

FOOD AND CONSUMER ECONOMICS

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Agricultural economists first carried out demand studies in order to understand determinants of farm prices and incomes. The shift to a focus on consumer welfare began with studies of the role of food and food assistance in standards of living. Now the profession is more concerned with how information and quality attributes influence consumer behavior. Agricultural economists' empirical work in this field has informed the development of household production theory, hedonic price theory, definitions of poverty thresholds, complete demand systems, and survey and experimental techniques to elicit preferences.

Key words: food consumption, household economics, Household Equivalence Scale, agricultural demand, food assistance, food security, hedonic prices, information, nonmarket valuation.

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The historical orientation of the profession to farm issues might lead one to think that agricultural economists' interest in consumer demand is only a recent phenomenon. However, history paints a different picture. It is true that the profession's interest in consumers grew as the agricultural marketplace became more consumer oriented, but this does not imply that agricultural economists of yesteryear were not at the forefront of developments in consumer economics, even if their purposes for pursuing the subject differed from ours.

Agricultural economists estimated consumer demand in the 1920s in order to forecast agricultural prices and farm incomes. The earliest literature examined whether it was either possible or desirable to estimate demand curves to predict market outcomes. During the same period, agricultural economists were the first to measure hedonic prices for product quality attributes to help producers understand how to maximize returns in the marketplace. Thus, early demand work was a complement to

the farm income and production focus of the profession's early days. During the 1930s and 1940s, agricultural and consumer economists considered the role of food costs and the opportunity cost of time in household income and utility. What role food assistance could play in alleviating poverty and supporting farm income was an important policy question.

Distinct characteristics of agricultural supply and of food demand shaped early work in this field. Fixed supply in the short run, the role of food in household budgets, the integrated nature of farm production and consumption, and unpredictable variations in food quality were among the challenges that brought forth creative responses from agricultural economists. As a result, the profession has contributed many empirical breakthroughs that have informed new theory in mainstream economics. These include household production theory, hedonic price theory, definitions of poverty thresholds, and the development of complete demand systems based on intuitive Engel curves.

Since the 1970s, there has been a steady, gradual shift in the agricultural economics literature toward a focus on consumer behavior and consumer welfare. At the same time, new data and methods, together with expanded computer power, supported a much wider scope of inquiry. This led to estimation of demand models that meet restrictions suggested by theory, which allowed agricultural economists to identify changes in consumer preferences and

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predict the impact of policies on consumer welfare.

In recent decades, agricultural economists have adopted new theories and methods of studying consumer choice as food products became more differentiated and as economic variables such as price and income have failed to fully explain consumer choice. These theories involve prospect theory, industrial organization, behavioral economics, and psychology. Methods of direct survey and experimental auctions have sprung up in search of better predictors of consumers' preferences and choices. Agricultural economists have made major contributions in understanding how information influences product demand and in applying nonmarket valuation techniques to food issues.

This article is organized around three questions that have motivated research in food and consumer economics. For each question, we identify key contributions to answering each, note how developments have led to newer and more subtle questions, and identify current trends in food consumer research.

How Do Prices and Incomes Influence Food Demand?

Contribution #1: Agricultural economists have utilized the restrictions suggested by demand theory to better estimate empirical demand relationships. This refinement has allowed a better understanding of consumer responses to market forces and potential policies.

Agricultural economists' early attempts at characterizing consumer demand for foods began with single commodity analysis and focused on price forecasting. For example, [Schultz \(1924\)](#) estimated the own-price elasticity of beef demand to be -4.5 (with standard error of 1), using federally inspected cattle slaughter and Chicago cattle prices. In 1938, he published the most thorough study of consumer demand at that time.

In subsequent decades, demand estimation grew more ambitious, utilizing new data and the restrictions defined by demand theory. After World War II, per capita consumption (disappearance) data were developed, providing better aggregate data on demand, as distinct from supply. The USDA conducted its first household survey in 1936–7 and repeated the process at roughly ten-year intervals until 1987–8, providing cross-sectional insight into food expenditures and food consumption.

Use of restrictions suggested by demand theory enabled more consistent elasticities for simulating market outcomes, and also provided a means to overcome data limitations. The focus was still on the implications of food demand for agricultural markets.

Notable examples of comprehensive food demand studies include the work of [Brandow \(1961\)](#) and [George and King \(1971\)](#)—two of the most cited references in agricultural economics in the post–World War II era. Brandow estimated demand for 24 foods at the retail level and derived farm level demand for underlying commodities. Own-price and income flexibilities were estimated from the data, using demand restrictions suggested by [Frisch \(1959\)](#) to obtain a consistent set of demand elasticities. [George and King \(1971\)](#) used data on 49 commodities and combined cross-section and time-series data. Time-series data provided own-price and cross-price elasticities, and income elasticities were obtained from household survey data, which also allowed them to explore variations in demand due to regional preferences and demographic characteristics. Referencing [Brandow's \(1961\)](#) earlier contribution, they follow his methods to combine both sets of estimates into a complete demand matrix using restrictions. They also estimated marketing margins and derived demands for the farm commodities, as this continued to be the primary motivation for demand work.

