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INTRODUCTION TO INSTABILITY, UNCERTAINTY AND RISK IN THE AGRICULTURAL-FOOD SYSTEM

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This paper provides an overview to market instability, uncertainty and risk management in the United States agricultural and food system. Increasing instability in prices and markets and production uncertainty, related to weather and pests, pervade the agricultural-food system and related activities. The importance of international markets and increasing interdependence with other sectors of the economy contributed to the increasing variability in prices and revenue flow to farmers and others in the food system.

Oscillating Supply-Demand Balance

Prior to the 1970s, United States agricultural-food policy focused on the domestic market and emphasized management (control) of excess capacity, and the level and stability of farm income. During the 1970s, export markets for U.S. farm commodities expanded rapidly. Food prices, increased dramatically and policy emphasis shifted to increasing production for export markets.

Substantial investments in machinery, drainage, irrigation and chemicals, and diversion of grazing land to cropland expanded the capacity of U.S. agriculture. Much of the investment by farm operators in agriculture was borrowed money. The increasing interest on debts increased cash flow requirements, and increased the vulnerability of American farmers to adverse economic conditions.

In the 1980s, the American farm sector and food system were confronted with declining domestic and export markets, falling prices and rising interest rates on the accumulated debt load. The rate of increase in farm production exceeded the rate of growth in both domestic and export markets by a substantial margin. U.S. farm programs prevented a near total collapse of farm commodity prices. However, government support of farm commodity prices caused a massive accumulation of surplus commodities and huge taxpayer costs. Taxpayers (consumers) benefited however, from relatively stable food prices.

Food supply-demand scenarios of the 1970s indicated a world rapidly depleting its natural resource base accompanied by environmental deterioration. A world of dwindling food supplies and rising real costs of food appeared to be the natural sequence of events. A major contributor to this scarcity syndrome was the anticipated dwindling supplies and rising costs of petroleum.

Prevailing scenarios in the 1980s are that of increasing production accompanied by decreasing prices and revenue flow. The reversal of the pendulum from scarcity to surplus is attributed to: 1) abundant supplies and falling prices of petroleum; 2) relatively favorable world weather; 3) rising investments in world food production and distribution; and 4) evolving science and technology.

Evolving science and technology alleviate the pressure on resources through improved efficiency in utilization and substitution processes. For example, new technology improved the efficiency in converting petroleum to locomotion and reduced the demand for petroleum. Also, discovery and recovery of petroleum technology improved and increased the supplies. The combined result is decreasing petroleum prices. Evolving bio-technologies have contributed to more efficient plants and animals. Silicone chips substitute for wood (paper) for storing information. Satellites substitute for copper (wire) in communication, and beat the goes on.

Instability, Uncertainty and Risk

The United States agricultural-food system of the 1980s is characterized by price and weather uncertainty and risk in decision making. A major challenge to the economics profession and to the actors in the agricultural-food system is managing the excess capacity in U.S. agriculture without creating unnecessary and undesirable hardships, and inequities.

A delicate balance exists in the supply of, and demand for foodstuffs at prices considered fair and equitable to consumers and to actors in the system. There are also considerations of humane treatment of people, hunger and malnutrition in areas where often there is little or no effective buying power (effective demand).

Major influences on the demand for food are need, personal preferences, and buying power. Need is based on the size, age-sex distribution, and physical activity of the population. Preference is based on personal tastes, customs, habits, social structures, etc. Real buying power depends on levels of employment, productivity and income transfer. Thus, political processes and business cycles affect both domestic and export markets (demand). Demand for foodstuffs is relatively stable once adjustments (usually upward) are made for population changes, consumer buying

power and the substitution process. Rising real income contributes to consumer substitution of more preferred foods for lesser preferred foods and is usually accompanied by rising real expenditures. Decreasing real income -- associated with recession and depression -- has the opposite impact. Reduced incomes adversely affected food markets during the early 1980s -- approximately the inverse of the early 1970s. Thus, market instability in the 1970s and 1980s is partially attributed to volatile demand.

The supply of food and its distribution is conditioned by weather; pests; technologies employed; investment in production and marketing and production-marketing organization. Adverse affects of weather and pests may be somewhat alleviated through irrigation; drainage; frost protection; greenhouses; pesticides; biological pest management; genetic engineering for frost resistance, drought resistance; etc. Although weather and pests originate in nature, their impacts can be modified through evolving science and adoption of technology. Nevertheless, weather and pests do contribute to variability in food production, and market instability. A production-marketing infrastructure and efficient exchange system are also necessary to both efficient production and distribution. Revenue flow from consumers through the food system to farmers is necessary to implement emerging technologies.

Output increasing technologies, although generally profitable to early adapters, contribute to market instability by exerting downward pressure on farm commodity prices. Revenue flow is reduced when prices fall at a faster rate than output increases. Over reaction to and/or misinterpretation of price signals on the part of farm producers contribute to variable commodities supplies and market instability. Because of time lags between production decisions and resulting production, supply variability takes the form of cycles which may vary from a few months in the case of poultry to several years in the case of cattle, fruit and tree nuts.

Market instability, and price uncertainty, stem from variable aggregate production and/or variable market demand. Additional uncertainty in revenue flows to individual entrepreneurs, including farmers, stems from uncertainty in yields, input-output relationships, deterioration of products in market channels, etc. The bottom line is that price variability and input-output variability contribute to both financial stress (including bankruptcy) and sometimes windfall gains. All economic activity involves some risk of undesirable outcomes. When undesirable outcomes dominate expectations, economic activity tends to decrease.

Government intervention in the agricultural-food system of the United States and in much of the world is based on 1) the essential character of food to all consumers 2) national security, and 3) the highly vulnerable character of the agricultural-food system to market instability. Government intervention through target prices, commodity loans, and natural disaster insurance removes much of the downside risk from individual producers, and insures a bountiful output to the benefit of consumers.

Unfortunately, the United States has not yet learned how to manage the excess capacity in the agricultural-food system. Also, the degree of intervention needed to alleviate the downside risks of individual participants has never been fully resolved. These are the issues explored in the Journal of Agribusiness -- Volume 3, Number 1.

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