

# INTRODUCTION TO THE ECONOMICS OF CHANGING MARKETS AND EVOLVING TECHNOLOGIES

**Joseph C. Purcell and Floyd W. Williams**

As the end of the 1980s approaches, the economics of the United States agricultural sector and kindred economic activities is enshrouded in uncertainty. Following two decades of relative stability during the 1950s and 1960s, the 1970s was an era of an unprecedented boom in agricultural commodity markets followed by a bust and severe financial crisis in the 1980s. A major challenge confronting agricultural economists is that of gaining insight and understanding of the cause-effect relationships operating in the global agricultural-food system. Assimilation of theory, logic, and historical data is required as the analytical underpinning for understanding and projecting change in the current situation.

A complex set of forces operate in the global agricultural-food system. Emphasis here is on the food system of which the farm sector is a vital component but only one part. Modern commercial farming requires a sophisticated infrastructure to provide financing, industrial inputs, a transportation system, assembly and storage, fabricating and processing, and distribution -- including wholesaling, retailing and food services. Moreover, a sustainable commercial agriculture requires revenue in-flow to offset revenue out-flow for industrial inputs, interest on borrowed capital, taxes and living expenses. Financial stress on businesses, including farming, occurs when revenue in-flow is insufficient to meet debt obligations, other operating costs, and provide a livable wage for labor-management.

## Balance in the Agricultural Food System

Many factors contribute to the delicate balance between food availability, food needs and food demand. Populations throughout the world, with concentrations in sub-Sahara Africa and other less developed areas, fail to meet food needs because of inadequate consumer buying power and/or lack of local produced foods. People heavily dependent on subsistence agriculture are highly vulnerable to local drought, pest outbreaks, etc. However, industrialized regions with relatively high buying power seldom suffer from food shortages because supply sources are widespread. For example, the Southeast U.S. experienced extreme drought and heat during 1986, but it did not seriously impact food availability to most of the people in the Region. Ironically, some farmers are

vulnerable to food shortages because of inadequate buying power.

Weather -- both good and bad -- pests and other natural forces impact food supplies. Food needs are determined by the size and composition of the population. However, food needs equate to food availability only when it is produced locally, or when it can be acquired in the market with adequate buying power. Most of the food available to individual consumers in the industrial world is acquired in the market. This is true even for most farmers.

A shortfall in food-stuffs in commercial channels contributes to high food prices to consumers and high prices and revenue flow to producers, except for those subjected to near failures in production. Conversely, super abundance of food-stuffs in commercial channels means low prices to consumers, and low prices and revenue flow to producers. Revenue flow through the agricultural-food system is extremely sensitive to relatively small opposite changes in product flow. An over-abundance of food-stuffs in commercial channels, together with weak world food demand, caused revenue shortfalls and financial crisis in U.S. agriculture during the 1980s.

Two enduring people-created forces, contribute to the balance between food supplies and viable food markets: 1) technological developments and 2) changing markets. The impact of these forces on food supplies, food markets, and revenue flows are explored in this issue of the Journal of Agribusiness.

## Evolving Technologies

Evolving technology is the force that undergirds rising economic affluence. Advancing technologies make it possible and feasible to provide existing or traditional goods and services more efficiently, i.e., the current stream of goods and services can be provided with smaller inputs of labor and other resources. Thus, it is possible to provide a larger quantity and/or a more sophisticated array of goods and services with the same or a smaller quantity of inputs. Advancing technologies provide new and better goods and services. The widespread availability of television, computers, jet air travel, super highways and super automobiles

are examples of the products of new and more efficient technologies.

The agricultural-food system of the industrial world evolved into a highly commercialized global system during the second and third quarters of the 20th Century. This evolution is attributed largely to advancing technologies and to economic systems that reward innovation and investment. The sequence of the evolution of the agricultural food system is well known. First was mechanization followed by chemical fertilizers and pest control. Mechanization in the food system, such as mechanical refrigeration, also made possible the high degree of specialization in the agricultural-food system. Biological technologies such as hybrid seed have been around a long time. Renewed emphasis has been placed on biotechnology during the last quarter of the 20th Century. Electronic technologies are also being emphasized during the final quarter of the 20th Century.

