

THE WEE GAME: A PRE-GAME

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ABSTRACT

The WEE GAME is a very simple single-player experiential exercise designed to show participants the nature of price-quantity, promotion-quantity and price-promotion-quantity relationships. This little game has both a monopoly mode and a competitive (oligopolistic) mode. The WEE GAME uses a retailer scenario to simplify and isolate these functions.

INTRODUCTION

Many authors have written about the advantages of using simple games to introduce complex ideas to students (Frazer 1975, 1977a, 1977b, 1983, 1984, 1985, 1986; Frazer & Bommer 1979; Dennis and Pray 1982). Much of this work was done in response to changes in computing technology, in particular time sharing and microcomputers. Neale and Stiles (1977) used a mini-simulation to exemplify a simulated work experience in which students practiced decision-making skills. Mergen and Pray (1992) presented a mini-simulation to demonstrate the importance of quality-based decisions. Furthermore, they showed how this helped the same students later when they participated in a total enterprise business simulation with total quality elements. O'Connell et al. (2002) examined the validity of using mini-simulations to assist in the training of Mexican retail salespeople. Steck and Lanze (2006) reported on the use of mini-simulations as training sessions designed to teach U S students about the European Union. These authors explained that first-time students, apprehensive at the prospect of performing under pressure in public, found these mini-simulations to be very helpful.

Even though most students have had a course in microeconomics before competing in a business game, they have often only had a theoretic explanation of marginal analysis. These students have not experienced oligopolistic competition in a simplified manner that will allow them to clearly see the connection between their classroom knowledge and the real world that complex business simulations are attempting to model. Some students in some business schools delay taking economics and may take a business course that used a business simulation before

being exposed to economic theory and a few business students never take a course in economic theory. With the recent impact of the internet on classroom simulations, the WEE GAME was written to provide students with a simplified experience in some economic fundamentals before being in a situation where they are required to participate in a complex business games.

THE PURPOSE OF THE WEE GAME

The WEE GAME is designed specifically to allow students to experience the process of finding the best price and the best marketing budget, both independently and jointly, first in a monopolistic environment and then in a competitive environment. In the competitive model, the WEE GAME uses three computer modeled firms, each following its own unique strategy using only the information available to the human players. While the WEE GAME is designed for individual players, small teams can also play the game by coming to concordance before entering any decisions.

A DESCRIPTION OF THE WEE GAME

This game uses a retailer rather than a manufacturing scenario. Thus, many of the functions of a more conventional total enterprise simulation are not present. This retail establishment sells a single product with an identifiable unit cost and a fixed allocated overhead. Both of these values are chosen by the administrator prior to the start of the game. These costs must be covered before the firm can show a profit. The costs of advertising the game's single product is identifiable, separated from the other costs, and shown as a separate line item in the firm's P & L statement. All sales are assumed to be cash so that the focus of the game remains on the relationships being explored. Because this is a very simplified model, no seasonality or other perfunctory variables affect demand; price and advertising expenses are the only variables causing demand to vary. An example of the output from a single round of play can be found in Exhibit 1. Graphs of demand and/or profit through the various rounds of a stage can be readily generated, as can graphs of demand and/or profit vs. the

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changeable variables. The complexity of the simulation and the relationships being explored increases in the later stages of this game.

Stage 1: The price-quantity relationship in a monopoly

In this stage of play, a fixed advertising budget, the unit cost and the allocated overhead are assigned by the game administrator. In the initial round, a preliminary price is randomly generated by the computer and tabular results similar to those in Exhibit 1 are provided to the participant. In subsequent rounds, the retail price of the product is determined by the participant and the computer advances the game to the next period and displays the tabular results from the prior round. This repeats for 12 rounds. The goal of this exercise is to find the most profitable price.

