

Developments in Business Simulation & Experiential Exercises, Volume 11, 1984

A COMPARISON OF TWO BUSINESS STRATEGY SIMULATIONS FOR MICROCOMPUTERS

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ABSTRACT

This paper evaluates two business strategy simulations commercially available for microcomputers and makes a strong recommendation in favor of Cartels and Cutthroats and presents some serious shortcomings of Free Enterprise for use in Business Policy classes.

INTRODUCTION

The advantages of running business strategy simulations on microcomputers is increasing with the improvements in hardware and with a wider availability of quality software. Microcomputers offer convenience--often in one's office or home--whereas mainframe computers may be across the campus or there may be a lengthy wait to get a terminal. Many small colleges cannot afford the investment nor the operating expenses of a mainframe but can easily afford microcomputers. Many students have microcomputers or have easy access to them so they can check out floppy disks and use the strategy simulations independently of the instructor.

For the past two years I have used two different, commercially available, simulations in my Business Policy classes. The first one is Cartels and Cutthroats and the second is Free Enterprise.

FIGURE ONE

Name:	Cartels and Cutthroats
System:	Apple][+, 48K, one disk
Price:	\$39.95
Publisher:	Strategic Simulations 465 Fairchild Dr., Suite 108 Mountain View, CA 94043

Name:	Free Enterprise
Systems:	Apple][+, 48K, one disk IBM pc, one disk
Price:	\$100
Publisher:	Science Research Associates 155 N. Wacker Drive Chicago, IL 60606

DESCRIPTIONS OF THE SIMULATIONS

Both simulations are quite similar in overall design. They simulate from two to six companies competing to manufacture and sell a product. Both require one set of decisions prior to each simulated period (cue quarter of a year). The decisions cover marketing, research and development (R & D), factory capacity changes, production scheduling, plus coping with unexpected events such as fires, labor negotiations, and floods.

A major difference in design is that in Cartels and Cutthroats, all sales are done in one common geographic area where all companies compete for sales. In Free Enterprise, the simulation creates one more area than there are companies. For example, if there are six companies, there will be seven distinct geographic areas in the simulation. This increases the level of complexity because each company can set different product prices and advertising levels in each area.

The output from both consists of marketing information, income statement, balance sheet, production information, effects of R & D, and general economic environment information.

FIGURE TWO

Cartels and Cutthroats		Free Enterprise

	<u>Inputs</u>	
Price		Price (by area)
Marketing		Marketing (by area)
R&D		R&D
Raw materials		-
Production level		Production level
Loans		Loans
Plant capacity		Plant capacity
Responses to special situations		-
-		Dividends
	<u>Outputs</u>	
Market summary		Market summary
Sales report		Sales report
Industry report		Industry report
Production report		Production report
Income statement		Income statement
Balance sheet		Balance sheet
Numerous memos		-
re special situations		-
-		Stock market report
	<u>Economic Variables</u>	
Inflation		Growth rate
GNP		-
Interest rate		Interest rate
-		Loan limits
-		Transportation cost
R & D impact		R & D impact
Product type		Price sensitivity
luxury		
necessity		
mixed		
-		Advertising impact
Degree of random variance		Random events
Raw material pricing		

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Both simulations accept input from the keyboard in interactive fashion and provide output to the screen or to a printer (or both).

Free Enterprise suggests that the highest stock price at the end of the simulation be used as the criteria for identifying the winner while Cartels and Cutthroats suggests the highest net equity be used for the same purpose. Instructors can, of course, select other criteria that may suit individual class purposes.

EVALUATION

Criteria

To be accepted for use in an academic course a simulation must be:

- 1) Realistic.
- 2) Understandable.
- 3) Reliable.

Failing in any of these three seriously impairs the learning experience. Each is discussed briefly.

Although a simulation is necessarily an abstraction of the real world, it must faithfully reproduce those elements chosen to be included in the abstraction. In a business strategy simulation, this will have the effect of motivating the students to use the analysis and synthesis tools they have learned in all of the prior "functional" courses and reward them for correct application.

