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**FOOD SYSTEM ORGANIZATION AND PERFORMANCE:  
TOWARD A CONCEPTUAL FRAMEWORK**

by

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This paper was presented as an invited paper at the Allied Social Science meeting in Atlanta, Georgia, December 1979.

The paper is a working paper intended to generate discussion, especially among the NC 117 participants. The concern is with the conceptual problems of integrating the extensive work in organizational behavior with the analytical framework of structure-conduct-performance in the context of the objectives of the NC 117 project. The author is Professor of Agricultural Economics at Michigan State University.

# FOOD SYSTEM ORGANIZATION AND PERFORMANCE: Toward a Conceptual Framework\*

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## Prologue

My purpose is to explore some ideas and problems concerning a conceptual framework for organizing knowledge of the relationship between political-economic organization and performance, with application to the U.S. food system. The connection with post-Keynesian economics is that of a common belief that existing paradigms are inadequate to inform some critical economic policies, especially those involving stagflation. This is stimulating a reexamination of assumptions about important variables and relationships. Most notable is the examination of the role of the market and the micro-macro relationships (Galbraith, 1978).

I put the paper in the context of the program of research on "Organization and Control of the U.S. Food Production and Distribution System" established as regional research project NC 117. The general objective of the project is very ambitious: to describe the existing organizational system for producing and distributing food products, to identify the economic and institutional forces that are changing this system, to forecast where present trends may lead, to set forth alternative public policies that could affect the system of the future, and appraise the alternatives in light of the values and goals held by the various sectors of the population.

Work to date on the project has been organized along three general lines of inquiry: 1) industry studies, i.e., food retailing, 2) studies of subsectors and vertical coordination systems such as the dairy subsector, electronic exchanges and procurement practices of retailers, and 3) studies of the legal environment such as anti-trust laws applied to the food system.

The analytical framework has been eclectic. Industry studies have tended to be conceptually organized by the Industrial Organization framework (IO) which is a structure-conduct-performance (S-C-P) paradigm grounded in price theory. The subsector studies have paid more attention to the internal decision-making of the firm and thus draw from work in organizational behavior. The dominating framework of the group has been an expanded S-C-P. The basic concept of the paradigm is that market structure strongly influences market conduct of firms which in turn influences market performance. Market structure variables include number and size distribution of firms, entry conditions and product differentiation. Market conduct refers to pricing policies, sales promotion actions, decisions on product characteristics, and actions by competitors to coordinate market behavior. Market performance is concerned with allocative and technical efficiency, progressiveness, product characteristics, and equity (Marion and Mueller). The extended S-C-P framework looks at the influence of government programs and regulations

on market structure, conduct, and performance and expands the notion of performance to a more aggregate system concern with such outcomes as income distribution, employment, inflation, level of living, and the distribution of economic and political power.

All models necessarily abstract from the conditions of the real world. The S-C-P framework tends to omit aspects of reality I would like to stress in attempting to extend the scope of the paradigm. The IO model attempts to explain the conduct of firms by concentrating on the competitive environment and other economic conditions external to the firm such as the characteristics of demand and technology. The basic unit of analysis is the "relevant" market. The firm is treated as a "black box." At the same time an extensive literature has developed dealing with intrafirm decision-making and the behavior of organizations which has had little influence on price theory and other economic analysis. Babb and Lang have explored the implications of this work for research on the food system. By avoiding consideration of firm decision-making IO tends also to avoid the problem of uncertainty. Thus, the pervading problem of coordinating economic activity, investing and producing in one period to meet demand in future periods, is generally external to the model. Finally, the performance of the food system depends upon the behavior of many organizations including governments, households, and associations of firms. I would like to explore a framework which would consider at least some aspects of this reality.

The extended S-C-P framework has contributed to valuable research. Marion and Mueller provide an insightful discussion of research on the food system from this perspective. My hope is to encourage additional conceptual work which will help with the type of analysis implied by the objective for the NC 117 project.

### General Approach

Start with the most elementary and global concept. At a point in time participants in a political economy exist in an environmental situation which is their opportunity set. Each participant responds to his environmental situation and the aggregate consequence is a change in environment. The changes in the environment contain the benefits and costs for individuals and groups which follow from the behavioral responses. Changes in participants' perceptions of the environment and appropriate behavior follow from the change in the environment. The sequence continues, the system evolves. Call the total flow of consequences which follow from the organization of the political economy, performance. Then we can say that the evolving system is driven by this basic three-term sequence of environment, behavioral responses, and performance--E-B-P . . . E-B-P . . .

