Chapter 14
Information and Market Institutions

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Abstract Information flows from producer to consumer in the form of product and quality information and from consumer to producer in the form of payments and consumer preferences. The economic efficiency by which marketing channel functions (e.g., lending, contracts, packaging, storage, transportation, or marketing) perform is based on the market institutions available for a particular function. Entities using these functions are considered institutional players. They rely on market institutions to limit transaction costs, including search costs, facilitate quality and price negotiations, and monitor markets. Institutional players use information to increase efficiency within market institutions. If public agencies help to generate information that contributes to consumer welfare, then consumers should be advocates for public agencies continuing their information production. Yet, increasing public scrutiny concerning the role that public agencies play in providing information to the agricultural industry has been a factor recently. This chapter details some of the issues for which the public is at odds with how to value public information. The authors offer recommendations for the future of public information policy and the collection of public data.

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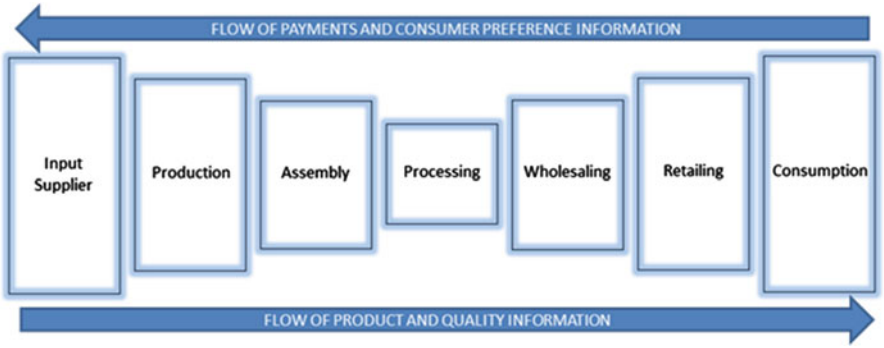

Fig. 14.1 Stages in the agricultural marketing channel. Recreated from Rhodes et al. (2007)

Information flows from producer to consumer in the form of product and quality information and from consumer to producer in the form of payments and consumer preferences (Fig. 14.1). The economic efficiency by which marketing channel functions (e.g., lending, contracts, packaging, storage, transportation, or marketing) perform is based on the market institutions available for a particular function. Entities using these functions are considered institutional players. They rely on market institutions to limit transaction costs, including search costs, facilitate quality and price negotiations, and monitor markets (North 1991; McMillan 2002). Institutional players use information to increase efficiency within market institutions. Access to information should decrease transaction costs incurred by institutional players, and thus, it affects transaction price, quantity and quality attributes of commodities and products. Consumer welfare increases when the agricultural marketing channel becomes more efficient. If public agencies help to generate information that contributes to consumer welfare, then consumers should be advocates for public agencies continuing their information production. Yet, increasing public scrutiny concerning the role that public agencies play in providing information to the agricultural industry has been a factor recently. This chapter details some of the issues by which the public is at odds with how to value public information.

Information may be derived from either the public or private sector and is used by private sector participants for strategic planning and by public sector participants to inform policymaking and regulatory decisions. Accordingly, information and underlying data can be distinguished as public or private in origin, source, or availability. Although the importance of this distinction may not be apparent to the casual reader of the *Wall Street Journal*, it is important to market institution participants. Generally, public information is publicly available. Private information may (often at a fee) or may not be available to the public. Availability and accuracy of information have important implications for economic performance. Public and private information employed in strategic planning by private sector participants drives the productive or technical efficiency of markets—efficient use of resources to generate goods and services. While public sector provision of information supports the achievement of such efficiencies by freely operating competitive markets, the public

sector is also charged with the role of ensuring societal concerns of allocative efficiency—allocating resources to maximize aggregate social welfare including distributing information to those who have the greatest need for it—through policy-making and regulatory decisions.

