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THE MARKET GAME: INTERACTIVE LEARNING THROUGH MARKET SIMULATION

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ABSTRACT

The modeling of market structures is a complex task that must recognize the social and cultural setting of those markets. This paper introduces a market simulation that can be used in a variety of contexts to examine market structures and even test proposed structures. The simulation can be adapted to a wide variety of situations ranging from simple barter to realistic supply or demand driven economies and can be used to develop organizational skills such as communications and marketing techniques.

LITERATURE REVIEW

Various empirical studies in the education field have demonstrated that the lecture form is one of the most frequently used teaching methods for transmitting knowledge. Passive learning is a feature of the typical lecture format: the instructor speaks at the front of the room, and the class sits facing the instructor. Interaction between the teacher and students often appears stiff and limited to questions and answers.

Many authors emphasize the positive aspects of the active learning approach and describe such methods as better alternatives to the traditional lecture form (Johnson et al (1989), Carlson et al (1995), Hoggatt, (1959), DeYoung, (1993), Hauptert, (1996)). The concept of active learning is simple: rather than the teacher presenting facts to the students, the students play an active role in learning by exploring issues and ideas under the guidance of the instructor. Instead of memorizing, and possibly being confused by, a set of often loosely connected facts, the student learns a way of thinking, asking questions, searching for answers, and interpreting observations.

Studies have shown active participation by the

student results in somewhat better attainment of problem-solving skills, in development of critical thinking, and in favorable student attitudes toward the course (Johnson et al (1989), Johnson et al (1991), Maier et al (1994), Becker et al (1995)). The Market Game was developed to augment the traditional lecture and introduce large-scale student participation into the class. Each active learning exercise has its own internal logic and functions independently as a learning tool.

STRUCTURE OF THE MARKET GAME

The underlying concept of the Market Game is deceptively simple. Players start with a basket of items that they have available to trade and a shopping list of things that they need. Each player, or Trader, must seek out other Traders and negotiate the best deal possible by trading away items brought into the market for things the Trader needs. The overall purpose of the game is for each Trader to gather as much "wealth" as possible.

Though the game is simple in concept, the actual trading presents players with some real challenges. Not all Traders come into the market with the same items to trade or with the same shopping list of things needed. Some of the items traded in the market may be in high demand (a shortage exists) while other items may be readily available (a surplus exists). For some items, the supply and demand can be equal; these items are in equilibrium in the market. Because the different trading items can be in shortage, surplus, or equilibrium, some players will initially be "wealthier" than others. For example, if Trader A comes into the market with a basket of items that everyone else wants badly (that is, shortage items), then Trader A should be able to arrange trades that will yield all the things on Trader A's shopping list, plus even more. However, Traders do

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not know how wealthy they are when they enter the market since they only have knowledge of their own supply/demand situation.

The number of Traders dictates the complexity of the game. The optimal number of Traders appears to be six. Fewer Traders result in a simplified structure that prohibits some of the more interesting interactions during the game. More than six Traders create a situation where the market becomes so complex that it is impossible for the Traders to grasp what is going on in the market in the relatively short time period of the simulation.

Restricting the size of the game to six Traders does not restrict the size to six individuals. In fact, it is highly recommended that each Trader be a "family" of three or more individuals. The use of multi-member families creates internal information control problems that add depth to the simulation. If more than twenty-four persons are involved in the simulation, the number of Traders can be doubled by duplicating the original six Traders' market positions. The participants initially will not be aware that two separate trading groups are operating from the same starting position, and once the simulation has begun everything will change. Care should be taken to assure that each Trader is actually a multi-person family. If only twenty people were involved, it would be better to use six Traders and have some families of four members than use twelve Traders and have families with only one member.