Development of complete demand systems that meet constraints defined in economic theory (see [Piggott and Marsh 2010](#) for a review) opened the opportunity for application to food demand. Such systems, including the Linear Expenditure System (LES), the Rotterdam system, the Translog system, and the Almost Ideal Demand System (AIDS), allow for consistent estimation of a complete demand matrix that meets the restrictions of homogeneity of degree zero and the adding up constraint. These systems allow derivation of income-compensated elasticities, which provide a better basis for estimating consumer welfare changes than do uncompensated elasticities.

A key issue is how food price and income elasticities change as incomes grow. As demonstrated first by [Engel \(1857\)](#), the income elasticity of demand for food declines as incomes rise. A limitation of the LES and the Rotterdam system was that the embedded Engel curves did not conform to this known characteristic of food demand. This led to a preference for Deaton and Muellbauer's (1980) AIDS

model, with its more intuitive embedded Engel relationship. It was no accident that the AIDS model was better suited to food demand estimation—Deaton and Muellbauer (1980) drew explicitly on the functional form suggested by Working (1943) and applied by Leser (1963) to household food expenditures: a semi-log budget share Engel curve.

The first major application of the AIDS model in agricultural economics was by Blanciforti and Green (1983), using the Consumer Expenditure Survey of the Bureau of Labor Statistics and incorporating dynamics to account for habit formation. By modeling food demand within a system that included expenditures on other major categories of goods, it also allowed consideration of how food might respond to major shocks in prices in other categories. The food and energy price inflation of the early 1970s made such questions more pertinent. Blanciforti and Green's work marked a major step forward in the profession's evolution toward more consumer-focused demand work, and subsequently the AIDS model has been applied in a large number of food demand studies.

Identifying changes in demand due to preferences, as distinct from changes due to prices, became important when beef consumption declined and chicken consumption increased, starting in the 1970s. Chavas (1983) was among the first to investigate alleged changes in meat preferences. This question spawned a large number of articles in the 1980s that approached the question of measuring structural change in different ways, including a nonparametric investigation by Chalfant and Alston (1988). Once again, the motivation was to understand how consumer behavior influenced producer returns, but it also served to draw the attention of the profession to the role of product characteristics and nutrition and health information in shaping demand.

As discussed below, food economics turned away from theoretical and empirical demand analysis as other pressing policy issues emerged that did not involve prices and incomes. However, interest in how price influences demand has returned as researchers have looked at how prices influence diet quality and obesity (e.g., Alston, Sumner, and Vosti 2008) or how taxes might reduce calorie intake (e.g., Cash, Sunding, and Zilberman 2005; Kuchler, Tegene, and Harris 2005).

In developing countries, large changes in income over time can radically alter price and income elasticities through the Slutsky effect. That is, own-price elasticities should become

more inelastic as incomes rise and the budget share of food declines. Timmer (1981) went further to ask whether income-compensated elasticities also decline, and identified “curvature in the Slutsky matrix.” His motivation was to better understand how poor people substitute among food staples when food prices rise. Estimation of food staple demand using Indonesian household survey data revealed a key insight about how much poor people substitute into inferior staples when the price of the preferred staple increases. Pinstrip-Andersen and Caicedo (1978) used similar insights to investigate targeting subsidies for inferior staples in Colombia.

More recently, attention has turned to understanding how income growth will drive global demand for food. In particular, the income elasticity of demand for meat in rapidly developing countries is a key determinant of global growth in demand for grains, spurring interest in refining estimates of these income elasticities. The research by Seale, Regmi, and Bernstein (2003) and Cranfield et al. (2002) are examples of recent multinational studies that find income elasticities for food to range from about 1 in poor countries to 0.1 in rich ones.

Another key issue is substitution among goods and aggregation of final products into commodity equivalents. How to best aggregate commodities into a manageable number was a concern for Brandow (1961) and for George and King (1971). The challenge is to not misrepresent underlying preferences by aggregating goods that consumers do not view as close substitutes, and one way to avoid that mistake is to test directly for separability. Eales and Unnevehr (1988) were the first agricultural economists to test separability, using meat products and demonstrating that chicken parts and steak are closer substitutes than steak and hamburger. Moschini, Moro, and Green (1994) refined the method by using likelihood ratio tests, which are invariant to the way in which nonlinear separability restrictions are imposed. As food products have become more differentiated, this provides better insight into substitutions among foods and into derived commodity demand.

Contribution #2: Agricultural economists have demonstrated how best to use observed market equilibria to understand underlying theoretical demand curves.

