# Introductory Finance in Simulation: An Innovative Educational Game for Business Majors

**Ernest P. Liang, Houston Baptist University**

## ABSTRACT

*An Excel based simulation game is introduced as an innovative educational tool for undergraduate business majors taking the introductory finance course in the core business curriculum. The game allows students to role play executives responsible for corporate financial performance as well as individual investors seeking superior results of personal portfolios. Apart from responsible decisions affecting corporate sales, cost, and thus earnings results, students are asked to study current industry, market and macroeconomic events to minimize the negative impact of "misses" from earnings forecasts and to maximize the positive impact of "hits" in investment portfolios. The game offers an integrated view of corporate, market, and investment performance and allows students, especially non-finance majors, to better appreciate the study of modern finance through a competitive, exciting exercise of simulated real world experiences.*

## INTRODUCTION

Introductory finance that is taught as a core requirement for business majors often must overcome the perception that it is dry, too technical, and disconnected from the real world. Partly due to the limiting contents of popular textbooks, such a perception stems from too much emphasis on tools as applied to managerial finance and a lack of discussion on how such tools form the basis of decision making in a highly integrated market of financial agents. Such agents play the simultaneous roles of corporate decision makers, market communicators, independent investors, and consumers of market information. Their collective expectations and actions effect and are in turn influenced by market outcomes in a continuous, yet non-linear manner. For business majors who will experience finance only once in their degree programs, an appreciation of the integrative nature of the financial markets is both illuminating and interesting.

Technology not only is found to help students enjoy their learning experiences but also enhance the learning outcome when it provides timely feedback.[1] Interactive simulations involving real world events is particularly helpful for students in business finance.[2] A simulation game built on Excel models has been developed to engage students in a semester long exercise as part of a grade determining activity in the introductory finance course of the business core curriculum. Students enroll simultaneously as decision-making top executives, corporate communication officers, independent investors, and consumers of market information. Executive teams of up to three students each will make weekly (representing a fiscal year) decisions on a set of forecast variables that affect the sales, earnings, and stock price of a simulated Fortune 200 multinational corporation (MNC). The executive team also communicates

to the market actual and forecast performance results, corporate strategies to cope with competitive and unanticipated risks, and current events pertaining to the real world MNCs.

To highlight the integrated nature of corporate, market and investment performances, all students also participate as individual investors who study markets and trade securities so as to maximize the value of their personal portfolios. Grades are determined by students' adherence to game rules and their performance as forecasters, communicators, and investors. More importantly, the game allows students to study the integrated nature of financial markets in a hands-on environment and the instructor to use selected features of the game to illustrate important financial principles. To the non-finance major, the game also hits home how corporate financial decisions and performance tie into operating and strategic decision-making that is presented in other non-finance business courses.

## THE CORPORATE FORECAST MODEL

The corporate forecast model is built on the latest full fiscal year financial results of the real world MNC, and the drivers of sales (the forecast variables) are calibrated from multiple regression analyses of historical time-series data. The MNCs that are adopted for the game are those with statistically significant coefficients for all forecast variables with the exception of the broad currency index, which is added to illustrate the potential relation between export sales and foreign exchange rates. Sales, once derived using the regression parameters, will be combined with historical financial ratios to develop the full set of pro-forma and actual financial statements. The model then combines earnings per share (EPS) and the required return from the Capital Asset Pricing Model (CAPM) to generate stock prices, presented in the context of guidance from consensus between corporate management and security analysts as in the real world. The model, built on the basis of sound modern finance theories and common financial statement forecasting procedures, is self contained, user-friendly, and can be easily navigated by students to produce weekly sales, earnings, and share price forecasts and actuals. The sophistication of the model structure, however, supports scalability and allows the instructor to use the model in both introductory and, if desired, more advanced finance courses.

As is generally the case, sales is the key driver in the forecast procedure. The model specifies incremental sales as dependent on the following forecast variables: general and administrative (SG&A) spending, capital spending above and beyond what is needed to replace depreciated assets, the change in a broad market index (S&P500) as proxy for the overall condition of the general economy, and the movement of the relative value of the U.S. currency (the broad U.S. currency index) as an export sales opportunity indicator. The mean and standard deviation of the regression residuals are then incorporated into a stochastic residual sales variable. Actual sales and thus earnings are then determined in the same model at the end of the weekly cycle when actual values of the market indexes are reported.

The student executive teams have direct control over the SG&A and capital spending components, little control over the trend and random residual sales components, and indirect control over the two market indexes in the sense that they must study current market and economic data to make an educated guess of the directions of these indexes. In addition, the instructor publishes a weekly inflation forecast that is calibrated by adjusting a base inflation rate by the weekly changes in the yield of one-year treasuries. The inflation forecast affects the projected cost of goods sold (COGS) of all firms. The executive team can make limited discretionary cuts in operating expense to offset any forecast rise in COGS (or, equivalently,

decline in the gross margin). By doing so, however, they may have to sacrifice a certain amount of incremental sales due to lowered incremental SG&A spending. Finally, several times over the course of the semester, firms will raise new capital through secondary stock (seasoned equity) offerings. Capital not raised from intended stock sales, which impact per share and stock price performance, is assumed to be borrowed and will result in higher interest expense.