The United States Department of Agriculture contributes significantly to information access for the agricultural industry and supporting industries. This information is used by various industry participants to make strategic and operational decisions. For example, sellers and buyers of boxed lamb cuts use Agricultural Marketing Service (AMS) boxed lamb price reports to establish prices, agricultural lenders rely on World Agriculture Supply and Demand Estimates (WASDE) price projections when determining client repayment capacity, a new organic soybean processor looks to National Agricultural Statistics Service (NASS) crop surveys to determine the best location to build relative to organic soybean production, or producer associations use Economic Research Service (ERS) marketing margin trends to approximate market fairness among producers, wholesalers, and retailers.

Chapter 1 identifies the structural change occurring within the agricultural industry. Structural change has, and will continue to have, an impact on the functions carried out within the agricultural industry. Structural change stimulates the need for new information, diminishes the need for certain information, can deteriorate or enhance data access, and amplifies the need for researchers to access data to study how structural change impacts the role of market institutions on marketing functions and on institutional players. Although the data may or may not represent a form of information (e.g., the number of farms with more than $1 million in sales is information, but the value of sales for each individual farm with more than $1 million in sales is data), the quality and consistency of reliable data is important to deriving credible and relevant information. This chapter cannot begin to address all issues associated with ongoing structural change in the agricultural industry. The chapter focuses on information issues from the historical perspective of lessons learned and how these lessons learned may benefit future leaders and decision makers as they assess policies and programs providing publicly generated information.

We focus our discussion in this chapter on the role of public information in ensuring agriculture market efficiency. Assessing the impact of private information has been more difficult because of limited public access to and historical records of such private information. Exceptions, for which analysis has been possible, include firm press releases or other voluntary public announcements. The supply of and demand for private information is market driven, and the availability and form of private information developed is conditional on the availability and form of public information provided. Collectively, public agents focus on developing information to respond to society's desire for allocative efficiency. Public agents include opinion leaders via the voice of voting constituents, public servants via university faculty and government employees developing a research agenda, and public nongovernmental organizations via philanthropic activities.

Significant agricultural market institution changes are at the forefront of society's need to continually reevaluate allocative efficiency. Agricultural market institutional changes observed during the past 20 years are unlike those experienced at

any period in the modern era of global agriculture. As changes in the market system occur to match end-user wants with producer supply, resources are reallocated to improve efficiency. Agricultural marketing system changes have created new demands for private information, brought about new agendas for public information development, and caused society to reflect on public information's role within agriculture. For example, the rapid adoption of production and marketing contracts in the animal agriculture industry has garnered significant societal concern. Although some firms argue that vertical coordination and vertical integration are necessary to ensure the efficient management of resources across levels of the marketing system (i.e., technical or productive efficiency), portions of society express concern that technical efficiency erodes allocative efficiency. What balance is needed between public and private information providers to meet private sector participant wants and society needs, and what role should the public sector have in data availability and public information development given the dynamic changes of the agricultural marketing system?

Public information generally is considered unbiased, credible, reliable, and relatively freely accessible to society. Government employees, who collect data, create information, and present information, have no financial incentive to act nonobjectively. Examples include USDA NASS price, supply, and demand data; Census of Agriculture data; WASDE data; AMS market news reports; and ERS Agricultural Resource Management Survey (ARMS) data. Nongovernmental organization employees and academic researchers are sometimes accused of research bias due to funding opportunities or personal agendas. These perceptions are often debated in a public forum by which the public is allowed to evaluate a researcher's results. Parcell et al. (1999) find that extension (deliver information) and research (develop information) marketing economists differ on many issues but also agree on some issues. Their results indicate the differences in perception are strongest for factors linked to producer marketing practices. They also report that extension and research marketing economists rarely collaborate. Agriculture and Food Research Initiative (AFRI) requests for grant applications now encourage integration of multiple land grant missions, and this has created incentives for research and extension economists to collaborate. The results of incentivizing collaboration are yet to be identified.