Obviously, no conceptual framework can deal with the complexity implied by this three-term sequence. The task is to classify strategic characteristics of the environment, classify participants and their behavioral modes, classify outcomes, and develop meaningful hypotheses about their relationships.

Environment. The environment can be thought of conceptually as overlapping opportunity sets. The physical environment or aggregate physical opportunity set at any one time sets the outer bound of the possible pay-off matrix for society as a whole. The political-economic system structures relationships among participants, thus structuring the opportunity set for individuals and groups by defining rules for access to resources and pay-offs from the aggregate opportunity set. An individual

opportunity set is a function of location in the political economy. The individual participates in the political economy as a member of organizations--governments, firms, households, and other associations. Thus, his opportunity set is governed by the external environment and the internal structure of the organizations and his positions.

Individuals articulate preferences, that is, seek their goals, through market, political, and social transactions. Transactions carry information, influence, benefits, and costs. Transactions take place within organizations and between organizations. A fundamental issue in political economics is the determination of the mix between market and political processes for preference articulation.

The external environment of organizations includes: 1) factor and product markets, which would include the extent and product content of the market plus all of the variables considered part of structure in the S-C-P framework, 2) the system of rights and regulations, broadly defined, which includes property rights, enforcement of contracts, all economic regulations, taxes, and subsidies, 3) perceived social and political pressures and expected markets, which introduces the idea that organizations respond to perceptions of the future. This includes the influence of ideology--a general agreement about acceptable behavior. Behavior outside of the prevailing ideology implies the possibility of sanctions and is a pervasive constraint, and 4) the technical transformation functions.

Performance. In the dynamic framework, performance is a complex concept. Performance is the outcome of the behavior of the sum of participants acting within the constraints of their perceived individual opportunity sets. The aggregate consequences are the changes in the environment. The changes include both the physical environment, i.e., production and consumption, and change in the political-economic structure. The outcome of one period is an input to subsequent periods. The outcome contains the distribution of costs and benefits to the participants. The expected distribution of benefits and costs contains the incentives for the behavior. Among the consequences is the change in perceptions and preferences of participants influenced by this experience.

Now comes a fundamental problem of the political economy and of organizations. The individual participant is exposed to only a small portion of the aggregate opportunity set, and only some of the consequences of behavior accrue to the individual. That is, the individual acts on the environment in terms of his perceptions of the consequences. Perceived consequences which will be most immediate and act as incentives will usually be those which fall directly on the participant and are directly linked to specific behavior. The management system of an organization is intended to structure individual opportunity sets, incentives and sanctions, in such a way that individual behavior is congruent with the objectives of the organization.

This pervasive problem is recognized in part in economics in such concepts as market failure, externalities, free riders, and public goods. Schmid provides an in-depth study of the problem of external consequences in public choice. Shaffer (1979) looks at regulations from this perspective.

For the political economy the combination of the market and regulatory system structures what consequences of behavior are taken into account by firms and other participants. Actions through both the political system and the market alter the aggregate and individual opportunity sets. That is, the available factors,

products, and incentives are influenced. The opportunity set of each individual is coercive. It rewards and punishes and thus channels behavior.

Time and uncertainty create many problems in structuring individual opportunity sets through regulations and markets in such a way that consequences of individual behavior are congruent with goals. Actions and consequences are separated by time, and direct connections are difficult to establish. The future pay-offs from actions are uncertain, future preferences are uncertain, etc. Uncertainty is pervasive. Political economic activity involves complex sequences with complex patterns of uncertain consequences. Understanding such sequences is the interesting challenge of political economics.

One of the problems in public policy is to identify relevant classifications of performance. The definitions of both relevant dimensions of performance and performance indicators are conceptual problems and such concepts would be an important part of a fully developed conceptual framework. Among those considered important are total production, product mix, employment, inflation, and distribution of benefits. Many other consequences are important but lack performance indicators.

Behavior. The link between political economic organization and performance is the behavior of individuals and organizations. We need to incorporate concepts about behavior into the conceptual framework to form the basis of realistic assumptions for theory development and for practical policy analysis. My basic assumption is that individuals search narrowly selected portions of the environment and identify patterns of behavior consistent with their perceptions of that opportunity set which will satisfy them. Thus, I suggest starting with the concepts of satisficing behavior and bounded rationality. Simon, in his Nobel lecture, eloquently supports the incorporation of these concepts in the theory of decision-making in firms and administrative units. He assumes the decision-maker has limited capacity and operates in an uncertain environment. Among the procedures adopted to solve problems is to look for satisfactory choices rather than optimal ones, replace abstract goals with tangible ones, and divide up the decision-making task among many specialists.