Advancing technologies create both opportunities and adjustment problems. Much emphasis and public resources are directed to science and technology, but only limited resources are directed to the adjustment problems created by advancing science and technology. Much of the human misery and stresses including financial, social and psychological, could be circumvented by adequate and appropriate attention to adjustment problems. People are all-important in the adjustment process. In most cases, people adversely affected by advancing technologies must be retrained and/or relocated. Impoverishment and/or government welfare are the only other alternatives. Nevertheless, all levels of government in the United States have neglected the people adjustment problem associated with advancing technologies.

Technologies adopted by the agricultural-food system are of two general types: 1) reducing management-labor (people) and other resource requirements, and 2) increasing output or capacity.

In a rather static market scenario, people displaced from agricultural production need assistance in retraining and/or relocating in order to remain productively employed. Mechanization and commercialization of agricultural production create employment opportunities in other components of the agricultural-food system. Also, people displaced in agriculture can and do contribute to economic productivity in other sectors of the economy.

Fortunately, for society as a whole, much of the evolving technology in the agricultural-food system -- particularly in the farm component -- is output or capacity increasing. To the extent that the increasing capacity is utilized, it exerts downward pressure on farm prices, and generally

downward pressure on revenue flow. The declining revenue flow subsequently results in financial stress, business failure, and psychological and social stresses.

The excess capacity problem can be resolved only by relocating people employed in agricultural production, and deactivating a part of the cropland base. The federal government has traditionally been involved in deactivating part of the cropland base -- and the animal inventory -- using acreage allotments, marketing quotas, PIK (payment-in-kind), and soil conservation programs. However, too little effort has been directed to retraining and relocating people in marginal agricultural areas. Near full employment of people is essential to both creating and distributing wealth. Governments should address the problems of achieving equity among people and alleviating social stresses as well as problems of technical and economic efficiency.

### Changing Markets

Many factors contribute to changing markets or changes in effective demand for foods and kindred products. Changing food markets subsequently impact resource requirements including labor- management, cropland, pasture land and forest; and an array of mechanical, energy and chemical inputs.

Markets for foods and kindred products are determined by population size, needs, requirements and preferences, and buying power. Food markets are further subjected to health and nutritional concerns of the populace. Type of employment, place of employment and time constraints also influence food buying patterns. Moreover, numerous corporate enterprises and commodity groups overtly attempt to change markets with product differentiation, advertising and promotion.

Over much of history, expanding capacity for food production was largely absorbed by increasing population. However, the rate of increase in population in the United States and most of the industrial world slowed substantially during the 1970s and 1980s. Although population continues to increase at a substantial rate in the under-developed world, the market for food is limited by inadequate income or buying power. The food needs of impoverished parts of the world have not been resolved. The global commercial food market is expected to experience slow growth or decline, depending on interpretation of existing data.

Although consumer income continues to increase in the 1980s, the rate of increase is slowing and the redistribution of income is toward the high end, which has a negative impact on the size of food markets. Moreover, food aid programs are being phased down for both domestic and foreign consumers.

Health and nutrition issues are alleged to influence food consumption patterns. However, this has not been well documented. Increasing demand for red meats and dairy products has been traditionally associated with rising economic affluence. However, this trend has been dampened or reversed by health and nutrition concerns and a progressively uneven distribution of income. Production of red meat and dairy products require a relatively large resource base in terms of pasture land, cropland, people power, and industrial inputs compared with plant derived foods and poultry products.

A large proportion of females in the labor force places greater emphasis on convenience in foods. Fast food service and foods adapted to microwave preparation accommodate time constraints. Markets for salad vegetables and fresh fruits benefit from both time constraints and health concerns.

The extent to which food markets are changed by product differentiation, advertising and promotion is not well documented. The implications are that soft drink (empty calorie or no nutritional value)

markets have profited from product differentiation, promotion and advertising contrary to nutrition and health concerns. Conversely, less intensive promotion of milk and dairy products has not been very successful.

Issues related to evolving technologies and changing markets are explored in more detail in the following papers in this issue of the Journal of Agribusiness. Hopefully, this issue of the Journal will promote understanding of technological and market forces that will benefit both the actors in the agricultural food system and the policy makers who emphasize technological opportunities. As a result, more emphasis may also be given to appropriately addressing the accompanying adjustment problems.

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Joseph C. Purcell is professor and head of the Department of Agricultural Economics, Georgia Experiment Station. F. W. Williams is Associate Director for Instruction, College of Agriculture and professor of Agricultural Economics, University of Georgia.