An early question for agricultural economists was: “What do statistical estimates of demand curves show?”, famously asked

by E. J. Working (1927). His insight, that any observed equilibria of price and quantity represent both supply and demand, was critical in shaping later empirical work in markets and prices. H. Working (1925) showed why early estimates of demand did not represent “theoretical demands,” but concluded that this did not matter for forecasting. The Working brothers focused on the gap between theory and practice in forecasting prices, and both concluded that under certain assumptions, forecasters need not worry about whether or not they were estimating the “true” demand curve. Of course, the later focus on consumers meant that interest in identifying true demand curves persisted, and dealing with the simultaneity of supply and demand has remained an important concern.

In contrast to industrial products, many agricultural commodities are produced only once or twice a year, and supply remains fixed in the short term. Thus, the shifting annual inelastic supply curve can identify the demand curve, but this empirical relationship has price on the left-hand side rather than quantity. To adapt theory to this reality, the concept of price “flexibilities” was introduced by H. L. Moore (1919). Price flexibility represents the inverse of the price elasticity (when substitution effects are ignored), and this concept was useful for empirical work over the remainder of the century (e.g., Houck 1965).

Even in agricultural markets, inelastic supply is an extreme assumption. Thus, methods to test whether to model supply as fixed made advances in the 1980s (Thurman 1986). Also, as demand systems became the preferred method of estimating demand in the 1980s, inverse systems were developed to bring the desirable characteristics of these systems into empirical applications where supply is predetermined (a review of these models can be found in Piggot and Marsh 2010). These methods may be less relevant in the future as global food trade becomes more important and therefore supply and demand are simultaneously determined more often than in the past.

Contribution #3: Agricultural economists have modeled how household production shapes and interacts with household demand, especially through the value of household labor (time).

Farm households integrate food production, consumption, and labor allocation under one roof. M. Reid was the first economist to identify

the role of labor costs and productive activities within the household in shaping both production and consumption decisions. In her book *Economics of Household Production* (Reid 1934), she relied on data from agricultural experiment stations to analyze the role of changing labor skills and new technologies applied in the home. Her studies were antecedents to the theories proposed later by Becker (1965) regarding consumer behavior and the allocation of time.

These insights have informed consumer demand work by incorporating the opportunity cost of time and household capital, including human capital, the value of product attributes, and the role of food in the production of health, as discussed below. Changing household structure and labor force participation have shaped food demand through the opportunity cost of time and the economies of scale in food preparation. These insights were applied by Capps, Tedford, and Havlicek (1985), who showed that demand for convenience could be proxied by the demographic characteristics of households. Food is a good for which there are clear and distinct markets for home production and away from home consumption. Kinsey (1983) and McCracken and Brandt (1987) were among the first to use household production theory to investigate that choice.

How Do We Measure Well-being?

It has long been recognized that food expenditures and prices are tied closely to measures of household welfare. Engel (1857) first showed that food expenditures are a higher share of income for the poor, who also spend a larger share of additional income on food in comparison with wealthier households. This basic economic insight, arising from food's role as a necessity, meant that programs designed to provide social assistance often focus on food. Faced with large food and agricultural supplies and low prices for farmers after World War I, followed by the Depression in the early 1930s, analysts in the United States explored how to effectively provide food for the poor and at the same time support for farm income. Thus, the agricultural economics profession recognized the link between agricultural policies and food policies. As a result, the profession developed methods to assess and compare standards and costs of living among households. They

also designed and evaluated food programs aimed at reducing poverty and alleviating hunger.

Contribution #4: Agricultural economists recognized the link between agricultural and food policies and food consumption.

In the period between World Wars I and II, agricultural production in the United States increased in response to technological advances, and the demand growth for food slowed. At the same time, the important role of nutritious food in health and human capital formation was identified (Schultz 1945). During this period, agricultural policies to secure adequate income for farmers included surplus disposal programs such as food stamps and school lunch.

The 1933 Adjustment Act provided for use of funds (collected from commodity processing taxes) to divert surplus into domestic relief in the forms of school lunches and food stamps. This approach helped address the dual problems of having surplus and people in need, as well as held the potential to develop habits among the people in need for using the distributed food—especially school children. Distribution of the food through the retail channel also made retailers more supportive and accepting of the relief program (Schultz 1945). Although the food stamp program was discontinued in 1943 as the war effort eliminated agricultural surpluses, in 1946 the National School Lunch Program received permanent authorization. The Food Stamp program was reintroduced beginning in 1961 through state pilot programs and received permanent authorization in 1974.

Agricultural economists have been interested in how food assistance programs affected nutrition and poverty. In a review of rural poverty studies, Bryant, Bawden, and Saupe (1981) argue that food program analysis is the “one instance in which agricultural economists have engaged in extensive research on poverty policy and programs” (p. 69). They identify Southworth’s (1945) paper “The Economics of Public Measures to Subsidize Food Consumption” as a landmark contribution to the analysis of effects of in-kind welfare programs and food programs at the household and market level. The Southworth model leads to three testable hypotheses: first, that if both food and nonfood are normal goods, then the marginal propensity to consume (MPC) food from a food program transfer is less than one. Second, those who

would prefer to consume less food than that provided by the transfer are “constrained” in their choices by the type of the transfer. And third, those who would purchase more food than the value of the transfer are “unconstrained” by the form of the transfer and will use cash transfers in the same way as in-kind transfers. Most research has found that even when unconstrained, households consume a relatively greater amount of food from in-kind transfers compared with cash.