I assume the participant develops multiple goals and many techniques to satisfy the goals. Techniques are patterns of behavior, adaptive and strategic, which are perceived as appropriate in dealing with particular situations embedded in the individual's perceived opportunity set. Perception is selective and influenced by experience. The technique may or may not be effective (optimal) behavior given the objective environment.

Techniques will include 1) the opportunistic behavior--"self-interest seeking with guile" suggested by Williamson (p. 26) as "having profound implications for choosing between alternative contractual relationships;" 2) decision processes similar to maximizing processes often assumed in economics; and 3) the behavior of Hirschman's slacker.

Much conceptual and empirical work remains to be done in incorporating learning, decision-making, and search processes into a political economic framework. I am impressed with some of the insight from the concept of contingent reinforcement which forms the basis for a theory of learning (Platt). This involves a three-term sequence (situation-behavior-reinforcement) and could be interpreted to a statement such as: At any particular time an individual is in a situation,

responds to it by changing the environment, and the change in the environment influences (reinforces positively or negatively) the individual's future behavior, he learns. He learns techniques or complex patterns of behavior as a result of pay-offs from the environment. The pay-offs (reinforcers) are contingent on particular patterns of behavior.

However, this theory is, I believe, too limiting for our understanding of political-economic behavior. It is useful to think of economic behavior in terms of goals, preferences, plans, expectations, etc. while recognizing they are all learned, including learning from communication, cognition, and especially imitation.

### Collective Action

Participants seek their goals primarily in environments of collective action and decision-making. The primary types of organizations in the political economy are firms, households, unions, and governments, although many other types of associations are also important. These organizations shape the opportunity set of their members and the interaction of organizations shapes the opportunity set of the organizations.

What differentiates this aspect of the E-B-P framework is the proposition that participants have individual and different perceptions about appropriate behavior to achieve general goals of the organization and have personally held preferences which they will seek to articulate within the opportunity structure of the organization. The behavior of the organization follows from the political interactions of the participants and there is no meaningful objective function for the organization independent of this political process. It is further assumed (as does Leibenstein) that each participant has some discretion in the amount and in the application of effort, and no one in an organization knows with certainty the consequences of the collective decisions.

In this section I first suggest a tentative analytical framework for examination of participant behavior in organizations in general and then briefly comment on a few characteristics of firms, households, and government. Finally, I comment very briefly on the market as a coordinating mechanism.

Organizations. The conceptual framework identifies four classes of variables which influence the behavior of the organization: the external environment, the organizational structure, the organizational control procedures, and individual perceptions and preferences (see Roberts).

The external environment of an organization was previously discussed. It represents the opportunity set for the organization and thus disciplines the behavior of the organization. The aggregate benefits available to members depend upon the collective ability to exploit the organization's opportunity set.

The organizational structure defines the roles of participants and the resources available to carry out the tasks identified with the roles. The structure defines jurisdictional boundaries, lines of communication, and authority. It is the basic structure in which transactions and decision processes take place. Roles are always incompletely specified.

Cyert and March, in their pioneering work, emphasize the concept of standard operating procedures (SOP). In order to reduce transaction costs in decision-making the group develops SOPs. These are generally accepted rules of thumb for the operation of the firm. The SOPs are political solutions reconciling the difference in perceptions and preferences of the various participants. As long as the goals of members of the group are satisfactorily met, the SOPs are retained. If target goals are not met, participants have an incentive to search for new patterns of behavior which better meet the targets. SOPs vary from complex decision trees to rules for delegating authority and rules for responding to other firms' actions. Knowledge of a firm's SOPs could provide the information for simulation models to predict firm behavior.

The control system consists of the rewards and punishments associated with decisions and effort. The contingencies are embedded in compensation, promotion, and retention practices as well as in peer approval. The ability of top management or leaders to impose their goals on the organization is a function of the effectiveness of the control system. The external environment, organizational structure, and the control system shape each member's opportunity set.

Individual objectives and beliefs determine how members respond to their opportunity set within the organization. Beliefs and goals are not independent, however. They are influenced by a socializing process within an organization which may be a significant influence on patterns of behavior.