At the beginning of the simulation, each Trader is given a list of the items he has available to trade and those items that he needs. An example is shown below:

TRADER #1			
AVAILABLE TO TRADE		NEEDS	
CHICKENS	20	DUCKS	10
COWS	8	HORSES	15
PIGS	12	GOATS	7
DONKEYS	30	SHEEP	25

Trader #1 has chickens, cows, pigs, and donkeys to trade away for ducks, horses, goats, and sheep, but Trader #1 does not know the relative value of each of these animals in the overall market. If chickens are in shortage and horses in surplus, it might be possible to trade one chicken for three or more horses. If cows are in surplus and ducks are rare, it may not be possible to trade all the cows for even one duck. The supply and demand characteristics of the market set the price of goods, not relative size or preconceived notions.

There are few or no rules imposed on how Traders gather information or conduct trades. The only rules that are applied are those that relate to the structure of the. Other than rules that relate to structure, each Trader is free to pursue his goals. This is the key aspect of the Market Game. Once the market has been defined, Traders pursue their individual goals without external interference. In this way, market structures can be tested, and the flaws and benefits of each structure recognized.

Once each Trader has time to look over the list of items to be traded and needed, the trading session begins. Each Trader needs to determine who has what, to establish the value of each item, and to make the trades necessary to acquire the needed goods. It is permissible to work out three-sided trades or do anything else needed to make the necessary deals, as long as the procedure is not prohibited by the market structure.

The trading period must be of sufficient length for the Traders to gather information concerning market conditions and act accordingly. The amount of time needed will depend directly on the complexity of the market structure that is being tested. In a simple one-period barter simulation, the trading period could be as short as half an hour while more complex scenarios could run several hours, or even days. Time is both the ally and enemy of the Traders. If time is sufficient, Traders are able to analyze the market structures of demand and supply and properly price market goods. If time is short, Traders must make decisions based on incomplete information. Keeping time periods relatively short usually

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provides the most interesting results. The market structures being examined are thus tested for their robustness, that is, whether the market can function efficiently when partially developed or if information flow is not totally efficient.

The goal of trading is to maximize wealth. Since the goal is to maximize wealth, each Trader should try to get as many “things” as possible. For example, Trader #1 needs 10 ducks, but it would be better to have 12 or 15 ducks. The more “things” that Trader #1 can get, the richer he will be. Each trade must be made in a way to get as many “things” as possible. The one thing that Trader #1 does not want to do is to finish the trading period with any chickens, cows, pigs, or donkeys. These were items that Trader #1 wanted to get rid of, and it would be inefficient to take them back out of the market. All items brought into the market should be traded away for other “things.”

Suppose that Trader #1 is successful in trading for the needed ducks, horses, goats, and sheep and still has some chickens left over. Trader #1 should then try to get more ducks, horses, and goats or anything else that is available. There may be some other Trader who wants to trade geese for chickens. Each Trader should trade the available items for any needed items or anything else that can be gotten. The goal is to get as many “things” as possible while not bringing anything out of the market that was taken into the market.

At the end of the trading session, each Trader reports what “things” he has. The success of each Trader is determined by how well the individual’s needs were met. Determination of success and failure occurs at two levels. First, individual Traders can be identified as winners or losers by determining whether or not they were able to meet their needs. Traders who collect all the needed items, and maybe extras, win over Traders who cannot meet their basic needs. This type of success or failure also can be analyzed by considering the initial wealth position of each Trader. Traders who start out with more wealth should logically end with more wealth, and vice versa. The second level of success and failure deals with the market

structure itself. A successful market allows all Traders to do their best in trying to meet their individual needs. If the market structure makes it difficult for Traders to function or if the final wealth distribution is unreasonable, the market structure has failed.

The items being traded are of absolutely no significance to the market structure, therefore they can be anything from animals to colors to insects to movie stars. It is useful to set up the first trading session as bartering for agrarian items for two reasons. First, the concept of swapping agricultural commodities makes sense to most people, and it is not necessary to have them deal with abstract concepts in the initial simulation. Second, most people have preconceived notions about the relative value of such items. In this way the market supply/demand structure can be set up so that a chicken is more valuable than a horse. The preconceived notions will lead Traders to make mistakes in their trading, and these mistakes will serve to show the difference between the market and the items in the market. One of the earliest lessons that Traders learn is that the market value of an item is relative and not intrinsic.

