USING STOCK VALUE AS THE PERFORMANCE MEASURE
IN A BUSINESS SIMULATION GAME

Lee Tangedahl, University of Montana

ABSTRACT

This paper proposes that the stock value may be used as the sole measure of student performance in a business simulation game. Note that for the course as a whole, assignments (e.g. papers or presentations) may provide additional grading criteria. A simple stock value model may be used and has certain advantages, but financial theory suggests a more complicated model, based on the present value of future cash flows should be used. It is suggested that students be provided with a planning model that enables them focus their planning in conjunction with the stock value model used in the simulation.

INTRODUCTION

Using stock value (i.e. value of an individual share of common stock) as the sole performance measure in a business simulation game poses at least two questions. First, does stock value adequately measure the factors indicating student success in a simulation game? Second, can stock value be accurately computed in a simulation game?

An affirmative answer to the first question implies that the stock value directly reflects how well the students have mastered the important concepts of the business simulation game. The game should be constructed to reward good decisions with additional cash flow and therefore a higher stock value. Certainly an instructor may want to emphasize other, non cash flow aspects of the game and other measures would then have to be used. Also, the course may include other assignments (e.g. papers, presentations, etc.) that may provide the instructor with the opportunity to measure other concepts beyond the business simulation game.

The second question may be more difficult to answer. The financial theory is fairly clear, basing the stock value on the present value of future cash flows. Applying this theory to a business simulation game, or the real world, may not be as clear. The mathematical complexities, besides making the simulation itself more difficult, may also make it more difficult for the students to focus their planning on aspects that will lead to a higher stock value.

THE COURSE AND GRADING

The business simulation game discussed in this paper is a total enterprise, two-product game with marketing, production, and financial variables. This game has been developed for a semester capstone course in which student teams (3 to 5 students) compete during in a 4-year (16-quarter) game. The course emphasizes teamwork, planning, and oral and written communication. The course provides students with experience in applying the knowledge from previous courses, in using technology, and in meeting deadlines.

Course grading is based in team performance in the game (50%), written annual plans (25%), a marketing plan presentation (12.5%), and individual presentations (12.5%). The number of points for team performance increases each year as more variables come into play. Peer evaluations may be used to modify the distribution of team points.

THE SIMPLE STOCK VALUE MODEL

The team performance (50% of the total grade) is measured by the stock value at the end of each year. A simple approach would be to

compute the stock value with a simple formula using the earnings per share and the dividend payout ratio for each of the four quarters of the current year. The earnings per share are weighted evenly and the payout ratio is measured against a target (e.g. 40%) that is set by the instructor.

The Advantages

While this formula for stock value favors simplicity over reality, with obvious shortcomings, it does have some favorable aspects. First, the students have two perfectly clear goals – maximize total earnings per share for the year and hit the target payout ratio. All decisions and strategies can be based on maximizing total earnings per share for the year. Second, the payout ratio serves as an indicator of planning accuracy. The difference between the actual and target payout ratios indicates the accuracy of a team's forecasted demand, productivity, etc. Third, stock value is not biased in favor of teams with larger capacity. A team that purchases additional capacity through issuing stock or increasing debt must increase income to match the additional shares outstanding or the increased interest expense in order to maintain their stock value. It should be noted that cost of borrowing must be properly tied to the debt equity ratio to make this model work. Fourth, the design criteria for the game can be generalized into rewarding good decisions with increased revenue or decreased expenses while penalizing all bad decisions oppositely. For example, good labor practices can be rewarded with higher productivity while bad cash management can be penalized with increased cost of borrowing, and each should have an appropriate effect on stock value.

The Disadvantages

Even though this stock value model may be appealing in its simplicity, its flaws cannot be overlooked - serious finance students have frequently complained about the inaccuracies. First, the model ignores the time value of money, dividends or earnings are valued the same for the first quarter as for the last quarter of a year. Second, the model does not consider the potential for future earnings and dividends. Teams are discouraged from expanding because their stock value will reflect the current expenses incurred from expansion but not the potential for future income. Third, the simple stock value model is too far removed from either "commonly accepted" theoretical models or from reality. Such comparisons (between simulation results, theory, and reality) are common, and may be controversial, but should not be overlooked. Fourth, the simulation game should reinforce the appropriate financial decisions made by the students who are serving as managers of a company. Rather than focusing only on the current "bottom line", students should consider instead the accumulated wealth of the stockholders. Students should be aware of what they are earning as return on the stockholders' investment and should seek to invest the company's earnings in a manner that will maximize that return in the future.

THE REVISED STOCK VALUE MODEL

Corporate financial theory indicates that stock value should be determined by the net present value of the cash flows, e.g. Ross (1995). Applying this theory to a simulation model requires estimating each team's future earnings, taking past team decisions and future economic conditions into account, and then discounting that future earnings stream back to present value using the team's weighted cost of capital. The model must also react correctly to factors in the game such as issuing or buying back shares of stock. Two excellent discussions of stock value models that are based on future team earnings are provided by Goosen (1994) and Brooks (1999).

Applying the Revised Model

The key to successful student performance in a simulation game must be based in planning.

Therefore, to successfully apply this revised stock value model to the simulation game, students must be able to focus their planning to achieve a higher stock value in accordance with the revised model. Students must be able to look beyond the current bottom line to be aware of the effect that current decisions will have on future earnings, which, in turn, affect their stock value. Students must also be aware of the cost of capital, the return on investment, and the economic conditions and how all these factors will influence their stock value.

To facilitate planning, students are provided with a comprehensive spreadsheet model to utilize in the planning process. This spreadsheet model records historic performance and current economic conditions and then projects future cash flows based on student decisions and forecasts. Students are able to experiment with the decisions and forecasts, observing the resulting cash flows and their possible effect on stock value. While the planning model provides ratios, pro forma financial statements, and other comprehensive information, it does not go so far as to make the decisions for the students. Furthermore, the information provided by the planning model is only as good as the forecasts (e.g. demand, productivity, credit rating) provided by the students. The planning model attempts to put the students in the realistic position of searching for optimal decisions that will maximize the wealth of the stockholders while in an uncertain environment.

REFERENCES

Brooks, LeRoy D. (1999), *Fingame Online 3.0*, Third Edition, Irwin/McGraw Hill.

Goosen, Kenneth R. (1994), "Increasing the effectiveness of performance evaluation through the design and development of realistic finance algorithms, " *Developments in Business Simulation & Experiential Exercises* (21), 63-69

Ross, S. A., Westerfield, R.W. & B. D. Jordan. (1995). Common Stock Valuation. *Fundamentals of Corporate Finance*, 3rd ed., Iwin/McGraw Hill, pp. 174-185.