Firms. The basic concept of the firm is that of a bureaucratic organization of members with disparate goals and individual discretion, within limits, operating under conditions of great uncertainty. It is hypothesized that variation in behavior and performance will be associated with the size and structure of firms, with the goals of the participants, and with the discipline imposed by the external environment.

A dynamic framework must also consider the interaction of the firm with the external environment. The extent of participant discretion is affected by the capacity of the firm and its participants to shape or protect themselves from the external environment. It is assumed that investments will be made to influence both the regulatory system and the market. Through collective action or custom, classes of participants acting across an industry insulate groups and practices within firms from the discipline of the market--for example, unions establish work rules, accountants have standards, and many decisions are based on industry-wide standards.

Galbraith (1967) argues that large-scale enterprise is a technological imperative. Investments pay off over a long period and in order to protect such investments the technostructure attempts to reduce uncertainty by obtaining a measure of control over the external environment through vertical integration and contracts for inputs and products, influencing demand by advertising, stimulating government purchases, sheltering the firm from the uncertainty of capital markets through retained earnings obtained in oligopolistic markets, and influencing the regulatory system.

Williamson provides an insightful analysis of the incentives for firms to vertically integrate and thus grow. He emphasizes uncertainty of markets and the incomplete nature of contracts. Bringing an activity within the firm deals with problems of information impactedness, among others. Williamson argues this



phenomenon is more important than the technological imperative in explaining firm size.

Firm growth is a powerful dynamic force if the objective is to gain control over the external environment. The greater the size the greater the capacity for political and market influence. If size also allows greater firm member discretion, and individual rewards to managers are related to size, the incentive is reinforced.

The concepts of organizational slack--payments to firm members in excess of what is required to maintain the organization, as developed by Cyert and March, and X-inefficiency (Leibenstein, pp. 76 & 79), roughly the deviance of a firm's performance from that which could be accomplished within its external opportunity set--represent phenomena and lines of inquiry of great significance for system performance. For example, based upon his analysis, Leibenstein concludes:

- 1) the cost of a commodity is not independent of the price of the commodity; 2) except in extreme circumstances firms do not minimize costs; 3) cost of production has a tendency to rise toward the price level, and 4) there is no production function independent of the environment of the firm and the history of the firm. (1976, pp. 492-493)

Organizational slack, however, has important economic functions. In an uncertain world firms make many mistakes and must deal with unforeseeable situations. If firms went out of business with every adversity, the economy would be in chaos. Hirschman argues that loyal or inert customers contribute to slack and that slack is necessary to allow firms time to recoup from temporary poor performance.

Households. Household behavior can be analyzed within the same general framework as other organizations. A multi-person household, for example, will develop specialized functional roles. Typically this will include a purchasing agent with perceptions and preferences differing from other members. Transactions between the purchasing agent and other members will lead to an acceptable set of SOPs for purchasing, and specific products will become embedded in other SOPs and individual techniques. An example of a consequence of this fact is that prices of products may vary within a range without response. That is, there will be a price threshold. Thus, an existing price represents a unique point on a kinked demand curve. And when a price change is sufficient to cause a reevaluation of related SOPs, a new purchase pattern resistant to change will develop. Thus, a change in price can result in a shift in a household's demand curve. Household behavior is influenced by advertising and other promotion practices and by the mix of products made available. Endogenous preferences are part of the dynamics of the system.

There is a good reason to emphasize the concept of household rather than consumer. Consumer implies a single individual and most decisions involving the selection of food and other "consumer goods" involve more than one person. The concept of consumer diverts attention from the important functions and characteristics of the household. Households combine purchased food and other inputs to produce meals which in turn produce human energy, garbage, changes in population, etc. It is sometimes assumed that performance is enhanced by maximizing consumption. However, the goal must be to minimize consumption, the using up of resources, while producing more good. Benefits and costs are produced by

households the same as every other stage of the transformation system. Also, many other organizations produce "consumer" satisfactions for their members--firms, government bureaucracies, churches, clubs, a farm, etc.

Government. We are interested in governments as mechanisms for the articulation of preferences and as bureaucratic organizations for implementing policy. The conceptual framework for organizations generally applies. Governments are made up of participants with goals of their own operating under conditions of great uncertainty. Elected officials are uncertain about the preferences of voters and uncertain about the consequences of their own actions. Votes often carry little information. Thus, the external environment of a governmental unit often provides a very non-specific discipline. The discipline is similar to that of stockholders over a large corporation. The economics of political influence is an important aspect of preference articulation. Elected officials have limited capacity to impose their preferences on the bureaucracy. Implementation of policies and programs depends upon the effectiveness in shaping the opportunity sets of the participants. The effectiveness of government depends heavily on the ideology and strategy of the agency.

