

Stock-trading simulations as a resource for management instructors

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Abstract:

This article reviews stock-trading simulations as a resource for use in management courses. Stock-trading simulations have three highly desirable qualities for educators: (1) they cost nothing to use—instructors can choose from various free simulators that all have the same general functionality, (2) they provide real and continuously updating data (e.g., company news, stock price movements), and (3) they can be customized to enhance learning. Feedback from experience, colleagues, and students confirms that all stock-trading simulations can indirectly enrich learning in courses, such as principles of management and strategy, by compelling students to follow and analyze the decisions of corporate managers. Stock-trading simulations also provide opportunities for students in courses covering managerial decision making to directly analyze and learn from their own decisions when they trade virtual shares of companies. The review concludes with a summary of the potential strengths and limitations management instructors should consider before implementing stock-trading simulations.

Keywords: simulation | managerial decision making | investing | teaching exercises

Article:

Simulations enhance management education in at least two ways. Whereas traditional pedagogical methods (e.g., lectures, readings) mostly impart conceptual knowledge, simulations can facilitate development of the real-world managerial competencies that employers seek (Gabric & McFadden, 2001; Lu et al., 2014). They also foster student engagement, especially when gamified (Keys & Wolfe, 1990; Salas et al., 2009). The degree of benefit simulations yield, however, varies proportionally with the extent they are (1) easy to use, (2) experiential, (3) enjoyable, (4) economical, and (5) extendible (see Neely & Tucker, 2012). One class of simulations that appears to possess each of these qualities is stock-trading simulations (STS)—artificial environments that facilitate trading virtual shares of real stocks with imaginary funds.

Given that business education researchers have reported that STS clearly enhance learning in disciplines such as accounting and finance (Jankowski & Shank, 2010; Marriott et al., 2015), they potentially could yield similar benefits in management. The present review explores this potential.

Resource Overview

This section provides basic histories of stock trading and STS. These histories provide the context required to appreciate how STS can enhance management courses.

Stock Trading

Most developed economies have one or more major exchanges through which private parties can buy and sell shares of publicly traded corporations (Fuhrmann, 2019). Accessing these exchanges usually requires opening an account with a registered stockbroker who can legally process trades. Historical brokerage fees, including commissions that started at \$40 per trade at their peak, plus additional charges for trading small quantities of shares (Brodie, 1940; Jones, 2002), discouraged stock trading by those with limited financial resources. These costs greatly diminished with the advent of online trading and the subsequent Robinhood® revolution (Gilani, 2020).¹ Now, zero-commission trading of stocks in any increment, including fractional shares, has created a new generation of traders from all socioeconomic backgrounds.

Stock-Trading Simulations

Business professors have used STS in their courses for decades. Originally, STS were paper and pencil, requiring students to pick stocks and track their performance using print newspapers such as the *Wall Street Journal* or local Sunday papers.² As real-stock trading has gone fully online, so have stock-trading simulators. Online simulators offer similar functionality and information (e.g., historical data, news, and expert analyses) to the systems they emulate. Some also facilitate private and public competitions (leagues), so that participants can test their trading skills against one another. Given the curricular relevance of stocks and the stock market, accounting and finance instructors often implement online STS to enhance their courses (Jankowski & Shank, 2010; Marriott et al., 2015). My experience suggests that management instructors can, too.

Use in Teaching

STS have a wide range of potential uses in any management course that addresses managerial decision making in some way. This section demonstrates how to realize this potential in three parts. The first part provides a general overview of STS integration in distinct management courses. The second part provides a detailed walkthrough of an STS implementation in a course dedicated to the topic of managerial decision making. The third part summarizes how STS can promote independent and vicarious learning in any management course.

General Overview of STS Integrations

I have integrated STS in two distinct courses—*Principles of Management* (hereafter Principles) and *Decision Making in Organizations* (DM)—using freely available simulators (see Appendix A for the hyperlinks and alternatives). Each STS presented the same goal—maximize account balances by buying and selling virtual shares. I incentivized this goal by awarding bonus points

¹ Robinhood is a registered trademark of Robinhood Markets, Inc.