One key thread of study emerging from Southworth’s (1945) analysis is the question of whether and how food programs affect the food sector and food consumption. The evidence reviewed by Bryant, Bawden, and Saupe (1981) and by Belongia (1979) shows that despite the importance of food programs in the USDA budget, U.S. food assistance programs have a very small (positive) impact on the price of food and aggregate farm income. These results stem from a relatively small MPC for food out of the in-kind (or later, money) transfer. Although estimates vary, additional food spending from an additional dollar of food program benefits is in the range of 0.17 to 0.47, which is larger than the MPC for food from an additional dollar of cash income (studies summarized in Fox, Hamilton, and Lin 2004). Economy-wide estimates based on a computable general equilibrium (CGE) model find the effects of changes in food program spending to have a relatively small impact on the farm economy, in part because the farm share of food dollars is small (Hanson et al. 2002).

Health problems arising from consuming too many calories and too much of some types of foods have led to different challenges today. Farm subsidies and policies have been implicated in a cheap food policy that leads to overconsumption of food. The main issues of concern are whether food prices (in general and for specific commodities or foods) are lower today than they would be without the prevailing agricultural and food policies (farm support, public research and development funding, trade and conservation policies, as well as food programs) and how much the effect of commodity prices matters in overall food prices and consumption. Today, traditional farm programs play less of a role in affecting the price of food commodities, and the cost of farm ingredients is relatively small for many food products (on average about 20%) (Alston, Sumner, and Vosti 2008). It may be, however, that policies designed to generate

incentives (taxes or subsidies) for specific types of foods or food ingredients may be effective at increasing or decreasing consumption of targeted foods or food groups, although most evidence suggests that the effects are small (e.g., Kuchler, Tegene, and Harris 2005).

Contribution #5: Agricultural economists have evaluated food expenditures and their relationship to household well-being. This includes estimation of equivalence scales and comparisons of cost of living.

Stigler (1945) argued for the merits of a minimum-cost diet that could be constructed without regard to palatability, variety, and cultural norms. Most analysts today would argue that the level of “basic” needs or minimum level of need for individuals and families is determined both by social norms and by economic circumstances. Burk (1968) observes that apart from physiological and nutritional norms, much judgment is entailed in determining “adequacy.” She cites work done earlier by Reid comparing estimates of minimum family budgets for 1918–1920 that range from \$1,329 to \$2,104 per year. The wide range arises from different definitions of adequacy, as well as other household circumstances such as location or occupation (for example, farm versus nonfarm households). Since World War I, analysts have used family budgets to design relief programs and determine level of need. Orshansky’s work in the 1960s established a rationale for setting poverty thresholds and tied the threshold level to the cost of food for a low-cost budget. She recommended that the food budget represent one-third of poverty income (Bryant, Bawden, and Saupe 1981). This guidance led to considerable research on how to measure the cost of living.

Cost of living comparisons and adjustments are used to establish equivalence among households of different sizes in social programs, including food stamp allotments, and to establish poverty levels. Adjustments range from simple weights based on per capita adjustment or calorie needs to empirically determined weights or even subjective or interpersonal assessment. Brown and Johnson (1984), among others, estimated equivalence scales and scale economies for low-income households and compared the estimated scales with those implied by food stamp benefits for households of different sizes.

Today, food represents a relatively small share of expenditures in developed countries.

Therefore, alternative and conceptually different approaches have been used to measure poverty and well-being (see Blank 2008 for a review). These include “subjective” assessments of poverty and equivalence (Blaylock and Smallwood 1986), and food security measures—access by all people at all times to enough food for an active, healthy life (Barrett 2002; Jensen 2002). Subjective measures of poverty, which include vulnerability, uncertainty, or other measures that adjust for behavioral expectations, may give a better indication of the degree of deprivation or economic need than do more objective income measures. Relative measures (e.g., as a percentage of median income) are more commonly used in the European Union to estimate the population share “at risk of poverty” (Blank 2008). Use of multiple social indicators of economic disadvantage may include life expectancy, food security, literacy, or access to health care or health insurance. Thus, as food has declined in importance in household budgets, it is now less important in measuring poverty levels.

Contribution #6: Agricultural economists have investigated the role of food programs in alleviating hunger, improving diets, and reducing poverty.

U.S. food assistance programs remain central to public efforts to ensure that the population has adequate food and nutrient intake. A significant amount of research has examined the food programs’ role in improving access to food and in improving the quality of food choices and diets. Reviews of findings regarding the impact of USDA’s food assistance programs on various outcome measures of interest, including food intake, expenditures, program participation, and other nutrition and health-related outcomes, are found in Bryant, Bawden, and Saupe (1981), Barrett (2002), and Fox, Hamilton, and Lin (2004).