The simulation must be clear enough so the student does not spend excessive time learning the artifacts of the "game" rather than applying business fundamentals. It also means that the simulated economic situation must parallel the economic world as the student understands it.

Students get so involved during a simulation that a missed or delayed output is very upsetting. This is especially true when the students' performance on the simulation is being graded. If a program fails to execute or makes errors it may delay output while the problem is rectified. This causes a slip in the schedule which may shorten the simulation or affect other aspects of the class.

In addition to the mandatory characteristics of an acceptable simulation, there are some features that are desirable options. These features include:

- 1) Clear and complete user's manual.
- 2) Variable levels of complexity.
- 3) Options for different environments at the discretion of the administrator.

Cartels and Cutthroats

Cartels and Cutthroats successfully met the criteria of realism, understandability, and reliability. Even though it is relatively simple compared to simulations that operate on large mainframes, it is a realistic representation of the oligopoly that it simulates. It is both intuitively and cognitively realistic for students. Probably its most significant shortcoming is its simplicity. For undergraduate students it is easy to use, inexpensive, convenient, and effective. For graduate students, it is useful and extremely motivating but may lack enough complexity to allow them to apply enough of their skills--especially finance.

The simulation does a realistic job of inserting random environmental events such as requests for charity donations (which often have a later benefit), research and development breakthroughs (which are a function of earlier R & D

expenditures), and demands for pay increases from the union to be negotiated. These events add excitement to the simulation without making it seem unfair to competing companies.

The inability to issue stock and pay dividends limits the ability of the students to explore different financial approaches. This is realistic if you assume privately held companies, but it does limit the learning potential. The simulation provides enough credit in the form of floating rate loans for various strategies to be implemented (or for companies to get overextended).

The 14 page manual [1] that comes with Cartels and Cutthroats is easily understood with only a few clarifying comments from the instructor needed to begin the simulation. Only one question has come up that was not answered in the manual, nor was it easily determined from the practice. That is whether raw material inventory is FIFO or LIFO. While it does not materially affect the simulation, students want to know.

Cartels and Cutthroats demonstrated its reliability by never missing an output deadline due to either software error or operator error. It is well designed to prevent the usual foolish mistakes. The only error in running five simulations (30 companies) was a "divide by zero" error that was easily overcome by altering one input slightly.

Cartels and Cutthroats has only one level of complexity although there is a "beginners option" which provides helpful hints which might be useful in Introduction to Business courses.

The administrator has sufficient latitude to change the economic environment for each simulation so that students cannot isolate a single strategy that always works.

From the administrator's viewpoint, Cartels and Cutthroats is easy to use. An industry is composed of two to six companies. Two or three person teams to manage each company is appropriate. (The simulation is not complex enough for any more on a team.) In a class of 18 or more, an instructor can run multiple industries with different economic scenarios to create different strategic environments.

Running Cartels and Cutthroats requires approximately one half hour of time per industry to enter the data, run the simulation, and fold the printouts. (Most of the time spent is waiting for the printer.) A teaching assistant without previous computer skills can learn to do the job with about two hours of training.

Free Enterprise

In contrast to the simplicity of Cartels and Cutthroats, Free Enterprise held promise of providing a more complex simulation. By creating multiple sales areas and giving each company a "home" area where it enjoys transportation and market share advantages, plus a common area where all competitors are equal, there is potential for more interesting marketing strategies. Free Enterprise does not allow companies to issue stock, it only simulates a stock market pricing mechanism, but this does add one more dimension of interest.

Unfortunately, Free Enterprise was a dismal performer on all three of the major criteria for a useful simulation. Some of the shortcomings are because the manual is inaccurately written. These can be rectified with an updated manual (the publisher plans a new version). Other problems cannot be corrected so easily. There

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are so many errors that it appears that the programmers simply did not understand enough about economics and business. These errors occurred in spite of the fact that the simulation is "based on the IBM Management Decision-Making Laboratory, which has been in use at International Business Machines since 1963"[2]. The two most serious errors include the calculation of stock price and the effects of expenditures for research and development.

