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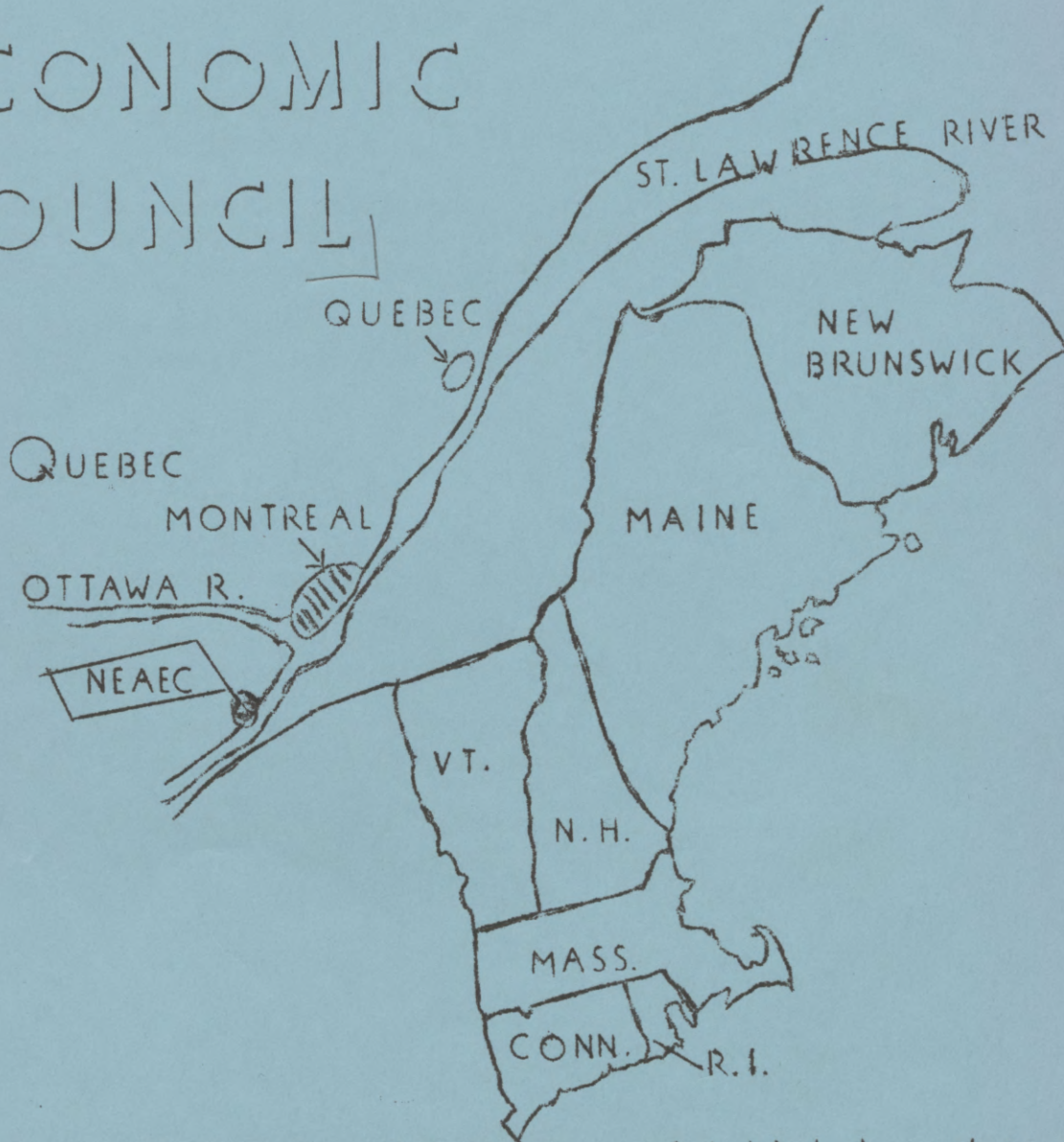
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THE SCOPE OF DECISIONS AND THE CONCEPT OF STRATEGY IN MARKETING FARM PRODUCTS

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The title of this paper as originally announced in the program is somewhat generous in its scope.

The purpose of raising the issue of strategy in decisions is not to sell "Game Theory" as a new and extremely useful tool in economic research. The purpose is to raise some questions about the customary approaches to decision problems. As a basis for my discussion today, I will use the food marketing industry.

In the past twenty years we have witnessed a second revolution in the food marketing industry. The initial revolution was the establishment of chain stores as such. However, for the period to 1945, it was possible for small retail firms to survive in marketing of food. The rapid decline of the individual food retailing firm is evidence that a second revolution is taking place.