Stage 2: The promotion-quantity relationship in a monopoly

In this stage of play, the participant manipulates only the marketing expenditures in each round to explore the marketing expenditures-quantity demanded relationship. Unit price, unit cost, and allocated overhead are set by the administrator prior to the start of this stage. An initial advertising expense is randomly generated by the computer and results similar to Exhibit 1 are displayed. In the following 12 rounds, the participant chooses a value for the advertising expenses and the computer again generates results similar to Exhibit 1. As in stage 1, the objective of this exercise is to find the most profitable advertising expenditure.

Stage 3: The price-promotion-quantity relationship in a monopoly

In this stage of play, both unit retail price and marketing expenditures are simultaneously determined by the participant after the starting position is randomly generated in the first round. The tabular output remains the similar to that shown in Exhibit 1. Due to the use of a price-promotion interaction in the underlying demand equation, the optimal values determined in the first and second stages may or may not provide an optimal solution for highest profit in this stage.

Stage 4: The price-quantity relationship in a competitive environment

Stage four of the WEE GAME introduces competition into the game. Three computer-run firms compete with the participant's firm in the game's marketplace. Conditions and participant play are otherwise similar to those in stage 1, with randomly generated starting prices for all four firms generated in round 1.

THE COMPETITORS' STRATEGIES

The first computer-run competitor, Alpha Corporation, follows a very simple strategy using market research information collected at the end of the prior round. In each round after the first, it simply uses the average of four unit prices in the prior round as its unit retail price in the ensuing period. Alpha Corporation uses this strategy throughout the entire game.

The second computer-run competitor, Beta Corporation, is a little more discriminating. This firm looks at the profits made by each of the four competitors in the previous round. If one has attained a higher profit than that made by Beta Corporation, Beta Corporation will change its unit retail price to the value used to attain that profit. Beta Corporation uses this strategy throughout the entire game.

The third computer-run competitor, Gamma Corporation, ignores the market research information and relies only on internal data when making its decisions. In the second period, Gamma Corporation uses a randomly generated unit price in the same manner as was done in the first period. At the end of the second period, the results from the first period and the second period are compared as follows...

- ❖ If the second time period had greater profits or (smaller losses) and...
 - o If price increased between the first and second time period, then the price in the third round would be the price from the second round increased by half the amount of the price increase between rounds one and two.
 - o If price decreased between the first and second time periods, then the price in the third round

**EXHIBIT 1:
Determining the amount of profit generated by the sale of game's one product**

Period	2
Unit price	\$ 15.99
Number of units sold	315
Total revenue	5036.85
Unit cost	9.14
Direct cost	2879.10
Gross profit	2157.75
Allocated overhead	412.00
Advertising expenses	852.00
Total profit for this period	893.75

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would be the price from the second round decreased by half the amount of the price decrease between rounds one and two.

- ❖ If the first time period had greater profits (or smaller losses) and...
 - o If price increased between the first and second time period, the price in the third round would be the price from the first time period reduced by the amount of the increase between rounds one and two.
 - o If price decreased between the first and second time period, the price in the third round would be the price from the first time period increased by the amount of the price decrease between rounds one and two.

This comparison method is then iterated, always using the results of the previous two rounds to make the price decision for the current round.

Although having the greatest profit among the four competitors in the final round is the object for this stage, the optimal unit retail price from the first stage may no longer be optimal in this stage of play due to the introduction of competitive forces. Exhibit 2 shows the tabular form of the output in the competitive mode of the WEE game.

Stage 5: The promotion-quantity relationship in a competitive environment

In this stage of play, the conditions and participant play are similar to those in stage 2 with the addition of the competitive environment of stage 4. The participant and computer-run firms can only alter the promotional expenditures in this round. The strategies for the computer-run firms are similar to those in stage 4. Obtaining the highest profit in the final round is once more the goal for these four competitors.

Stage 6: The price-promotion-quantity relationship in a competitive environment

In this final stage of play, the conditions and participant play are similar to those in stage 3 are added to the same

competitive forces deployed in stage 4. Both the unit retail price and the promotional expenditures are under the participant's control for his firm in this stage. The strategies for the computer-run firms are once more similar to those in stage 4. Having the maximum profit in the final round of play is the objective in this stage, which is the most complex available in the WEE GAME.