² I know this from firsthand experience as a student in an introductory business course in 1993.

or assignment exemptions to students with the highest virtual account values. In both courses, STS started students with US\$5,000 in virtual funds and settings imitating a basic Robinhood account (e.g., zero commissions on trades, limit and stop orders), with one exception—students could short sell stocks they believed were overpriced (see Appendix B for an explanation of short sales and other trades).

In addition to choosing a starting balance and platform settings, integrating STS requires choosing how many different stocks students can trade. STS in Principles followed the “one-stock” model, which requires students to choose, follow, and trade only one stock the entire term as described in Appendix C. STS in DM allowed for trading multiple stocks. In the first iterations, I let students trade any stocks they wanted, but doing so created issues in both courses. It precluded common frames of reference in Principles and led DM students to focus more on how they chose stocks to trade than how they traded those stocks. Having students collectively preselect 1 stock and 4 to 5 stocks eligible for trading in Principles and DM, respectively, before the STS began eliminated these issues.

Detailed Walkthrough of an STS Implementation

The detailed walkthrough of a specific DM implementation presented here demonstrates how management instructors can use STS to enhance learning. Specifically, it shows how to get STS started and then, once started, how it can facilitate students prospectively connecting course concepts (e.g., biases, effects, fallacies, heuristics) with managerial decisions as well as retrospectively connecting the same concepts with their stock-trading decisions. Appendix D provides a supplementary discussion of how instructors could implement STS in Principles and Strategy courses.

Getting Started

The STS starts with an initial survey informing DM students about the STS, as well as asking them to indicate their familiarity with stock trading and name up to three stocks they would like to trade. Having their responses facilitates introducing the STS by setting it up live during class and walking students through registering their accounts and making practice trades. From there, students make at least two trades involving at least 5% of their account value (combined) per week.

Prospectively Connecting Concepts With Managerial Decisions

To see how stock trades relate to managerial decisions, students must recognize how most, if not all, managerial decisions involve the same three basic types of choices as stock trades—(1) initiating an action (buying), (2) perpetuating an action (holding), or (3) terminating an action (selling)—often with similar reasoning. This framing makes it easier for students to draw prospective connections between the two types of decisions.

In-class discussions prompt students to make such prospective connections after introducing each new course concept. The introduction to framing effects and prospect theory, for example, involves asking students to think, discuss among themselves, and share with the class

(cf. Kaddoura, 2013) how they would anticipate such effects influencing their stock-trading decisions. Inexperienced students then can often use this theory to predict that stock traders may tend to hold losers and sell winners, as many actually do (Bazerman & Moore, 2013). After they share their predictions and experiences, they next consider the types of managerial decisions that could be influenced by the phenomenon in question. That is, they share predictions or observations of how such influence plays out. In response, one student recently noted that managers may be risk averse and risk seeking when hiring and firing due to framing those choices as gains and losses, respectively.

Retrospectively Connecting Concepts With Students' Own Decisions

Using STS leads to students experiencing the same decision-making pitfalls we study in the course. To get them to recognize and report how they do, the course includes two reflection report assignments (see Appendix E). The first part requires them to provide a *Heading* describing each of three trades, their rationale for making it (*Anticipation*), and its *Outcome* as of that point in time. The second part requires them to provide a *Joint Analysis* in which they identify three specific phenomena (biases, fallacies, heuristics, etc.) they experienced in one or more of their trades, and then distill lessons into an *Integrated Application*, discussing how they have experienced similar tendencies in past decisions and should manage those tendencies going forward.

Writing the reflection report obligates students to evaluate whether and how much they experienced certain phenomena we study. Specifically, requiring students to describe the range of prices they anticipated cues them to assess whether they suffered from *overprecision*—a form of overconfidence bias leading decision makers to make overly narrow estimates of numeric ranges (i.e., confidence intervals). However, the process also allows them great flexibility in recognizing if they have fallen into any of the other pitfalls we cover. For instance, some students report having fallen prey to the *focusing illusion* by predicting prices will increase due to product releases or seasonal demands (e.g., holiday and spring break travel) without considering other indicators pointing to imminent price drops. Similarly, others describe how some combination of *inattentional blindness* and *confirmation heuristic* led to them failing to update their expectations with new and readily available information. Yet others still describe how the *conjunction fallacy* led them to incorrectly presume that new entrants (e.g., NIO, Nikola) would follow the same incredible growth trajectories as Tesla because they have similar products or profiles.