The Food Stamp Program (now called the Supplemental Nutrition Assistance Program, or SNAP) has been the most widely studied, and findings vary regarding its effectiveness in reducing hunger and improving diets. As might be expected, most studies find that food stamp benefits increase food expenditures. In-kind transfers increase food expenditures more than do direct cash transfers (e.g., Fraker 1990 for a

review; Senauer and Young 1986). Results from studies that compare participants with nonparticipants find that program benefits increase household food expenditures by 18–20% (e.g., Lane 1978; Basiotis et al. 1983; Devaney and Fraker 1989).

Despite the increase in food expenditures, evidence on improvements in dietary intake and changes in food insecurity are mixed. Fox, Hamilton, and Lin's (2004) review shows little evidence that the Food Stamp Program affects dietary intakes of key nutrients as well as aggregate measures of dietary quality. Results on the relationship between program participation and food security are subject to problems of selection bias and endogeneity (Gundersen and Oliveira 2001; Jensen 2002). Dynamics and timing of benefit allocation or receipt of income, as well as stigma, are likely to be important determinants of participation and program outcomes (e.g., Ranney and Kushman 1987). Evaluation of food programs faces many methodological challenges, leading to continuing investigation of how effective these programs are in either alleviating hunger or improving diets. Outcomes of interest, such as "food security" or "hunger," are not easily measured and are affected by many factors, some of which are endogenous, while other factors are uncontrolled.

The policy context for food assistance programs has changed in the past three decades. In 1978, a presidential commission was established to address "world hunger," including the persistent undernourishment of a significant segment of the U.S. population. More than three decades later, we are also concerned about the persistent problem of overnourishment. Policy interest in diet and health is bringing forth new regulations and pilot programs to direct food assistance toward promoting healthier food choices. At the same time, food assistance is only one of many social safety net programs that may influence household well-being. As the benefits provided through other social welfare programs change—for example, with the welfare reform enacted in 1996—the role of food assistance in supporting low-income households also changes. Thus, emerging research in this field addresses both of these issues: the impact of multiple program participation on household expenditures and well-being (e.g., Joliffe and Ziliak 2008) and the impact of food assistance on diet and health (e.g., Ver Ploeg and Ralston 2008).

How Does Information and Quality Influence Consumer Choice?

Contribution #7: Agricultural economists have identified how food markets are affected by product attributes, quality, and heterogeneous consumer preferences and concerns.

Although economists are perhaps best known for emphasizing the role that prices and income play in explaining consumer choice, it has long been recognized that other factors, including heterogeneity in food quality and in consumer preferences, drive food purchasing behavior as well. In the early 1960s, the agricultural economist M. Burk (1961) noted that food consumption choices were driven by, among other things, "family composition and size; occupation; the homemaker's age, employment, and education; home food production; ethnic background; technological changes; extent of eating out; education, merchandising, and promotion; and psychological factors" (p. 90). She went on to document how these and other factors, such as nutrition and eating away from home, influenced food consumption, and she provided a more formal analysis in her 1968 book *Consumption Economics: A Multidisciplinary Approach*. Her observation that "the predictive value of changes in income . . . for most foods . . . is diminishing" (p. 164) seems to have foreshadowed the explosive growth in work by agricultural economists on non-price determinants of food production and consumption.

Indeed, agricultural economists played a key role in identifying and analyzing the effects on food demand of nonprice factors such as advertising (Nerlove and Waugh 1961; Brester and Schroeder 1995), away-from-home food consumption (Kinsey 1983), demographics (Kokoski 1986), food safety (Caswell 1991, 1995), food scares and recalls (Brown 1969; Marsh, Schroeder, and Mintert 2004), nutrition and health (Adrian and Daniel 1976; Capps and Schmitz 1991), and various food quality characteristics (Waugh 1928). Much of this work tended to focus on the physical qualities of the food itself.

In recent years, attention has turned to analysis of consumers' aversion to new food production and processing technologies such as irradiation (Hayes et al. 1995), biotechnology (Lusk et al. 2005), the use of antibiotics and growth hormones in livestock production (e.g., Alfnes and Rickertsen 2003), and organics and pesticide use (Misra, Huang, and Ott 1991;

Thompson 1998). These practices raise questions about the safety and efficacy of foods in promoting human health. In addition, social and ethical issues have become variables defining the choice characteristics of food such as fair trade purchasing practices (Loureiro and Lotabe 2005), the environmental impact of food production activities (Blend and van Ravenswaay 1999), and the humane treatment of animals used for research and food (Mitchell 2001). The primary conclusion from this body of work is that food consumption is heavily influenced by quality and other nonprice factors. For example, in an analysis of U.S. consumer meat demand, Tonsor and Marsh (2007) estimate that about 75% of the variability in meat demand is driven by factors other than meat prices and income. As food expenditures continue to consume a smaller portion of disposable income, it is likely that nonprice factors will play an increasingly important role in explaining future food demand.