Credibility refers to the research team's integrity and information development documentation. Credibility is one area in which public information has a comparative advantage. For example, the NASS publishes procedures for developing crop forecasts, and this lends transparency to the process and credibility to the forecasts (Vogel and Bange 1999). Credibility is of general interest to society and decision makers. The agricultural press observes and reports on the process used to develop NASS crop forecasts (e.g., Hill 2010), and this news coverage seems indicative of society's thirst for understanding the process. Yet, society's thirst seems to be quenched by a few summary paragraphs instead of a 17-page document. Credibility refers to a different meaning depending on the audience, and the level of credibility relates to data reliability behind the information.

Data reliability is critical for public information development. The WASDE report, a monthly production of the Office of the Chief Economist, includes reliability measures in the appendix of each report. Although extension and research marketing economists generally agree about producer use of futures/options marketing strategies, Parcell et al. (1999) find that extension marketing economists do not believe marketing strategies need be based on statistically significant findings; on the other hand, research marketing economists believe statistically significant findings are important for developing producer marketing strategies. Extension economists view marketing from an individual producer risk-management perspective, in which the producer's objective is to obtain a profitable price for production in the individual year that is involved and avoid serious cash-flow problems in that year. Research economists view marketing from the aggregate standpoint, or on the average. They believe that the data determine the confidence in a decision-making context. Regardless, ensuring credibility of the information and reliability of data comes at a cost to society.

In discussion of the effective allocation of information resources to meet private and public sector needs, the focus is on public information agents' role, public information's value as measured by market price reaction, and the distinction between public data and public information. Many economists beleive that more information is preferred to less, and that private information providers continue to utilize public data, but not exclusively, for creating private information. This chapter provides a brief review of the relevant literature on how information affects markets, a review of studies related to market efficiency and public information, and a review of studies assessing the role of public information and data. Throughout the chapter, anecdotal examples assist in telling the story of the relationship between public information and market institutions. The chapter concludes with thoughts related to future balance between private and public information and to public–private information collaborations.

History of Public Information in Agriculture

Public information and access to public information has been a steadfast part of American history and helps to remind us of where we have been and where we might be heading as a society, as an industry, or as a business. Technological innovations have strong implications for information and data collection and delivery methods. Note the distinction here between information and data. Information is developed from data, and the agenda for what data to collect is regularly dictated by the type of information sought. The divergent information segments then flow to the market where market participants assess and digest the information. The market, as an institution within the value chain, is dynamic in that participants, industry structure, consumer demands, and geographical scope change over time so that resources are allocated efficiently to ensure market efficiency. The availability of diverse data

Table 14.1 Summary statistics from survey of journal articles relative to the use of data, public data, and USDA data

	(%) of articles referencing data[a]	(%) of articles referencing public data[b]	(%) of articles referencing USDA data
1980			
AJAE	78	54	30
JARE	86	52	19
FDRS	50	21	11
1990			
AJAE	80	51	21
JARE	100	74	39
FDRS	57	34	18
2000			
AJAE	81	46	22
JARE	88	76	53
FDRS	71	32	19
2008			
AJAE	83	61	24
JARE	85	56	26
FDRS	85	44	29

[a]Data originating from both public and private sources. Examples include public data from government sources to proprietary data from private sources such as the National Panel Diary (NPD group)
[b]Examples include futures data, non-USDA government agency data, or survey data from surveys initiated by public servants

serves educational, research, policy analysis, and firm- and industry-level strategic planning objectives. Questions of data consistency (e.g., changes in data specifications to reflect industry changes) and data reliability (e.g., reporting errors, data smoothing, and representative sample size) abound when discussing data and public information. Is not the very debate over reliability and consistency of data used to develop public information a sign of value?