The most difficult role in the entire game is that of Observer. This is the individual responsible for establishing the parameters of the trading session and monitoring the Traders and their behavior in the market. This individual is most responsible for identifying the “lessons learned”. The Traders are involved in the details of their own wealth maximization process and usually oblivious to the larger question of market structure and efficiency. The Observer must be able to identify characteristics of group behavior that reflect on the structure of the market. This requires that the Observer has an understanding of economics and market structures and that the Observer is able to translate that understanding into an analysis of the simulation as it occurs.

SINGLE-PERIOD BARTER

The simplest form of market experiment is single period barter. This is the first step in developing

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advanced market structures and is critically important. Other levels of the simulation cannot be conducted effectively until this simulation has been completed. Most individuals today have been brought up in a market climate that includes prices. These prices might be set by market mechanisms or governmental edict, but they are presented to the buyer. Sometimes buyers engage in some form of rudimentary bargaining, such as in the purchase of an automobile, but this type of bargaining is merely fine tuning around an initial given price.

In almost all markets, the prices given involve the concept of money. Money and monetary policies are very powerful in and of themselves, but they are not necessary for the functioning of a market. In order to understand markets, it is necessary for Traders to understand that market and monetary structures are separate concepts. The first experiment of single-period barter therefore is useful for all individuals, regardless of their previous market background and experience.

This simulation begins by giving each Trader a card that specifies items needed and items available to trade. During this first simulation, it is normal for most Traders to be uncertain about what they are doing and how they are doing it. Traders will be unsure about how to gather the information they need to make their decisions.

One of the important points that must be made during this first simulation is that the Traders must search for market information. Nothing will be given to them. This is why it is important to get the Traders up and moving around. Traders must learn early on that the market structure that has been given is the only constraint on their behavior. Their success or failure will depend on their own abilities, and maybe a little luck.

This first simulation should last about 30 minutes. Several forms of group dynamics will be manifest during this period. Traders may or may not begin trading immediately. Sometimes there is a short interval when the market participants spend time asking questions and trying to find out who else has what and needs what. Initially, Traders try to

deal one-on-one, and sometimes a given Trader might complete trading early. After the first easy trades have been completed, there is usually a lull while Traders figure out that they will have to engage in more complex transactions. The Traders will then meet in-groups, these groups will break up and reform and eventually all Traders may end up in one large group with everyone talking at once.

After the trading session has closed, it is necessary to allow about five minutes for each Trader to figure out exactly what items he has. This includes items that were brought into the market and not disposed of and any items that were traded for. The best way to review this material is to show each Trader exactly what the market supply/demand structure looked like and the original trading position of each Trader. While this could be done either through handouts or projection, it is recommended that a blackboard be used. The blackboard presentation is slower, but the Traders are still winding down from the trading session, and if the final information is presented too quickly its value can be lost.

One of the technical questions that will arise deals with wealth and its measurement. This may be the first time that participants have been exposed to the concept of wealth as “things”. Since there is no money in this market, the only way wealth can be measured is by possessions. But not all possessions are equally valuable. Shortage items are worth more than surplus items since they can be bartered for more “things” in the market. This is where Traders learn the difference between market value and intrinsic value.

It is instructive to show the Traders that they began with different wealth positions. The Traders who had shortage items to trade and needed surplus items were initially wealthier than those Traders that had only surplus items to trade and needed shortage items. The review of the Traders’ final positions will show that those Traders who started out rich usually wind up poorer and those that start out poor will wind up richer. The Trader that has accumulated the most wealth will probably be the most aggressive

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Trader and easily can be from an initially poor position. The improper use of information by all market participants leads to this redistribution of wealth.