Contribution #8: Agricultural economists have analyzed how information affects food markets and food consumers.

Kinsey (1993) made the case that consumer expectations for food quality have been increasing. As consumer demand for premium quality, healthier, safer, and more environmentally friendly food products has increased, firms have responded by marketing quality-differentiated foods with explicit claims. Information is crucial for determining, maintaining, and communicating product quality, differentiation, traceability, and safety. The use of information allows firms to signal quality and other attributes, which creates the potential for quality premiums. On the consumer side, information allows buyers to select the particular quality characteristics or product attributes that they prefer and are willing to pay for.

Asymmetric information occurs frequently in food markets, and agricultural economists have been concerned with how asymmetric information can be overcome. Caswell and Padberg (1992) discuss the use of food labels to mitigate the imperfect information problem in food safety, arguing that quality signaling through labeling promotes market incentives with relatively limited government involvement. Golan et al. (2001) provide a comprehensive review and discussion of the

economics of food labeling. Labeling facilitates other forms of product differentiation by highlighting product attributes that may be desirable for specific niche markets.

The economics literature (Nelson 1970; Darby and Karni 1973) provides three common classifications based on the consumer's ability to determine quality: search, experience, and credence. *Search* goods provide perfect information about their own quality prior to purchase. The quality of *experience* goods can be determined only after the product has been consumed. Quality in a *credence* good cannot be directly observed (or is observed too slowly to matter or is prohibitively costly to be observed) by consumers even after consumption. Many of the newer categories of food products, such as those with environmental, local, ethical, and other health and quality claims, can be categorized as credence goods. Caswell and Mojduszka's (1996) application of this concept to food products with *ex post* unobservable attributes was novel and spurred new research in agricultural economics and beyond.

Asymmetric information problems occur with credence goods because food producers know whether they have used the appropriate methods to achieve the desired quality attributes, but consumers know with certainty only what the producers' quality claims are or what the label says. A key contribution in analyzing credence goods is that third-party certification is needed for credibility and can increase welfare. McCluskey (2000) showed that repeat-purchase relationships and third-party monitoring are required for high-quality credence goods to be available. Roe and Sheldon (2007) show that firms that sell credence goods have incentive to hire private certifiers in addition to paying for government-mandated labels when the government's quality benchmark substantially deviates from firms' private quality choices.

Product reputation is another way to alleviate the problem of asymmetric information. For the purposes of understanding reputation, there are two classes of experience goods based on traceability. In the first class, extensively analyzed in the economics literature, the consumer knows the identity of the producer. In the second, it is either impossible or too costly for the consumer to identify the producer (i.e., there is no traceability).

Agricultural products are often pooled from multiple producers for the purpose of distribution or processing, which offers an illustration

of the second class of goods, where quality is associated with the region of production. Olmstead and Rhode (2003) describe the case of cotton grown in the South in the early twentieth century. Partly due to the high cost of testing quality, sometimes only samples of cotton pooled from many growers were tested. This prevented an individual farmer from building his own reputation. Empirical research has quantified the existence of collective reputation specific to certain production regions—such as wine producing regions (Landon and Smith 1998). A related idea is state commodity promotion (Patterson et al. 1999) or “buy local” campaigns (Darby et al. 2008).

When consumers do not distinguish the products of different agents, then all firms sell at a common price and share a common reputation for quality. This has been an important consideration in agricultural markets, and was the motivation for minimum quality standards in marketing orders (see Sexton et al. in this issue). Winfree and McCluskey (2005) showed that the presence of asymmetric information means that enforcement of quality standards can be welfare enhancing. This article provided an argument in favor of minimum quality standards, which are usually regarded by economists and antitrust lawyers as collusive devices.

Agricultural economists have studied how information on health and nutrition affects food markets. Brown and Schrader (1990) created a cholesterol information index based on medical articles and found that information on the connection between cholesterol and heart disease significantly lowered egg consumption. Health information indices have also been used to study the impact of health information on consumer demand for other food products (e.g., Capps and Schmitz 1991; Chern, Loehman, and Yen 1995). Ippolito and Mathios (1993) examined the effects of information transmitted by advertising nutritional benefits regarding fiber in the ready-to-eat cereal market. Comparing the pre- and post-claim periods, they found that market share shifted to higher-fiber cereals, the fiber content of cereals in general increased, and disclosure of other nutrients, such as sodium, increased. Their study showed how information disclosure can influence product composition, a result that has since been replicated (see Golan and Unnevehr 2008 for a review).

Agricultural economists have studied how the supply of information through media affects consumer demand and preferences,

with a focus on food safety and technology issues. Verbeke, Ward, and Viaene (2000) showed that media coverage of the outbreak of bovine spongiform encephalopathy (BSE, or “mad cow disease”) in Europe significantly reduced meat demand and that younger people and households with young children were the most susceptible to such negative media coverage.