Government and markets are joint mechanisms for articulating preferences. Government produces the regulatory system shaping the opportunity set of firms and households. This determines what has to be taken into account by participants. The regulatory system sanctions a pattern of private power including facilitating and limiting collective action. In this sense, markets deal only with solved political problems and the market is an instrument of the regulatory system.

The Market. The genius of the market as a social institution is that it provides a mechanism for collecting and summarizing an enormous quantity of idiosyncratic information about the environment and preferences in an easily understood form (prices), which at the same time carries incentives to produce and conserve to the participants of the system. The political economic problem is to institute the regulatory system in such a way that price carries the information and incentive consistent as possible with preferences for system performance and the reality of the environment. Two marginal comments: 1) market power is the ability to influence opportunity sets and is a function of the market structure and political influence, and 2) trading is usually between agents who have some discretion, rather than between individuals or principles.

### The Food System

Meeting the objectives of the NC 117 project requires 1) a description of the food system, 2) some understanding of the evolution of the system, 3) a means of identifying performance, 4) a capacity to design policies and programs to achieve specific performance norms, and 5) a means of predicting the consequences of specific programs and policies. This section includes brief comments related to these tasks and a few conceptual and practical issues.

First, we have a conceptual problem in defining the U.S. food system and thus the scope of the project. I propose a very broad definition, not suggesting that it is possible to direct research to the whole, but to provide a context for the inquiry.

Start with the concept of a systems model which would provide a simplified description of that part of the world which has an interdependence with production,

distribution, and use of food in the U.S. The striking reality is that much of the world's political economy and ecology influence or are influenced by these activities. An industrialized food system uses inputs which originate in every corner of the globe. U.S. food input and product markets are affected by public policies and organizational behavior of many countries. Chemicals used to produce U.S. food enter the ecological system of the entire world and deplete world resources. Many multi-national and conglomerate firms supply inputs and process and market food.

Policy Design. To evaluate alternative policies it is necessary to predict the way in which the policy will alter the opportunity sets of the relevant participants, the consequence that will have on behavior, and in turn on performance. This means attention must be paid to the details of the policy design.

The implementation procedures must be included in policy design and evaluation and must be based on predicted responses of both public and private participants. For example, developing a workable approach to protection from toxic substances in food depends upon knowledge of SOPs of users and behavioral interactions between inspectors and users.

Policy-making is an evolving process. It is necessary to develop a feedback and monitoring process for the system. Developing performance indicators is critical to the process, and the design of the indicators is a major conceptual task. For a useful discussion of problems in translating global notions about performance of the food system into policy relevant indicators, see Jesse.

Evolving Structure. A key to projecting changes in food system organization is an understanding of the processes of firm growth, including incentives for vertical integration. Many hypotheses might be suggested. An especially intriguing question relates to the concept of opportunistic behavior. What is the consequence for the structure and performance of the food system of market participants operating from different ethical standards?

The recent interest in farm structure would be informed by an understanding of the changing structure of the food system. What has been taking place is the shift of functions from the farm firm to non-farm firms, many of them large conglomerates. Of the total value added in the U.S. food system probably less than 10 percent is accounted for by on-farm activities.

The complexity of the evolving structure is illustrated by the observation that the largest grain handler in the world (Cargill Grain) operates the largest beef feeding organization (Caprock Industries) which sells to the second largest beef processor and wholly-owned subsidiary of Cargill (MBPXL) which markets a large proportion of its product through contractual agreements to the largest fast food chain (McDonald's) (adapted from Richardson).

Preference Articulation. Preference articulation refers to the processes by which preferences are expressed and taken into account. This includes the ability to satisfy preferences within an existing opportunity set and influence the content of future opportunity sets. The effectiveness of the food system as a mechanism for preference articulation is the key question about the system performance. The effectiveness of preference articulation is a function of the behavior of firms in searching both the preference and physical opportunity sets, the behavior of households in transmitting information and influence, and the responsiveness of government.