Zilberman and Heiman (1997) make the case for the value of agricultural economics research, and they acknowledge that resulting information outputs are closely tied to policy and technology adoption that collectively benefit agriculture. As an applied economics profession, agricultural economics is heavily data driven. We wondered how agricultural economics researcher data use has changed over time, so we conducted a survey of journal articles published in the *American Journal of Agricultural Economics*, *Journal of Agricultural and Resource Economics* (formerly *Western Journal of Agricultural Economics*), and *Journal of Food Distribution Research Society* for the years 1980, 1990, 2000, and 2008. These journals were selected because each was published during the entire time period, and they vary in scope (international, regional, and discipline) and diversity of topics (theory, applied, and strategy). The time period covered reflects a period of significant structural change throughout the profession and throughout the agricultural industry.

Survey results (Table 14.1) confirm that agricultural economists continue to rely heavily on data for publishing scholarly research (column 2) and that researchers have

not reduced their dependence on public data or USDA data to test hypotheses (columns 3 and 4). Our survey of public data use does not account for the difference in the methodologies used by researcher scientists or the change in issues analyzed. However, we conclude that reliance on public and USDA data has not waned over time.

Current Provisions of Public Information

At the time of this writing, the USDA has 17 agencies, which each providing public information of relevance to agricultural markets. This information includes a host of well-known traditional products such as WASDE reports, AMS market news reports, ERS farm income and costs summaries, and NASS census of agriculture. Over time, the USDA has also added public information relevant to new social concerns. For instance, USDA's Food Safety and Inspection Service (FSIS) provides food recall data; USDA's Animal and Plant Health Inspection Service (APHIS) provides data on BSE (Bovine Spongiform Encephalopathy) surveillance programs; and USDA's Grain Inspection, Packers and Stockyards Administration (GIPSA) provides information regarding US standards being met on a host of agricultural commodities.

The availability of agriculture-related public data can be traced to the first US census in 1790, though specific enumeration of agriculture began with the 1840 census of agriculture (see historical years in http://www.agcensus.usda.gov). The US Census Bureau expanded on this initial census survey and continued to conduct the agricultural census until 1992 when the census administration was passed to USDA's NASS. The 1997 US Census of Agriculture was the first conducted and published by NASS. The USDA was formed in 1862 by then President Lincoln, and in the year following, the Division of Statistics was formed to track agricultural data. The Office of Farm Management was organized in 1905. The Bureau of Agricultural Economics, which is known today as the ERS, was established in 1922. The first Agricultural Outlook Forum was held in 1923, and it brought together the most important authorities in agriculture, a tradition the remains in force today. Other USDA agencies serve an equally important role of providing data and reports including producer [e.g., ARMS and National Animal Health Monitoring System (NAHMS)] and agribusiness surveys (e.g., NASS ethanol industry trends), food recalls (e.g., FSIS meat recalls), mandated price reporting (e.g., AMS lamb mandatory price reporting), special congressional reports (e.g., wholesale pork mandatory price reporting assessment by AMS), market summary reports [e.g., AMS Oklahoma City feeder cattle summary or river terminal crop prices or USDA Foreign Agricultural Service (FAS) export intentions summary], or privately purchased data (e.g., ERS retail meat price series from scanner data).

State-level departments of agriculture contribute or collaborate to ensure the availability of local or regional information. Examples of state and local information include the reporting of local sale barn prices and volume, retail fish market prices, or biofuel coproduct prices. All branches and levels of government make available data and information for public access. These include federal agencies, such as the Environmental Protection Agency, Department of Energy, Department

of the Interior, Forest Service, or National Park Service, or global governmental agencies, such as the World Bank, the Food and Agriculture Organization of the United Nations. They play an important role in making available public data and information for use by all persons, including agricultural economists.

Impacts of Information on Markets and Knowledge

The study of interrelationships between information and the performance of agricultural commodity markets has a long-standing tradition of assessing the effect that information has on market prices. The approach is appropriate in (perfectly) competitive price-mediated markets, where prices are reflective of supply and demand, and only a handful of informed traders are necessary to arbitrage prices to true values and thereby allocate assets optimally (Grossman and Stiglitz 1976). However, as market concentration, product differentiation, and alternative marketing arrangement use increases, other concerns and informational needs come to the forefront.

