings forecasts.
- Analysis of investment risks (e.g. liquidity, business, financial, systematic).
- Target price (three to five year range).
- Summary/conclusions/recommendation (buy/hold/sell).
- Sources of information.

Five-minute individual company presentation, with 1 minute for each of the following:

- Company highlights and business description.
- Unique aspects of the company (e.g. new product) and/or stock (e.g. size or growth/value).
- Current financial position and risk.
- Current price and target price in three to five years.
- Summary and explanation of recommendation (buy/hold/sell) and type of investor who would benefit from holding a long position in the company's stock.

Appendix 4. Final portfolio simulation report and presentation

The final Stock-Trak report requires a performance analysis, including Sharpe (1966, 1994) ratios. A summary of the individual stock trades and their performance is required.

Template/outline

- (1) Compare the daily returns of the active portfolio to the passive portfolio over the trading period (download daily portfolio values from Stock-Trak, remove weekends and calculate daily returns):
 - Calculate and compare arithmetic and geometric means (daily and annualized).
 - Calculate and compare volatility measures, e.g. SD (daily and annualized).
 - Compare other characteristics of the return series (i.e. skewness and kurtosis).
 - Calculate and discuss the correlation between the active and the passive portfolio.
 - Regression of Active (y -axis variable) versus Passive (x -axis variable) portfolio returns:
 - Is the intercept significant at the 5 percent level? How does the intercept value compare to the Jensen alpha?
 - What is the β coefficient and its interpretation?
 - What is the value and interpretation of the information ratio?

- Calculate and compare the holding period returns for the active and passive portfolios to the S&P 500 index.
 - Are markets efficient, nearly efficient or inefficient? (Justify your response based on your trading).
- (2) What are the three most important insights gained from the Stock-Trak simulation:
- From your trading strategies (required and/or otherwise)?
 - Market trends and conditions during the 12 weeks?
 - Overall?
- (3) Given the rules and quirks of Stock-Trak, how can the classroom experience be enhanced?
- (4) Include:
- Data used in Excel spreadsheet (including arithmetic and geometric returns, daily means and annualized means).
 - Chart of daily portfolio values of active versus passive portfolios.
 - Chart of daily returns of active versus passive portfolios.
 - Descriptive statistics of daily returns.
 - Regression output of daily returns of active versus passive portfolios.

Three-minute Stock-Trak presentation, with 1 minute for each of the following:

- worst trade;
- best trade; and
- most interesting insight gained from Stock-Trak experience.

About the authors

Stephen P. Huffman earned his BBA and his MBA from James Madison University and his PhD in Finance from Florida State University. He has taught corporate finance, investments, and security analysis at both undergraduate and graduate levels. Stephen P. Huffman is the corresponding author and can be contacted at: huffman@uwosh.edu

Scott B. Beyer earned his BS from the University of Wisconsin Madison, his MA/MBA from Western Illinois University, and his PhD from the University of Missouri-Columbia. He has taught Corporate Finance, Investments, Derivatives/Risk Management and International Finance at both undergraduate and graduate levels.

Michael H. Schellenger earned his BA in Economics at the University of Wisconsin La Crosse, his MA in Economics from the University of Wisconsin Milwaukee, and his DBA at the University of Arkansas. He has taught Corporate Finance and Financial Statement Analysis at both undergraduate and graduate levels.

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