

TEACHING MANAGERIAL ECONOMICS WITH DYNAMIC COMPETITIVE SIMULATIONS: WARGAMING IN THE CLASSROOM

Shawn Carter, Jacksonville State University

ABSTRACT

All business firms face risks and uncertainties of various sorts in their day to day decision making. Drawing on military wargames to simulate battlefield conditions, business decision makers fabricate real world conditions so that managers must act and react to each other's actions. This paper illustrates how these simulations can be used effectively in teaching economics. Specifically, I develop wargaming exercises that center attention on the role of the entrepreneur in subjectively ascertaining and dealing with oligopolistic uncertainties to which his firm is subject. Since no one firm can perfectly anticipate either the actions of its rivals or how its rivals will react to actions by the firm under consideration, uncertainty is inherent in this market structure. In the classroom, the students are sensitized to anticipate and react expeditiously to market developments and to tailor solutions to authentic business problems. These simulations open the students' eyes to potential problems caused by competitive interaction and introduces them to a business decision practice commonly found today in the competitive market place.

INTRODUCTION

There has been a recent trend in economic education increasing the use of cooperative learning exercises to enhance student learning. Holt (1999) noted that placing students directly in an economic environment connects them to the theories presented in lecture. Beach (1997) concluded that students participating in or observing cooperative economic exercises score significantly higher than non participating "control groups" for the same course. These exercises enhance

learning because they open the students' eyes to enhanced understanding and retention of the theories presented in lecture.

Indeed, experimental methods are changing the way economics is taught. This trend has led to some economics textbooks replete with games and classroom experiments (e.g., Binmore 1992 and Gardner 1995). A popular introductory textbook by Mankiw (2001) includes an activity and game book written by Stull (2001). These experiments allow students to engage in classroom simulations that reinforce the theories presented in the course.

UNCERTAINTY IN BUSINESS DECISIONS

Oligopolistic behavioral uncertainty (Greenhut and Lane 1989) evolves from the condition that business decision makers face an increasingly complex market because of the rapid pace of technological innovations, the increased rate at which new products are introduced, intensified competition, market globalization, and more regulations. Business decision makers confront these challenges as they attempt to guide their companies through changing business landscapes.

The business climate is changing rapidly and firms need to be prepared for the dynamics required by anticipating and adapting to market risks. Entrepreneurs also have to be able to visualize the future needs of their consumers and to draft research and development plans which would meet future demands. Firms must acquire a strategy which recognizes that their profits and market shares depend on variables such as: customer satisfaction, employee satisfaction, inflation, interest rates, product quality, location, currency exchange rate volatility, taxes and economic growth.

In his 1994 book, Henry Mintzberg noted that "analysis intensive" business planning was destined to fail. Companies seek to efficiently produce and distribute their products. To accomplish this, typical "analysis planning" uses the past to interpret how the future might evolve. However, because markets are highly unpredictable and fast changing in this information age, it is impossible to predict how competitors will act based on historic analysis. Wargaming, on the other hand, addresses these dynamic issues by simulating the markets to be analyzed. Unlike "analysis planning" that uses historic information, wargaming is forward looking. Business executives are witnessing technological advances outpace strategic thinking, consequently, to improve their competitive rank in

oligopolistic markets, business executives have begun hiring consulting firms to create business wargame simulations.

Business wargaming simulations are designed and administered by many firms, including: MC Associates, Booz-Allen and Hamilton, Coopers & Lybrand, KPMG Peat Marwick, SAIC, Technology Strategic Planning, Black and Veatch and Monitor Company. Evolving from military wargames, these simulations improve the understanding of business dynamics by allowing decision makers to discover how competitors are likely to react to their market actions. Wargaming exercises have been implemented by numerous industries including: utilities, airlines, oil, defense and electronics. Companies using simulations hope to train their managers to make optimal decisions to support the firm's mission. It is important to emphasize that in these oligopoly structures, the competitive outcome for each firm is dependent on their own actions and those of their competitors.

WARGAMING IN THE CLASSROOM

Sakar et. al. (1998) notes that oligopoly markets are traditionally taught using a two firm approach of non-cooperative behavior because mathematical solutions with more than two firms are too cumbersome for many students. The classroom use of game theory also has limited applicability to these business situations. Usually the dialogue consists of the classic games including "the prisoner's dilemma" and "the battle of the sexes." These classics are then transformed into a two company advertising or OPEC oil production game. However, with our complex multinational business society, the actions and reactions of oligopolistic competition is not as simple. Consequently, computer simulation games (i.e., TeleSim and Capstone) have been developed to create would-be worlds and allow students to divide into competing teams and play competitive simulations.