The effects of information on market prices provide a proxy for effects on market institutions and the marketing system. Grossman and Stiglitz (1976) noted that the assumption of perfect competition is convenient because a handful of informed traders performing arbitrage make prices reflect true values, and price signals thereby allocate assets optimally. Hayek (1945) concluded that the importance of prices depends on the cost of information acquisition. When information is not costly (as in a perfectly competitive market), information will have little real value. This argument was formalized by Fama (1970, 1991) in his development of the efficient market hypothesis.

Fama's efficient market hypothesis provides the theoretical principles underlying the analysis of market response to information, and the theoretical underpinnings of the efficient market hypothesis lie with the belief that investors have rational expectations (Muth 1961). The underlying premise of the efficient market hypothesis asks "To what degree do prices reflect available information?" An efficient market, in which prices reflect market equilibrium for a point in time, will "fully reflect" all available information (Fama 1970). Fama supported his argument by analyzing investment return anomalies. He defined three levels of market efficiency tests: strong-, semi-strong-, and weak-form.

Weak-form tests refer to a data series reflecting only historical trends. Semi-strong-form tests refer to a data series that reflects, in addition to weak-form qualities, all available public information. Strong-form tests refer to a data series that reflects, in addition to weak- and semi-strong-form qualities, access to proprietary information. Subsequent higher levels of market efficiency, if available, would then yield noncompetitive rates of return. The strong-form efficient market model refers to a market where all available information is reflected (Fama 1991). Disproving that a market is strong-form efficient serves as the base premise, i.e., the market is strong form unless proven otherwise.

While extension and research marketing economists generally perceive the efficient market hypothesis to not hold for commodity futures markets (Parcell et al. 1999), the efficient market hypothesis is supported for agricultural commodity markets in general (for example, see Bessler and Brandt 1992; Garcia et al. 1988; Kastens and Schroeder 1995, 1996; Kolb 1992), and research generally indicates that commodity futures markets forecast better than extension economists (e.g., Colino and Irwin 2010; Kastens et al. 1998) and sophisticated econometric models (Park and Irwin 2010; Just and Rausser 1981). Tomek and Robinson (1990) note that futures markets are not perfect but are generally competitive. They also note that exchange-imposed trading price change limits allow traders ample time to assess new "radical" information. Their summary also notes that though the statistical evidence of futures market efficiency is mixed, the model development costs prohibit traders from adequately profiting in the long term from short-term market inefficiency (Rausser and Carter 1983). They conclude their summary of how information affects market prices by noting that the agriculture industry's dynamics and biological lag factor mean that information affects prices differently depending on the time of season and the relative size of inventories.

Grossman and Stiglitz (1976) identified that the value of information is high when no one is informed, and the value of information is low when everyone is informed. They further argued that the marginal individual must be indifferent from being informed versus uniformed because for that individual, the marginal utility of being informed is equal to the acquisition, analytical, and interpretation cost of being informed. Thus, there is a fraction of society for which the marginal utility exceeds the marginal cost from access to public information. Or, the specialization by traders provides for diverse knowledge and diverse perceptions (Working 1958, 1967). Even for competitive markets, Grossman and Stiglitz (1976) concluded, prices and allocations will be imperfect because of arbitrage costs, and for decentralized governments, bureaucratic costs will cause market imperfection. Thus, neither a centralized nor a decentralized organization will be efficient in the face of costs.