ADMINISTRATOR CONTROLS

The authors selected the MTS algorithm (Murff, Teach and Schwartz, 2006) to model the demand function. Since participants were free to select any positive values for unit retail price and/or promotion expenditures, a well-behaved model that would function across the entire domain was absolutely necessary. Many demand models do not meet this criterion (Perotti and Prey, 2000). This model also allowed for interactions between unit retail price and promotion expenditures in stages 3 and 6.

The controlling parameters for this unit demand function include two constants to control price-demand elasticity, two constants to control marketing expenditures-demand elasticity, and one constant to control the strength of the relationship between the effects of price and marketing on demand. These can be randomly assigned at the start of each play of the game or they can be chosen by the game administrator. This flexibility means that two participants playing the game using identical decision values may have different outcomes (Murff, Teach and Schwartz, 2006a and 2006b). To assist the administrator who wants to choose values for these constants, relevant graphs are provided in the administrator controls to assist in visualizing the unit demand model.

The game administrator also controls the strength of the carryover effect for both price and marketing expenditures. This is done through the use of separate asymmetrical exponential smoothing adjustments on these two variables. Price increases and marketing expenditure decreases will always take effect immediately without carryover. A smoothing coefficient of 1 for unit retail price indicates that

**EXHIBIT 2:
Determining the amount of profit generated by the sale of game's one product
in the competitive mode**

Period 2				
	Your Firm	Firm Alpha	Firm Beta	Firm Gamma
Unit price	\$ 15.99	\$ 18.50	\$ 15.00	\$16.00
Number of units sold	315	220	360	330
Total revenue	\$ 5,036.85	\$ 4,070.00	\$ 5,040.00	\$ 5,280.00
Unit cost	\$ 9.14	\$ 9.14	\$ 9.14	\$ 9.14
Direct cost	\$ 2,879.10	\$ 2,879.10	\$ 2,879.10	\$ 2,879.10
Gross profit	\$ 2,157.75	\$ 1,190.90	\$ 2,570.90	\$ 2,400.90
Allocated overhead	\$ 412.00	\$ 412.00	\$ 412.00	\$ 412.00
Advertising expenses	\$ 852.00	\$ 770.00	\$ 700.00	\$ 900.00
Total profit for this period	\$ 893.75	\$ 8.90	\$ 1,458.90	\$ 1,088.90

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price decreases will not carryover from prior time periods, while a value between 0 and 1 will allow price decreases in prior time periods to have holdover effects for the price variable, which will affect unit demand in the current time period. A smoothing coefficient of 1 for marketing expenditures indicates that promotion increases will not carryover from prior time periods, while a value between 0 and 1 will allow promotion increases in prior time periods to have holdover effects for the marketing expenditure variable, which will affect the unit demand in the current time period.

Finally, the degree of competition in the latter three stages is also controlled by the game administrator. These two parameters control the elasticity of demand at the firm level with respect to each of the demand causing variables, price and marketing expenditures. The degree of competition for the price variable is set independently of the degree of competition of the marketing expenditure variable. A value of 0 for the price parameter causes the demand elasticity with respect to price at the firm level to be the same as that at the industry level, thus the firms are not competitive. The degree of competition on price (firm level demand elasticity compared to industry level demand elasticity) increases as the price parameter increases. The marketing expenditure parameter behaves in a similar manner.

THE NEED FOR THIS GAME

As many students do not clearly understand demand response curves and the interactions of price and promotional expenditures, the WEE GAME is designed to provide a participant to with empirical evidence of some of the material taught in micro-economic theory.

Most students do not seem to understand the constraints that competitors impose upon a firm's decision making, so this simulation is also intended to provide a simplified introduction to competitive behavior and responses to decisions in an oligopolistic market place. The experience of playing the WEE GAME should help improve the decision making processes used by participants in large-scale functional or total enterprise business simulations when played after a WEE game experience..

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