Large retail outlets have enveloped more and more of the food distribution industry. Now over 40% of the sales of food made in the United States are made by chains owning only 6.4% of the stores. Chain sales increased 117.8% from 1948-1958 while non-chain sales increased 60.2% in the same period. Table 1 also illustrates the changes that are taking place. The percentage of stores owned by single unit firms increased from 1939-54 while their proportion of sales declined. The reverse was true for multiple store firms. Thirty three large chain sales had 33.9% of total

Table 1. Per Cent of Food Store Sales and Number of Stores per single and Multi-unit operations.

	<u>1939</u>	<u>1954</u>
Single Unit		
Stores	86.4	91.1
Sales	57.4	51.3
Multi-Unit		
Stores	13.6	8.9
Sales	42.5	48.7

food store sales in 1958 and 24.8% in 1948. Nine of the largest chains had 26.2% of sales in 1958 and 21.6% in 1948.

In addition to the increase in the volume sold by chains, there has been a rather significant increase in the number of cooperative or voluntary chains, in which the owner still retains a considerable amount of independence, but purchases goods in concert or in contract with a single wholesaler. Retailers who were members of cooperatives had sales of 15.1% of total food store sales in 1958, against 8.2% in 1948.

Clearly not all of the changes that have taken place have been associated with cost curves, demand curves, and supply curves. This is not to say that these factors have not been of importance to the food distribution industry, but it has been important for large chain distributors of food to recognize their competition.

Monopolistic competitive theory, oligopoly theory, or oligopsony theory, etc, are not adequate to the task of explaining the complex decision areas that exist in the relations of one firm to another or another group of firms. Discussions based upon the theory of imperfect competition center almost exclusively around marginal cost and marginal revenue, supply curves, and demand curves. But there are obvious areas of indeterminacy which cannot be resolved within the context of ordinary theory. We have extraordinary difficulty treating of problems of acquisition, merger, and integration within the context of classic economic theory.

It seems, then that it would not be unreasonable to inquire if there are not other frameworks of thought which will permit us to discuss the decision problems with respect to prices, the decision problems with respect to mergers, the decision problems with respect to acquisitions very much within the same framework.

We can recite examples ad nauseum of studies of demand curves, all done with the view in mind that they would assist not only producing firms, but marketing firms in making decisions. There is a tendency to view the parameters we estimate and the kinds of information which ^{are} obtained as possible policy parameters either for firms or for government. When decisions are required however, it is obvious that these are not the only relevant variables. As a matter of fact we sometimes feel a little saddened to discover that not only are these not the only relevant variables, but that they are irrelevant to the decisions which must be made by individuals responsible for the competitive survival of the firms which "should" employ them.

Since World War II, a considerable amount of effective research has been done in the area of developing cost curves and economy of scale curves in the processing and transportation and marketing of food. These researchers have contributed to a considerable degree to our knowledge of the food industry. This work was not designed to resolve all of the competitive problems in the food industry, nor would anyone claim that it should, nor that the work is "bad" because it has not. It does not, however, seem too soon to consider fairly seriously the other decision problems which are not necessarily unrelated to cost curves, but which are most certainly related to other factors as well.

It is because we have often ignored these "other factors" that we as economists have had to abdicate to a considerable extent to colleagues in business administration and operations research, responsibility for the assistance of business enterprises in making effective decisions. We suggest it is unfortunate not because we as agricultural economists do not have enough to do but because it has heretofore been necessary for these groups to solve problems on a more or less ad hoc basis. This is not to say that they have not been skillful in their work and in their assistance of businessmen in making these decisions. However, it seems unfortunate that an economist should abdicate the wide ground available in the area of competitive survival to workers in other disciplines. It is also discomfiting to find that workers in other disciplines can be so completely divorced from the principles of economics as we know them. It does not seem reasonable that estimation of economic parameters should be completely alien to the uses to which these estimates will be put. Nor does it seem reasonable that decisions that will be made in the future should ignore estimates of parameters.

We understand advertising relatively little and we do not very often enter into problems which involve advertising. Yet, it must be fairly clear to all of us here that however we depreciate this sort of activity, it is important in the context of operating a modern business. We consistently ignore the suggestion that firm behavior may not be maximizing and the goals of management may not be maximizing goals. Simon has clearly pointed out that in many instances it is possible to attribute to man a satisficing goal. We may not be particularly happy with this word but it is certainly necessary for us to recognize it. Simon has also clearly pointed out that the divorcement of ownership from management has led to kinds of behavior on the part of the business enterprise which no longer, if they ever did, represent the maximizing characteristics attributed to a firm. The retention of power has come to be an important element in the decision making process of any manager. It is without question true that this manager cannot unequivocally ignore his profit prospects, but it is also true that he has within his power an enormous number of variables with which to cloud the issue if necessary.