The Impact of Market Information on Market Prices

The market price discovery process occurs when participants have divergent opinions for how to interpret information. Divergent interpretations lead to consensus views and market equilibrium. Because opinions are dynamic, the consensus view is dynamic and constantly changing. See Irwin et al. (2002) for an example of how professional commodity market advisers market strategy recommendations change over time. Information affects market institutions by adjusting beliefs and perceptions held before the release of the new information, commonly referred to as updating. Devine and Marion (1979) use experimental economics to show how information corrects for market imperfections. To determine if consumers respond to information, they offered consumers information for stores that offer price differences for homogeneous products. They find product prices adjust in response to demand, or

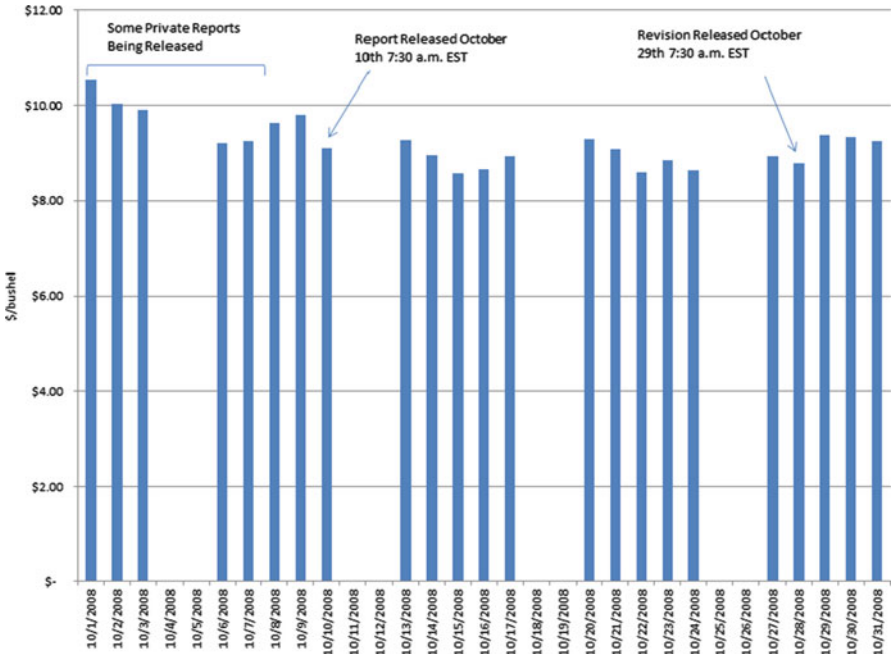

Fig. 14.2 Timeline of USDA crop report release and revision and Chicago Mercantile Exchange nearby soybean futures contract prices for October 2008

lack of demand for the product. Other instances of questioning reported data have led to report revisions. For example, the USDA NASS released a revised report 18 days after the initial report for the October 2008 crop production estimates. The soybean market, and competing crop markets, responded immediately to this update (Fig. 14.2). The point being, USDA information is observed by market participants, and market prices respond. Academics may see this reporting fault as the perfect experiment to prove a hypothesis and find positive long-term value to society, the value of the reporting fault to society is negative in the short run. But, does the new public information consistently affect market price levels, or is this information already factored into the market prior to the report? Before reviewing literature on price response to public releases of information, consider a process example.

This example follows the release of the September 2010 USDA NASS Crop Production Report and WASDE World Supply and Demand Outlook on September 10, 2010. Market participants position themselves (balance risks through buying and selling futures contracts versus cash obligations) relative to the expectations for the report. For up to 2 weeks prior to the report release, a series of private firm pre-report estimates are released (Table 14.2). The prereport estimates offer fodder for speculation as to the relative level of USDA values versus private firm estimates (Table 14.3). On September 10, 2010, the USDA Crop Production Report is released, and market advisers begin to offer comment as to futures market price direction in response to the new information (Table 14.4). Most important is the price level

Table 14.2 September 2010 USDA NASS Crop Production prereport estimate profile released by private firms up to 2 weeks prior to the September 10, 2008, report date