TeleSim, created by Coopers and Lybrand, is a highly recommended computer simulated wargaming program. However, this software loses some of the human element because the players act and react playing against the computer. Management Simulations, Inc. developed "capstone" business simulation software. Each team will play a series of decision strategies entered into the program. Instant feedback shows the results describing the competitive impacts of each teams actions. These simulations are very effective at introducing students to the complexities and consequences of business decisions. However, the programs are of limited value because they cannot contain strategy scenarios

that have never been thought of. A more dynamic classroom simulation will prepare students to consider the unexpected. Each team needs to include in their decision making “what ifs” to consider how their proposed strategy would fare against any potential action taken by competing teams. Any reasonable operation that a company could take in the real world should be fare game in classroom simulations. These actions will trigger reactions from other participants. Therefore, each team must think and act based on the strategies and expectations of strategies from other players.

Computer simulation games also limit student learning because they provide cookbook results to each potential set of actions. Student teams act and then wait to discover which team chose the best strategy. Consequently, team decision making is disconnected from the market consequences. A more dynamic simulation allows market teams to adjudicate the market response to the teams’ actions. These market teams in effect synthesize the actions of the competitors to reveal the market results for each competitive period. A market team increases learning as competitive players seek to discover how their strategies and the actions of others impacted their profitability.

In the classroom, the instructor can teach about market interaction in oligopoly industries. With wargaming, the students become part of the interaction bringing together concepts, strategy, analysis and vision. Gapra et. al. (2000) developed a multi market oligopoly simulation with entry exit and pricing decisions. Teams deciding to enter are given the opportunity to select price and quantity. The authors use the simulation to encourage discussions about market structures. This approach, however, is limited because student participants are not free to act and react with any reasonable action. Their experimental design limits the strategies for participants.

DESIGNING THE SIMULATION

There are numerous consulting firms presently designing business simulations. The exercise presented here follows the basic design of the game developed by Booze-Allen & Hamilton for military and business wargaming. To design a dynamic classroom simulation the instructor must efficiently select teams. If there are twenty students in graduate managerial economics, I will select three company teams and one market team. Each team will have five members. I select teams based on a biographical sketch I request during the first class meeting, to include the courses they have completed and their employment

history. Because MBA students generally have a wide range of experience and skills, careful team selection is necessary to create equal teams. Consequently, I select teams in a way to give each group approximately the same amount of skills and experience. I should note that I will assign the students with the most business experience to the market team because their decisions are the most important, and it is paramount that the class trusts their judgement decisions.

After the teams are selected, I designate for each a company that they will represent. The players are required to explore the company's competitive landscape and collect company specific information. Specifically, each group is given three weeks to collect information about their company's finances, physical resources, and other performance variables found on annual reports. The teams also collect recently published articles about the company's standing. After collecting the information, each team shows a brief PowerPoint presentation about their company to the class and they provide me with a copy of their research.

By having the students collect and present most of the market information, they follow a path of self-discovery with a sense of ownership in their effort. This is more valuable than artificial scenarios created by software simulations. After the presentations, I create a packet including the information that each group provided. I also provide cost and demand functions for the industry, each firm's market value, and the costs that would apply to expansions. Due to limited resources, I invent demand and cost characteristics and present them in the packet as authentic market attributes. Each company team is provided a copy of the market packet. They will then meet outside of class to discuss their strategy. The basic objective of each is to choose actions that will generate the highest company profit given the competitive landscape.

COORDINATING THE WARGAME

During the team meetings, a recorder writes down every suggestion and counter suggestion until specific actions are agreed upon. Each group attempts to understand what incentives motivate the other groups and, consequently, the players can better anticipate what other teams will do in response to each action. Teams will tend to put themselves in other players shoes as they attempt to anticipate strategy reactions and to better understand the potential consequences. Groups sometimes play out their game with themselves simulating other teams before agreeing to their own best action. Generally, teams are not willing to share their strategies with other groups because they do not want to give away

strategic information. Interestingly, some teams will occasionally leak the wrong information to mislead their competition. This is similar to the misleading signals which companies can send in the real world. Any action that may be made legally in the real-world is acceptable in wargaming (i.e., these business teams can: enter new markets, invest in new technologies, counter a competitors aggressive move, cooperate with competitors, change production schedule, introduce products, announce takeovers, enter e-commerce, alter advertising, and vertically or horizontally integrate).