Independent and Vicarious Learning

STS can have the additional benefit of promoting independent and vicarious learning. With sufficient rewards attached, STS promote independent learning by motivating students to inform their trading with corporate news and events rather than merely speculate. Reading news stories, in turn, invariably results in students learning about the issues real-world managers face (Abrahamson, 1998). Furthermore, following evolving stories in which managers must make high-stakes choices can also promote vicarious learning about how and when managerial decisions succeed and fail.

Analysis

The previous sections established that STS have the potential for promoting learning in management courses. This section analyzes the strengths and limitations of doing so.

Strengths

Feedback confirms that STS fit the profile of ideal simulations by being (1) easy to use, (2) experiential, (3) enjoyable, (4) economical, and (5) extendible (Neely & Tucker, 2012). First, buying and selling stocks in STS is easy and convenient. Many students intuitively understand STS interfaces or can quickly learn to trade virtual stocks on any connected device by viewing short, live, or recorded demos (e.g., Nugent, 2020). Second, STS provide relevant firsthand and vicarious experiences. The former comes by requiring decisions with the same structure all managerial decisions have—initiate (buy), perpetuate (hold), or terminate (sell) courses of action—whereas the latter comes by incentivizing students to follow company reports, familiarizing them with real management issues. Third, many students enjoy STS, especially those who already trade stocks or currencies. In my latest course evaluation, one wrote, “I wish there were more relevant courses like this that teach . . . investing in stocks.” Fourth, simulators such as those listed in Appendix A are economical (free). Fifth, and finally, STS are extendible by lending themselves to customization for use in various courses (see Appendix D).

Limitations

Feedback and mixed results obtained following STS suggest three limitations other instructors should consider before using them. First, STS have no inherent structure. This is an important consideration because many students prefer working to explicit rather than exploratory requirements. Without imposing structure through graded assignments inducing students to engage each key aspect of the STS (e.g., trading quotas, summaries of company news), only the intrinsically competitive and curious get engaged. Second, using STS implicitly requires instructors to know stock trading well enough to explain it to students. This requirement can present a substantial start-up cost to instructors without trading experience. Fortunately, instructors can now get up to speed by participating in public STS or experimenting with real trading. Third, a fine line exists between trading and gambling. STS can blur this line and thus encourage unhealthy risk taking (Konstantaras & Piperopoulou, 2011). Instructors should regularly remind students of this fine line and the need to respect it.

Conclusion

I have found STS to be a valuable resource in my own management courses and expect that other instructors could, too. Those wishing to explore STS further can start by trying simulators listed in Appendix A and reading Schmidt’s (2020) review of several of them.

Appendix A

Free Stock-Trading Simulators

1. Thinkorswim® by TD Ameritrade®³ <https://www.tdameritrade.com/tools-and-platforms/thinkorswim/features.page>
2. NinjaTrader® Free Trading Simulator⁴ <https://ninjatrade.com/GetStarted>
3. Investopedia® Simulator⁵ <https://www.investopedia.com/simulator/home.aspx>*
4. MarketWatch® Virtual Stock Exchange⁶ <https://www.marketwatch.com/game>*
5. Wall Street Survivor®⁷ <https://www.wallstreetsurvivor.com/>*

*Has functionality for running competitive leagues.

Appendix B

Stock-Trading Fundamentals⁸

Stock brokerages have progressively offered more ways for their clients to trade stocks. This appendix provides explanations of those ways for students. It starts with some basic terminology necessary to understand the types of trades that one can execute.