The manual states that "Money spent [on R & D] will reduce your unit cost over a period of time." This is not true in the simulation however. R & D, in actuality, had no effect on unit cost whatever, R&D increased demand for the product during the quarter it was expended. Aside from being an inconsistency between the manual and the program, it is also unrealistic compared to the real world where R & D rarely has an immediate effect. The effect normally lags by several quarters or even years. Virtually no industry can produce dramatic and instantaneous sales increases by R & D spending.

"A high stock price is due to two factors: high dividends and consistently high profits" (Free Enterprise Manual, p. 4). This is quite realistic. Unfortunately, the programmer did not code it that way. The simulation includes market share as the dominant factor in establishing stock market price. This changes the objective function of the simulation plus makes it unrealistic and frustrating for students.

Additional problems that detract seriously from the realism of the simulation are:

1. The interest on loans is so low that there is no incentive to pay them off. It seems to be advantageous to maintain maximum leverage at all times.
2. There is no storage cost for holding inventory and hence little motivation to schedule production to meet demand.
3. The production cost function is unrealistic. There is no production cost when producing zero units (i.e., there is no fixed cost of production). Conversely there are no economies of scale.
4. The "random events" are not random. They were frequently forecast by the simulation but rarely manifested as events that affected the outcome. The students learned to completely ignore this part of the simulation.

The simulation output provides projections of the production cost at the current level, 10% higher, and 10% lower as a method of indicating the production cost curve. Under some (often encountered) conditions these production cost projections from the simulation are wrong. This makes it almost impossible to forecast actual production costs. This is compounded by the fact that the program sometimes produces less than the quantity requested by the student's decisions but always charges the full amount.

Free Enterprise is well coded so that even the most careless of operators will not lose any data nor cause program failure. Again, this reliable coding is hampered by an apparent lack of understanding of business operations. While this did not cause any output to miss a deadline, it did force the administrator to change students' decisions numerous times to meet the demands of the peculiar input routine. For example, the input routine attempts to make certain that a company has enough cash on hand before accepting decisions for the quarter. It will not allow the decision input to continue until it is satisfied there is sufficient cash. Again, the programmers erred. The cash routine is not explained anywhere in the manual nor could we understand how it worked. Students were frustrated because it often required a

company to borrow excess money when they had sufficient cash on hand.

The final insult to aggressive companies was that the input routine limited all decisions to four digits (9999). This was fine until the companies that were using a market share strategy were successful in achieving rapid growth. They were forced to change strategy because the input routine would not allow them to produce enough product to meet the demand they created. In one simulation, five of the six companies eventually ran into that barrier and were irate when forced to change strategies due to an artificial barrier.

CONCLUSIONS

Some of the errors in Free Enterprise might be rectified by a customer who has the time and skill to correct the code. However, this is made very difficult because Free Enterprise is "copy protected" to prevent the customer from making copies and giving away or selling the program (Cartels and Cutthroats is also copy protected). In my opinion, the practice of copy protection imposes on the publisher the burden to perfect software before releasing it, rather than using paying customers (and students) to find their errors.

Free Enterprise should not be considered for use in Business Policy classes because it does not meet the three criteria of realism, understandability or reliability. The manual must be rewritten and the program corrected before it has any educational value.

Cartels and Cutthroats is a useful, inexpensive, and well done simulation. It can be used to great advantage in undergraduate classes. It consistently receives the most positive responses compared to any other part of my Policy classes. I usually schedule it for two or three weeks of a predominately case oriented course with decisions due every weekday (in a class that normally meets twice per week). This provides high intensity and active involvement. At \$39.95, the program is a bargain.

REFERENCES

- [1] Cartels & Cutthroats, (Mountain View, California: Strategic Simulations, 1981).
- [2] Free Enterprise, (Chicago: Science Research Associates, 1982).