Freebairn (1967) used an indifference curve analysis to show that information increases utility. Foster and Just (1989) made an important conceptual contribution by providing a framework in which to analyze the effect of information on consumer choice and welfare. They pointed out that when consumers are uncertain about product quality, the provision of information can help to better align choices with preferences. In particular, because consumers make a different set of choices when uninformed versus when they are informed, they often suffer from what can be called a cost of ignorance. Foster and Just’s approach has been applied empirically in a variety of contexts such as valuing nutritional labels (Teisl, Bockstael, and Levy 2001), valuing information related to mad cow disease (Mazzocchi, Stefani, and Henson 2004), and biotechnology (Rousu et al. 2007), just to name a few examples. Teisl, Bockstael, and Levy’s (2001) results illustrate one of the key insights of the value-of-information approach: Consumers derived positive benefits from nutritional labels even though the labels did not necessarily lead to healthier choices. As Teisl, Bockstael, and Levy (2001) put it, “Better nutritional information may allow individuals to . . . attain the same health status in a way that increases their utility from food intake or decrease their cost” (p. 133).

Contribution #9: Agricultural economists developed ways to measure consumer demand and willingness-to-pay for food product attributes. Agricultural economists were the first to measure hedonic prices for quality attributes and among the first to pioneer various methods of nonmarket valuation.

Hedonic models have been widely used to evaluate the characteristics of food products for which there is not a separate market. The idea is that the differentiated product is a bundle of product attributes that cannot be purchased separately. Each of these attributes contributes to the total price. Agricultural economists have a long history of interest in markets

for products that are differentiated by quality. Waugh (1928) estimated a hedonic price equation for asparagus, tomatoes, and cucumbers. In the 1960s, the relationship between product characteristics and prices was examined in order to separate product quality from inflation (Adelman and Griliches 1961). Ladd and Suvannunt (1976) confirmed the hypothesis that the equilibrium price is the sum of the level of product characteristics weighted by their respective marginal implicit prices, using the example of nutrients in meat.

As demand for quality has become more important in the last two decades, agricultural economists have used the hedonic price technique to estimate the implicit prices of attributes for many food products, such as apples, beef, fish, wheat, rice, and breakfast cereals (see McCluskey and Costanigro 2010 for a comprehensive review). It has been used frequently to understand how product attributes affect wine prices. For example, Combris, Lecoq, and Visser (1997) showed that objective characteristics (such as expert rating score and vintage) are statistically significant, while sensory variables (such as tannins content and other measurable chemicals) are not.

Detailed information on product quality attributes is often missing in traditional sources of food consumption data. Moreover, such secondary data sources are of little help in analyzing consumer preferences for new foods or in projecting the effects of new food policies. Agricultural economists have learned to generate their own data to address the problems that have arisen in food markets, and as a result have made significant contributions developing survey and experimental techniques to elicit preferences for food products and attributes. Environmental economists first developed the contingent valuation method, many of the key early contributions of which are detailed in Kling et al. in this issue. However, the agricultural and environmental economists who developed the theoretical foundations underpinning contingent valuation noted early on that the conceptual framework was readily amenable to the study of consumer willingness-to-pay for changes in food quality (Hanemann 1982; Randall and Stoll 1980). As a result, it was not long before the potential usefulness of the contingent valuation method was noted by those studying food markets. Although it is difficult to say precisely, some of the earliest applications of the contingent valuation method to food-related issues

appear to have taken place in the context of food safety by Misra, Huang, and Ott (1991), as well as by Buzby, Skees, and Ready and by van Ravenswaay and Wohl, contained in the edited volume by Caswell (1995).

The contingent valuation literature evolved separately from a related literature on conjoint analysis that emerged mainly in marketing studies. Numerous conjoint studies were conducted on food-related topics as early as the 1970s and 1980s, but most of this work was carried out in marketing departments. Interestingly, the first-ever application of what is now called the “choice experiment” approach, in which conjoint analysis was extended to stated preference choices, was carried out in an application to food (Louviere and Woodworth 1983). Although much of this literature developed outside of agricultural economics, it was agricultural economists that led the charge in taking these stated preference methods and marrying them with economic models such as the random utility models of McFadden (1974) and Hanemann (1984) and the product characteristics model of Lancaster (1971) and Ladd and Suvannunt (1976). The result has been a virtual explosion in the use of conjoint-based methods in the agricultural economics literature. Agricultural economists are now developing new ways of analyzing and conducting conjoint analyses and are increasingly addressing questions related to consumer demand for novel foods and food attributes, *ex ante* effects of food policy alternatives, and factors motivating consumer choice.