It is time we recognized also, that these decisions influence all of agriculture. That these decisions are not always clearly related to the kinds of variables which we normally feel compelled to treat; prices, costs, demand, supply, etc. We have become relatively well acquainted in recent months with the important acquisitions of processing firms by large chains. The FTC report recently made indicates a strong pull in this direction. It is important to ask what kind of considerations may be involved in deciding to acquire a cheese factory, a slaughtering plant, a freezing plant, an orange grove. It is crucial to inquire into the kinds of firms that are in a position to do so. It is the case that the retail behavior of a single firm is conditioned by its desire to achieve the savings, either real or illusory, in processing or manufacturing its own food products.

Imagine for example a small chain caught in the competitive crush between Safeway and A & P. This firm is relatively well aware of the inefficiency of the methods that it must employ working through wholesalers and jobbers to maintain the kind and quality of food it needs. What must it do to survive? Certainly all of its information can neither come from peculiar demand curves, supply curves, marginal problem curves, average cost curves, nor prices.

Perhaps the decision that it will make will involve the acquisition of other firms to make available to this coordinate group the possibility of exercising some power in the market. To avoid being forced to be the sole flexible element in a market and subject to the whim of powerful neighbors these firms are faced with the problems of survival and power problems which cannot be minimized.

The individuals who either manage or own small firms are faced with the problem of minimizing their losses or maximizing their gains in some sense. And maximizing these gains does not infer that these firms must continue in their normal pattern of existence. Certain opportunities are available not through normal growth but through acquisition and the exercise of power in the market place. Power alone of course over-simplifies the problem greatly. It would be folly to pretend that this were the only goal of these enterprises. However, it clearly reflects that the strategic alternatives available to a firm are circumscribed not only by costs but the firm's ability to engage in enterprises which are available only to firms in a stronger position. How can the concept of strategy or some of the words of "Game Theory" assist us in the analysis of these problems?

Perhaps the most important contribution that "Game Theory" can make is to permit us to deal with problems of pricing, with problems of cost, and decision problems of cost, and decision problems concerning advertising as being equivalent.

It is interesting to note that "game theory" as exposed by Von Neuman and Morgenstern is a direct outgrowth of the social sciences, more particularly economics. It is in fact among the only tools available to us as economists that has come by way of some other science, say general agriculture, physics, or engineering, or been developed by the military. While it cannot be argued that it is desirable to conclude, that "game theory" is a solution to most economic problems simply because it grew out of economic problems; it does not seem unreasonable to include those aspects of decision problems treated by "game theory" within the realm of economics. As has been mentioned earlier, it is difficult for us to exclude the problems of competition faced by a relatively small number of firms in a single market. It is most certainly impossible for us to exclude from decision making processes the need and desire for power if for no other reason than it permits survival or self-protection. Perhaps a great advantage of approaching a problem using the words of "game theory" might only be that the words that we have heretofore used have become muddled and unclear. These are new words which must therefore, at least for a time, have a precise and clear meaning and permit us to argue extremely precisely and carefully about the problems with which we are faced. It might be well for us then to review just briefly what "game theory" is. To begin this review by asking what a "game" is?

A game can be loosely defined as the problem of resolving a conflict of interests. This general definition then does not preclude treating as a game, if necessary resolution of the conflicts of interests between two retailers, between two military commanders in the field, among nations, among firms deciding upon the best advertising policy, among individuals seeking the same promotion. It would be folly to imply that "game theory" could resolve all of these difficulties, or would be appropriately applicable to the resolution of possible problems. The fact, however, is that each of these represent a conflict situation, a conflict of interest and therefore a game.

It is clear that these conflicts will be resolved one way or another, "game theory" or no. Is there a way then in which we can analyze this game to determine what the optimum resolution of the conflict might be? It is fruitful to ask what need we know in order to play the game without the players. In short what kind of information must we have.

First, we must have a complete catalog of the possible outcomes of this game. Among the outcomes for two competitive firms might be an increasing share of a market; increasing size for one firm, decreased size for the other; increased profits for one firm, decreased profits for the opponent; or perhaps decreased size for both. In case of the H-bomb, it may mean total destruction of one country, partial destruction for the other, possibly total destruction for both, or possibly no destruction to either. These are among, let's say, the possible outcomes of this game.

Second, it is important that we have a clear cut notion of the alternatives available to each of the players in the game achieving any one of the cataloged outcomes. The executive working for promotion has a number of options available to him. These may, among other things, include the assassination of his opponents,

or the more subtle activities available to him in the confines of the corporation. It may of course, include honest effort on his own part, plus personal advertising. It is of course clear that these particular options are open to all of the opponents in this game. Among all of the possible moves available to military commanders and a more or less unlimited war might include decision choices among conventional weapons or atomic weapons, the use of gas or possible uses of bacteriological warfare, or at a more customary and simple level the choice among the battalions to be used in certain assaults and kinds of weapons that they will employ in these assaults. It is clear that most of the kinds of conflict used as illustrations could not be resolved by a single decision. They may require continuing decisions from time to time as the play of the game proceeds. Knowing then the catalog of possible outcomes, and knowing not only the choices which you have among these outcomes, but also the possible choices which your opponent has among these possible outcomes, it is critical to ask what kinds of rules one will use to make these choices as the play of the game proceeds.