Basic Terminology

Novice traders can easily become confused when attempting to purchase stocks. For instance, many misinterpret relatively low (e.g., under \$10) and high (e.g., more than \$1,000) prices per share to mean companies are cheap or expensive, respectively. Learning the following basic terminology will minimize the risk of such confusion:

- *Market Capitalization*: The full market value of the company calculated as the *Current Price* × *Shares Outstanding*
- *Current Price*: The last price per share at which shares traded hands
- *Shares Outstanding*: Total shares owned and available to be traded by parties
- *Bid Price*: The highest price another party is offering to buy shares
- *Ask Price*: The lowest price another party is offering to sell shares
- *Margin*: A line of credit offered so stock traders can leverage their portfolios or engage in short selling (explained below)

Simplest Approach: Market Orders

The simplest way to trade stocks is with market orders. Market orders accept the current ask or bid price when traders buy and sell, respectively. This distinction bears noting because novice traders often mistakenly think market orders execute at the current price.

³ Thinkorswim and TD Ameritrade are registered trademarks of TD Ameritrade IP Company, Inc.

⁴ NinjaTrader is a registered trademark of NinjaTrader Group, LLC Affiliates.

⁵ Investopedia is a registered trademark of Investopedia, LLC.

⁶ MarketWatch is a registered trademark of MarketWatch, Inc.

⁷ Wall Street Survivor is a registered trademark of Stock-Trak, Inc.

⁸ The trades described herein can apply to trading other securities, such as bonds and options, as well.

Betting Against Stocks by Short Selling

Short selling provides a means for traders to make money when a stock's price has gone higher than warranted. Short selling works in five steps: (1) borrowing shares from other stockholders at a preestablished interest rate, (2) immediately selling the stock, (3) waiting for the price to drop, (4) rebuying the shares at the lower price, and then (5) returning the shares to the original owner plus interest. The brokerage executes these steps on behalf of the trader. Short selling is risky because sometimes the prices go up without ever coming back down (see Duggan, 2020 for an extreme example). Due to this risk, stockbrokers only allow clients with margin accounts to short sell.

Bidding and Asking With Limit Orders

Traders bid or ask prices for stocks by placing limit orders. A limit order specifies the worst price a trader is willing to accept for a stock trade. Hence, a limit-buy price indicates that the buyer will pay that amount or less, whereas a limit-sell price indicates that the seller will take that price or more. The highest limit-buy price becomes the current bid, and the lowest-sell price becomes the current ask.

Hedging Bets With Stop Orders

Stop orders work in opposite fashion to limit orders. Whereas the latter trigger when stock prices hit specified prices or better, stop orders trigger when stock prices hit specified prices or worse. Stop orders, also known as stop-loss orders, provide traders a defensive tactic against misprediction. Specifically, stop-loss sell orders allow traders to set how much of a drop in price they are willing to accept before abandoning a position, as well as lock in gains on positions that have increased in value. Stop-loss buy orders serve the same purpose in the context of covering short sales.

Appendix C

One-Stock-Trading Game Instructions

Our class will follow a large multinational corporation to provide context for our learning. You will choose that corporation as a class at the end of our first meeting. For the rest of the term, we will use the corporation you choose as context for our course material. To incentivize you to follow the latest news for the corporation, we will also play an online investment game as follows:

1. Each student **starts** with an allocation of **US\$5,000.00** in play money.
2. You use this money to buy or sell the stock of the chosen corporation.
3. You can make as many trades as you like.
4. Trade wisely. If you run out of money, the game ends for you.
5. The game will only allow trading of the stock the class chooses—no others.
6. *Note:* In previous versions, students could choose any company they liked, but that deprived us of all having the same frames of reference.

7. Student with the highest account value(s) at the end wins [**instructor-specified reward**].

Recommended Resources

1. New to investing: <https://www.investopedia.com/slide-show/learn-how-to-invest/>
2. To research a specific instrument (i.e., stock, bond, etc.):
 - a. <http://finance.google.com>
 - b. <http://finance.yahoo.com>
 - c. <http://www.nasdaq.com>

Appendix D

Using STS in Other Management Courses

Here, I synthesize insights from my experience, colleagues, and students into how STS could promote learning in Principles of Management and Strategy courses.