Our attention is directed to problems where the system as instituted is either a barrier to effective preference articulation or fails to facilitate preference articulation. These include the basic micro-macro problems where individuals following their own immediate interests lead to long-run consequences inconsistent with the preferences of the group. The missing institution may be the lack of a mechanism for the collective expression of preferences. For example, the local grocery store may have lost out in competition with the supermarket because no mechanism existed for customers to express their preferences for the option to have the store available. Food reliability is a major dimension of performance for the food system, but problems exist in articulating preferences for the option to have adequate food available at a future date and for food safety. Many dynamic sequences seem to result in outcomes inconsistent with all (or most) participants' preferences. The demise of some light density rail lines serving rural areas is an example. The institution for collective action is missing. Such problems are often identified as market failure, but might better be identified as institutional failure.

Practical policy analysis needs to be directed to the diagnosis of such situations and the identification of the missing institutional mechanism for effective preference articulation.

Equity or justice is a particularly important dimension of performance and must be included in analysis. It is not possible to articulate preferences for equity through the market. Many conceptual problems exist in designing policies to reflect preferences for justice, including the development of performance indicators.

Vertical Coordination. Vertical coordination is a special problem of preference articulation. The issue is the effectiveness of coordination of supply decisions with demand. It deals with the sufficiency of price as a carrier of information and incentives and the behavior of participants in strategic positions. For example, the SOPs and interaction of purchasing agents, merchandisers of large retail chains, and marketing agents of food manufacturers determine to a large extent the characteristics and variety of food products offered to consumers. These practices severely limit the effective access of new products and products from new and small firms. The institutional mechanism for consumers to articulate a choice for a different set of choices is missing.

The cycles in hog and beef supplies and prices are another illustration of the problem in the U.S. food system. There is no evidence that the variation in supplies is related to variations in preferences for these products. The institutions are missing that could provide coordination of current production decisions of producers as a group with future demand. The missing institution may be a system of forward deliverable contract markets.

Productivity and Costs. If large firms have the capacity to influence prices and members have independent goals and discretion in the firm, then it could be expected that costs would tend to rise to the level of prices. If groups can improve their immediate returns or security by restricting inputs or output, and have a collective capacity to do so, productivity will be reduced and costs increased. These phenomena contribute to both lower productivity and a cost-price spiral. This follows from the behavioral model of the firm.

Galbraith and Williamson argue persuasively that large firms seek to protect themselves from uncertainty and that this is necessary. And slack is necessary for

survival. But small firms also seek the same protection and for the same reasons. They attempt to accomplish the needed protection from the uncertainty associated with unfettered competitive markets through government programs, collective action, and contracting. Careful analysis is necessary in developing policy to squeeze out "X-inefficiency" to assure that the long-run consequences and trade-offs are accurately assessed.

The argument is often made that regulations reduce productivity and increase costs. Often the regulation simply shifts costs among participants and thus the question is whose preferences should count. However, regulations also often impose unintended and unnecessary costs--the regulation is inappropriately designed. Participants may seek regulation to facilitate collective action which results in reduced output. Union work practices are an example. The missing institution is a mechanism to achieve equity objectives which do not reduce productivity.

Inflation. Inflation is a major problem and NC 117 has been asked to address the issue of the relationship of inflation to the food system. If inflation is a general rise in prices, and firms and groups behave as indicated in the discussion of productivity and costs and the supply of money is responsive to the demand for money, as it must be, then industrial concentration and the organization of the food system can cause inflation, especially if firm managers are opportunistic. An understanding of inflation thus requires an understanding of organizational behavior and market structure.

#### A Final Comment

A practical argument is often made that it is not possible to include behavioral variables in analysis because it is not possible to obtain the data. This is a monumental problem. My argument is that for policy relevant analysis we at least need to make assumptions about behavior based on the best data we can get. A conceptual framework which includes behavioral variables generates hypotheses which can at least partially be tested by observable actions of the participants.

A conceptual framework for the food system needs to identify the participants in the system, the relevant contingencies in their environment which influence behavior, and the consequences of that behavior. Simplification is essential. Thus, we will have to work with classes of participants and simplifying assumptions about motives and opportunity sets. Realistic assumptions are necessary for effective policy. My effort has been in that direction with emphasis on micro-macro relationships and problems and on the institutions which shape individual and organizational behavior and affect the capacity of individual participants to effectively articulate their preferences. In addition, I emphasize the evolutionary nature of the system and the pervading problem of uncertainty. The task is far from completed.

Just as bounded rationality is a fact of life in organizations, it is also true for analysts and theorists. We have to recognize the very limited capacity we have for understanding and predicting the behavior of such a complex system. The most unrealistic assumption of all is that of the omniscient analyst.

## FOOTNOTE

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