Several features of the corporate forecast exercise are of particular pedagogic interest. First, the actual earnings result invariably differs from the forecast value. Such "surprises," when exceeding a preset limit (e.g., 0.2 percent), will cause the firm's stock price to react excessively as is the case in the real world. Second, stock prices are estimated as a weighted average of the intrinsic values derived from the historical price-earnings ratio and the required return estimated from the Security Characteristic Line (SCL), with the weight being the coefficient of determination from the SCL. Third, the student executive teams will report earnings each week on an electronic board (such as a Blackboard blog). Students will write in a style emulating real world press releases, with management discussions and forward looking statements incorporating current strategies and events reported by the real world MNC. Finally, in another weekly electronic board release, the student executive teams will report on research results from current press releases and news headlines pertaining to their respective MNCs and the related industries. Moreover, actual MNC stock price performance for the past week and key reasons underlying such performances would be discussed. Together, these features allow the instructor to explain important financial principles, relate them to real world events, and integrate them in a simulated exercise of corporate communication using game features the students are already familiar with.

## THE INVESTOR MODEL

As individual investors students will invest an endowed sum of capital (e.g., $250,000) in the firms run by their fellow students as well as a limited number of active Exchange Traded Funds (ETFs). As is the case in the real world, student investors study the track record of each firm, communication from the firm's executive team, and the financial forecasts to make their investment decisions. For educational purposes the ETFs are chosen to represent a broad spectrum of the global financial markets and allow discussions of how these market instruments are impacted by macroeconomic and/or sector-wide events. A typical portfolio would include the MSCI world stock index (ACWI), Emerging market stock (EEM), Deutsche Bank Commodity Index (DBC), U.S. Small Cap index (IWO), one or two sector funds (such as the SPDR Select Sector Technology (XLK) or Energy (XLE) funds), and perhaps an inverse ETF such as the Short Dow Jones (DOG). To avoid the complication of accruing and distributing interest payments during cycles not consistent with the game reporting cycle, a broad bond market index such as the Dow Jones Corporate Bond Index (^DJCBP) can be used to substitute for a bond ETF to allow students access to a fixed income portfolio. It is also often useful to introduce a risk-free instrument, such as the iShares Barclays TIPS Bond fund (TIP), to help in the construction of fully diversified portfolios. Students must keep up with world political/economic events and observe market reactions in order to make informed decisions on trading the ETFs.

The investment exercise is a valuable tool in educating students about basic investment principles. Concepts such as expected and holding period returns, specific versus market risk, portfolio diversification and hedging are learned both through class discussions and the game

experience.  In addition, since students act as both corporate chieftains and individual investors, they have an added appreciation of the sources of specific risk and why it matters only if an investor deliberately target excess returns (seeking alpha).  Asset allocation as a strategy to maximize gains comes alive as students learn to balance between high yielding versus growth stocks, small cap versus commodity stocks, fixed income versus equity securities, and domestic versus global markets.  There is plenty of opportunities, if so desired, for the instructor to discuss the nature of these asset types and the economic forces affecting their prospective performance.  The investment competition is both a fascinating and enlightening experience for all business students, but in particular the uninitiated non-finance major.

## CONCLUSIONS

The most distinctive pedagogic values of the game include a deeper appreciation by students of the interplay of firm-specific and market factors in determining firm market value and portfolio performance, how financial statements analysis is appropriately employed in corporate budgeting and forecasting practices, the critical importance of proper investor communication, and investment principles that come alive in a competitive game of constant risk-return balancing.  Designed to highlight key elements underlying the integrated, dynamic nature of financial markets, corporate finance, and investment decision making, the simulation exercise facilitates learning by business majors of how the three dimensions of modern finance interact and function in the real world of global markets.

Before and after surveys of students of introductory finance participating in the game generally showed a heightened interest in the subject of finance.  The fact that the course must still be taught in accordance with the contents of the adopted corporate finance text underlies why the game typically does little to alleviate the anxiety of non-finance majors towards the core subject matters.  Students learn better in competitive hands-on exercises simulating real world conditions.  The game offers such a simulation based on sound finance concepts.  What is required is an innovative text that will bring together such concepts by taking the students on a tour of hands on simulated real life experiences.  Until then the uninitiated non-finance major will try very hard to delay taking the required introductory finance course until the last semester of their graduation year.

## ENDNOTES

[1] Greco, Joseph F., and Dennis J. O'Connor (2000). A role for computer-assisted instruction in the beginning undergraduate finance course. *Financial Practice and Education,* 10(1): 239-244.

[2] Sachdeva, D. (1989). Psychology of computer use: XI. students' attitudes toward use of computer-simulation games in teaching business finance. *Psychological Reports, 64*(3), 1195-1195.