Principles of Management

Principles provide students basic introductions to a wide range of fundamental concepts while leaving more in-depth analyses to specialized courses (e.g., organizational behavior, strategic management). Because students who take Principles often lack professional experience, stimulating engagement with course content can pose serious challenges. Its survey nature further complicates matters by compelling the use of short-lived exercises to illustrate each concept and then moving on to the next with little connection between them. Using a “One Stock” STS (see Appendix B), however, can remedy these issues in three ways.

First, STS can provide vicarious experience. Doing well in STS requires making informed trades, which requires following corporate news. Following news stories, in turn, can promote learning about the issues real-world managers face as well as their successes and failures responding to those issues (Abrahamson, 1998). Second, the same stories can also facilitate connecting course content with real-world management. For example, my last section chose Tesla, which was making headlines for concerns with legally questionable tweets (Rapier, 2019), employee well-being due to excessive safety violations (Ohnsman, 2019), overworking employees, and union suppression (Korosec, 2019), in addition to revolutionizing the auto and energy industries (Forbes, 2017). These incidents provided rich and powerful examples for class discussions on ethics, leadership, human resource management, and innovation and change, respectively. Third, following a single company can also facilitate spontaneous generation of hypothetical examples. When covering organizational environments and structures, for instance, students were able to speculate about the environmental tensions Tesla had likely experienced as well as how they structured themselves and why.

Strategy

Strategy courses address how firms achieve and sustain competitive advantage. Strategy instructors have long used simulations such as the Business Strategy Game (BSG) to enhance

learning (Stone, 1995). STS offer low-cost and easy-to-implement alternatives and complements to such simulations. STS can serve as alternatives by imposing structurally similar requirements as the BSG on students—that is, having them compete through iterative capital allocation choices like top management teams do. In addition, STS can complement the artificial and narrower contexts of simulations and similar capstone requirements. Whereas simulations like the BSG have students make decisions about specific strategic initiatives in an imaginary market, STS require students to evaluate the holistic strategies of real companies. As noted by a colleague (V. Maksimov, personal communication, December 18, 2020), this holistic evaluation aspect of STS resembles corporate governance: It has students vote in favor or against overall strategies like corporate directors do.

In terms of possible implementation, another colleague (M. Rickley, personal communication, December 16, 2020) proposed, and others confirmed, that STS restricted to single, well-defined industries would work best (e.g., automobiles, cosmetics, retailers) in strategy courses. She continued that instructors could then assign STS requiring students to create, track, and trade portfolios of strategically diverse companies in the prechosen industry (e.g., Ford, Maserati, Tesla). Instructors could then ask students to explain, based on course concepts (e.g., the PEST—*Political, Economic, Social, and Technological* factors—framework; Jurevicius, 2013), if and why they would change their portfolios at various points in the term.

Appendix E

Reflection Report Instructions

Purpose: Make sense of your decision-making processes so you can improve them.

General Requirement: Describe **three** specific decisions (**1 buy, 1 hold, and 1 sell**) and then analyze them in terms of our course content.

Required content and format:

For each trade:

Heading: [Trade #] Bought/Sold/Held X Shares of ABC @ \$YY.ZZ/share on [date]

- **Anticipation (2 to 5 lines):**
- Explain how you arrived at the decision to buy, hold, or sell. State the range of prices you estimated the price to vary along **and** how you came up with this range.
- **Outcome: +/- \$X.YY/share (% change) based on sold (for buys) or current price (for holds and sales) of \$X.YY.**

For all trades . . .

Joint Analysis: (up to 25 lines total)

- *Identify* **three** decision-making phenomena (course concepts) that affected your trades.
- State trade(s) affected (some may affect two or three trades, others only one), and explain how.

Integrated Application: (15 to 20 lines total):

- Identify thematic learning and takeaways you got from the trading game.
- Discuss how the lessons you draw would apply to other decisions.
 - Would you make the same or similar decisions again? Why or why not?
 - Make connections between these and other personal and professional decisions you have made or will make.

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