Contingent valuation and conjoint methods involve asking people, hypothetically, what they would do in certain situations. That is, they are stated preference methods. Agricultural economists were among the first to demonstrate that consumers’ revealed preferences could be measured even when market-based data were unavailable. In a sense, these economists solved the problem of missing market data by creating their own markets. This work emerged as some environmental economists began using laboratory experiments to elicit preferences for goods to question whether the hypothetical nature of contingent valuation was problematic. Although the laboratory valuation approach was useful for testing such conjectures, it was impractical in many environmental valuation exercises where goods are undeliverable (i.e., researchers could not actually deliver cleaner air if someone paid them for

it). But what was a limitation for environmental economists was a boon to agricultural and food economists, as new food products could be created and delivered in laboratory-created markets. As a result, agricultural economists were among the first to create experimental markets to reveal people's preferences for food attributes with the intention of using them in public policy or for marketing purposes. Some of the earliest applications related to consumer preferences for packaging in beef (Hoffman et al. 1993) and in work on food safety (Hayes et al. 1995). Much of this development is reviewed in Lusk and Shogren (2007), where they show that over 100 studies have been conducted using experimental auctions to value products—mostly food. These experimental methods provide the realism that is missing from stated preference methods, and this work by agricultural economists has spread to a wide variety of fields, including marketing, psychology, and sensory science.

In recent years, agricultural economists have systematically taken methods originally developed in marketing and have found ways to convert them to revealed preference methods using experimental techniques that promote incentive-compatible responses. Moreover, there continue to be a host of creative developments in experimental methods related to value elicitation for food products. Examples include the development of nonhypothetical choice experiments, nonhypothetical conjoint ranking methods, elicitation in quantity-space, open-ended choice experiments, random n th price auctions, inferred valuation, and field experiments (see Alfnes and Rickertsen 2010 for a partial overview).

Future Research Directions

Research in this field of agricultural economics will face new challenges from continuing changes in food markets, policy issues in diet and health, evolving consumer demand for quality in many dimensions, and the need for both new data and new methods to answer important research questions. Because of additional processing and services, retail food product demand is more and more divorced from farm-level commodity demand. Consumers now spend almost half of their food dollars and obtain more than a third of their calories away from home (Economic Research Service 2009). At the same time, rising rates of obesity and

diet-related adverse health conditions bring a focus on understanding motivations for better dietary choices. In food assistance programs, this question has become more relevant as concerns about obesity and diet quality among low-income households gain currency.

Although agricultural policies may have less direct effect on food choices and intake today than in the past, investments and policies for the food sector influence choice (including product ingredients). Furthermore, energy prices and policies may play a greater role in the future in shaping food prices and consumer budgets. Many public interventions in diet and health, current or proposed, focus on information provision, so the profession must continue its work to understand the likely impact of new information on consumer choice. Food policy may incorporate taxes or subsidies designed to affect food choice in the future. Within food assistance programs, it will be important to understand the effect on consumer welfare of transfers targeted to more desirable diets, in comparison with less constrained food/income transfers.

Our ability to understand food choices will be enhanced by a number of exciting new areas of emerging research and potential new sources of information. The new research agenda is brought about by the increasing affluence of consumers that results in the need to better understand the determinants of consumer choice (as prices and income play a lesser role), problems that relate to overeating rather than issues associated with subsistence, the increased demand for new food product attributes, or concerns about where or how food is produced. There are ongoing questions about how to study the gap between what consumers say they will pay or do in the marketplace and what they actually do, and whether experimental methods are capable of narrowing this gap.

At the same time, traditional sources of data do not provide much of the information needed for understanding important dimensions of food choice. Information technology is providing new sources of data, such as retail scanner data and Internet-based surveys, and the profession has only just begun to tap into these sources, as many of them are proprietary. Data continue to be scarce for food away from home, despite its importance. While new methods discussed below can give insight into demand for quality, nationally representative data with detailed information about emerging quality attributes are scarce or nonexistent.

Topics that are likely to be at the forefront of the research agenda for agricultural economists include:

- Learning how to best combine traditional data sources (e.g., aggregate time-series data, scanner data) with newer data sources (e.g., stated and revealed preference experiments) to arrive at more accurate depictions of consumer preference. Research will also be needed to determine how to deal, both conceptually and empirically, with the increased differentiation and variety that exists in today's food markets.
- Not only will agricultural economists need to combine information about consumer preferences that are present in different sources of choice data, they will also need to turn to other disciplines to better understand choice. This includes insights from sensory researchers about the factors affecting taste and palatability perceptions and how these factors change and adapt over time with repeated experience, and they also include insights from psychologists to investigate the determinants of preferences, including such factors as values, social norms, and personality.
- Although it was once considered heretical to make interpersonal comparisons of well-being, economists have recently gained insights by venturing again into this area in what is now often referred to as "happiness research" (Frey and Stutzer 2002). There remains much to learn about how consumers' food choices, food policies, and health influence well-being. The emerging literature on happiness research represents one avenue in which to pursue such questions.
- Finally, there is increasing evidence that people's choices are not as consistent and systematic as our models often suggest. There is a need to uncover and model such behavioral biases as they relate to health and food intake and to either learn about the origins and potential rationality of such behavior or investigate methods and policies to help people overcome cognitive limitations.

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