Each team must understand the move-countermove interactivity and the potential consequences of various strategies and actions. They must assess their competition and devise a strategy to match the amount of risk the team is willing to undertake. The players must also consider: salaries, taxes, debt, depreciation and regulatory concerns. Each simulation period represents two years in the market. During the exercise, the instructor is responsible to make sure all actions are feasible and acceptable. Teams are free to engage in any strategy that a firm could reasonably enact. However, the teams should be aware that some actions are not reasonable. Consequently, each team must contact the instructor prior to the simulation class to have their proposed actions approved. The teams are constrained only by the demand/cost limitations presented in their packet and legal/ethical activities that I adjudicate on a case by case basis.

During a simulation exercise, each team shows a PowerPoint presentation explaining their market strategy. They also provide a copy of their presentation to the market team. Before the next class, the market team meets and adjudicates how each team's actions play out in the market. Specifically, they decide how much the market purchases from each team. In addition, they utilize the provided cost and demand information to calculate the profits earned by each team. The market team presents their results during the next class, which is the most crucial part because this is where the learning takes place. Afterwards, the teams will meet again outside of class to discuss their new market position and prepare their next strategy to be presented in the ensuing class. Generally, a complete wargaming exercise involves three to five simulations.

CONCLUSION

Wargaming allows students to research information, develop strategies and apply them. The actions are critiqued and the lessons are discovered. Students who participate in wargaming tell me that they believe the simulations

teach them more about “real world” business than other business classes they have completed. They also agree that the competitive nature of the exercises encourages them to work harder on the project. I should note that every wargaming exercise is different because of its dynamic style. Team strategies and actions will not be identical for each class. Consequently, the direction in which the market evolves is contingent upon what actions and reactions the teams choose.

Wargaming is a process of synthesized learning and amelioration involving creativity and insight. It requires the students to look at the entire market space and opens their eyes to the potential problems caused by competitive interactions. The students are sensitized to anticipate and react expeditiously to market developments and to tailor solutions to authentic business problems. They learn that links between products can create cascade effects where moves in one series can affect a firm's profitability in other successions. Beyond the specific lessons learned about competitors and the market, wargaming also serves as a cogent avenue to foster teamwork and augment unanimity among participants about their group's ideals, strategies and tactics.

REFERENCES

- Beach, H. (1997). The Impact of Classroom Experiments on the Learning of Economics: An Empirical Investigation. *Economic Inquiry*. 35(4), (October): 763-769.
- Binmore, K.G. (1992). *Fun and Games: A text on Game Theory*. Lexington Mass.: D.C. Heath.
- Capra, C.M., J.K. Goerce, R. Gomez & C.A. Holt. (2000). Predation, Asymmetric Information and Strategic Behavior in the Classroom: An Experimental Approach to the Teaching of Industrial Organization. *International Journal of Industrial Organization*. 18(1), (January): 205-225.
- Gardner, R. (1995). *Games for business and economics*. New York: Wiley.
- Greenhut, M.L. & W.J. Lane. (1989). A Theory of Oligopolistic Competition. *The Manchester School*. 57(3), (September): 248-261.

- Holt, C.A. (1999). Teaching Economics With Classroom Experiments: A Symposium. *Southern Economic Journal*. 65(3), (January): 603-610.
- Mankiw, N.G. (2001). *Principles of Economics*. 2nd ed. Fort Worth, Texas: The Dryden Press.
- Mintzberg, H. (1994). *The Rise and Fall of Strategic Planning*, New York: The Free Press.
- Sakar, J., B. Gupta & D. Pal. (1998). A Geometric Solution of Cournot Oligopoly with Nonidentical Firms. *Journal of Economic Education*. 29(2), (Spring) 118-126.
- Stull, C.A. (2001). *Classroom Activities, Demonstrations and Games Manual to accompany Principles of Economics*. Fort Worth, Texas: Harcourt College Publishers.

ECONOMICS ARTICLES