This review also highlights the difference between markets and items in the market. If the supply/demand structure had been established so that non-intuitive relationships exist, like a chicken being worth five horses, Traders will most likely make trades based on their preconceived notions. By showing Traders that they have made errors due to these preconceptions, they will be able to focus more on the market and less on the "things" in future sessions.

There are several other lessons that are usually learned from the first session. Traders will be forced to recognize the need for accurate accounting. During the review of trading, it is good to do a census of certain items in the market. For example, originally there may have been 100 chickens brought into the market by various Traders. The final census will almost certainly show that after trading there are either more or fewer than 100 chickens. Traders become so focused on trading that their accounting goes awry. This becomes the point where the Observer turns the discussion to the use of accounting principles and the reasons for good bookkeeping.

Another major lesson learned at this time is the value of information, at several levels. Traders who reveal too much information too quickly usually come out of the game poorly; they allow themselves to be taken advantage of. Traders who keep information too close will miss out on trades and subsequently do poorly. Information control techniques can thus be shown to be vital to market success.

The success of individual Traders should open the discussion about how they gathered and processed information. Traders can be led to realize that in any market, some goods can be offered to find out what price they will command. This is a technique of price discovery that most Traders will have never considered. By risking a portion of one's assets, it is possible to determine the value of the rest of the assets.

This discussion may be complicated if one Trader aggressively entered the market and proceeded to trade for anything with anybody. This type of Trader often winds up with most of the wealth in the first simulation. This is an example where trading in ignorance worked for one individual to the detriment of the market, and this situation can provide fruitful discussion about the need for effective information gathering and processing.

A second level of information control is apparent from the internal workings of each Trader family. The reason that many items were "lost" or "created" during the session usually can be traced back to miscommunications within a family. Each member of the family will be trying to trade the same assets, and sometimes they will do so simultaneously. At this point the discussion turns to the roles of members within the family. The use of a central bookkeeper who maintains the records while other family members trade and whether individual family members should specialize in given commodities or be allowed to trade the entire portfolio of assets are worthwhile topics for this discussion.

A third level of information processing is that of listening. Most Traders focus solely on what they are doing at one time, say exchanging a chicken for a horse, and ignore what is going on around or behind them. Many potentially good deals are missed because Traders are not paying attention to what is going on right beside them. While this can be pointed out to the Traders, it is a skill that needs developing.

In general, the review of the trading session and the lessons learned should at a minimum touch on the points of accounting and information processing. Market behavior and ethics may also be appropriate discussion topics. This review should be done in as open a method as possible, and all participants should be drawn into the discussion. It is necessary that Traders recognize that they "own" the market

It is important that the single-period barter simulation be conducted twice. The first session will allow Traders to "learn" how things work. The second

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session is needed so that Traders can develop some confidence in their own abilities. If modifications to the market structure are introduced too quickly, Traders may not be able to assimilate the lessons learned in the previous sessions. In fact, it is recommended that each specific simulation be repeated twice until Traders develop the ability to adapt rapidly to changing market structures. Once the Traders have become accustomed to the simulation experience, it is easy to introduce changes to the market structure that illustrate different aspects of market behavior and information processing.

CONCLUDING REMARKS

There is always a need to develop innovative approaches to traditional material. This is becoming more important as student populations mature and budgetary constraints force schools to institute large sections of introductory courses. The present structure of large-class teaching presumes a homogeneous student population and ignores crucial differences among students. Students have a wide variety of abilities, needs, experiences, social backgrounds, life styles and expectations. Teaching must acknowledge the heterogeneity of the classroom and transform the traditional one-dimensional teaching process into a multidimensional experience.

These applications of the Market Game can have a strong impact on the students because the role-playing experiments facilitate active learning and acceptance of new concepts and can generate increased student interest, enthusiasm, and motivation. When used in a business setting, the Market Game can be used to illustrate and develop communications skills and test organizational information processing capabilities. The Market Game can be an important developmental tool whether it is used in the classroom or in the workplace.

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