We, could and do, very often call this rule for making choices a policy. In a business firm these rules may be laid down with some generality by a board of directors acting in concert and approving the kind of play which they find acceptable among their employees. In "game theory" we have a somewhat different, and perhaps a somewhat precise word called strategy. The board of directors does not adopt a policy it adopts a strategy. It is also clear to us that different firms operate in different ways with respect to the laying down of these rules for making decisions more specifically called decision rules. Some firms keep extremely tight rein on their employees in all divisions and their decision rules will then be outlined with considerable specificity. We, as agricultural economists, may some times almost choose to call these rules programs rather than policies. Other boards of directors do not keep a very close rein, or close check on their employees in various divisions and various geographic areas and allow considerable latitude for decision-making among their employees at lower levels. This obviously leaves the area of decision making open to some interpretation on the part of these employees and perhaps each of them can be envisioned as adopting a set of decision rules which will be satisfactory or optimal for his particular segment of this firm or enterprise. He is not only in conflict with his competitors, but to an extent is in conflict with his board of directors. He must evaluate its decision rules, its strategies as it were, in the light of possible admonition or censure for misinterpretation or inability to interpret the decision rules. That is the individual does not live by the rules of the game.

There is one important factor which we have until now neglected. It is extremely important to "Game Theory" and important to us because herein lies the possibility of vitiating all of the claims that one might make for "Game Theory" as such. We can talk about outcomes of the game or possible outcomes of the game in a slightly different way and call them payoffs, a term with which almost all of us have become familiar. We use it loosely and in an enormous number of ways.

Clearly in the business firm the payoff may not simply be in terms of profit. The payoff for an individual cannot only be measured in terms of dollars. The haunting specter of utility must be raised. We must presume, at the least, that we can measure utility. Many of you have perhaps suspected that the issue of measurable utility was long since dead and buried-displaced by an indifference analysis which was easier to live with. Unfortunately we have discovered in many areas that indifference analysis is not sufficient. This weak ordering of likes and dislikes has not been satisfactory. It is most certainly not satisfactory in the resolution of conflict. We are required to evaluate the payoffs in order to play this game reasonably comprehensively in terms of the utility of these payoffs.

Obviously when we consider death or incarceration it might be quite possible for us to evaluate this in terms of dollars, but it is extremely unlikely that, a reasonable dollar evaluation can be placed upon death or long term incarceration. Individual's preference patterns as given by the payoff matrix are assumed not changed with time. Further it is assumed that the players do not learn as the play of the game progresses. We are still, in this characterization of the game, searching for an equilibrium theory. It is pertinent to ask whether or not such a search is not unnecessarily naive. It does not seem requisite to the explanation of human behavior that the concept of equilibrium be importantly or necessarily involved.

Among the more interesting and perhaps relevant considerations dealing with games in the realm of agriculture and agricultural economics in particular are those which have to do with infinite games. Games of survival where one can regard the continuing operation of the firm or its managers as essential and of paramount importance. The game differs from those we have discussed in that it has no apparent terminus except death. The firm continues to play the game over extended periods of time. There are intermediate payoffs and discounted values of future payoffs to be considered in this kind of firm. It seems clear that if we view the struggle for survival as being of some consequence then this formulation of the game problem appears appropriate. Unfortunately this formulation is by no means complete. But it perhaps, again gives us words and concepts which we can find useful in viewing in broader scope the behavior of firms in the competitive situation which we observe in food marketing. In games then which are considered to be those of survival we can consider as important parts such things as entry, earnings, and available capital.

It is with this plea that I would conclude: We are troubled by the failures of our classical competitive theory. Much of our dissatisfaction with this theory stems from the fact that it prevents consideration of elements of important factors. We are constantly reminded that business decisions hinge not only on the parameters in which we, as classical economists are often interested. Other problems within the firm are of great importance to its survival. And my suggestion is this: That within the scope of game theory, we have an opportunity to treat all variables as fully equivalent until we discover them to be otherwise. We can then treat demand elasticities along side advertising expenditures; supply elasticities along side investment expenditures; price changes along side product changes. It would be unreasonable to assume that this consideration would be sufficient to solve all of our problems. But out of this attitude which I feel is realistic may evolve a more comprehensive theory capable of examining critically and precisely the whole behavior of firms.