	Corn production	Corn yield	Soy production	Soy yield
ABN Amro	13.325	164.5	3.448	44.2
ADM Inv Services	13.251	164.0	3.433	44.0
AgResource	13.032	160.9	3.360	43.4
AgriSource	13.170	162.6	3.397	43.6
Agrivisor	13.204	163.0	3.373	43.3
Allendale	13.147	162.3	3.370	43.2
Citigroup	13.410	165.9	3.403	43.8
Doane	13.282	164.3	3.400	43.7
Farm Futures	13.203	163.0	3.430	44.1
FC Stone	13.195	162.9	3.390	43.5
Globl Cmd Anlytics	13.165	161.8	3.361	43.2
Informa	13.349	164.8	3.437	44.1
Kropf and Love	13.245	163.0	3.354	43.0
Linn Group	13.016	160.7	3.399	43.6
Midco	13.145	162.7	3.372	43.3
Midwest Mkt Solutn	n/a	163.5	n/a	44.1
N. Am Risk Mgmt	13.164	162.5	3.392	43.5
Newedge	13.156	162.8	3.395	43.7
PFG Best	13.210	164.4	3.390	43.8
Prime Ag	13.365	165.0	3.471	44.5
Pro Farmer	13.290	164.1	3.500	44.9
Prudential Bache	13.200	162.9	3.433	44.0
Risk Mgmt Comm	12.880	160.0	3.360	43.5
RJ O'Brien	13.132	162.1	3.450	44.2
US Commodities	13.244	163.5	3.417	43.8

Table 14.3 Anticipation of USDA crop production report proceeding the September 10, 2008 report date (Newsome 2010)

US crop production (million bushels) 2010–2011					
	USDA	Private estimates			USDA	USDA
	September	Average	High	Low	August	2009–2010
Corn		13,199	13,410	12,880	13,365	13,110
Soybeans		3,406	3,500	3,354	3,433	3,359
US average yield (bushels per acre) 2010–2011						
Corn		163.1	165.9	160.0	165.0	164.7
Soybeans		43.8	44.9	43.0	44.0	44.0

OMAHA (DTN)—Normally, USDA's September Crop Production and World Agricultural Supply and Demand Estimates (WASDE) reports receive little fanfare, suffering from "Middle-Child Syndrome" compared to the much-ballyhooed August (first official field surveys) and October (month of the many surprise revisions) reports. However, this year could be an exception, given the hugely debated production estimates for US corn and soybeans and the ongoing tightening of world coarse grain and wheat fundamentals

The reports will be released at 7:30 a.m. CDT on Friday (September 9, 2010)

On the domestic side, the most logical place to start is expected production as a function of yield. For the time being, it seems acreage has been put on the back burner, to be taken up again in the October report. That being the case, both US corn and soybean production projections are expected to decrease, according to prereport estimates

Darrin Newsome, DTN Senior Analyst, September 8, 2010

Table 14.4 USDA Crop Production report released at 7:30 a.m. EST September 10, 2010 (shaded cells reflect report totals versus estimates and prior USDA values)

US crop production (million bushels) 2010–2011						
	USDA	Private estimates			USDA	USDA
	September	Average	High	Low	August	2009–2010
Corn	13,160	13,199	13,410	12,880	13,365	13,110
Soybeans	3,483	3,406	3,500	3,354	3,433	3,359
US average yield (bushels per acre) 2010–2011						
Corn	162.5	163.1	165.9	160.0	165.0	164.7
Soybeans	44.7	43.8	44.9	43.0	44.0	44.0

This morning's USDA numbers are seen as being supportive for corn, negative for beans, and neutral for wheat. The USDA pegged corn yield slightly below the average trade guess, but still well above recent estimates from many private groups. There was nothing surprising in the numbers for corn demand. World carryout down 3.64 mmt. After a $1.20+ rally since the June 30 report, it is tough to say that this morning's numbers justify higher prices initially

A solid increase in soybean yield kept carryout projections above analyst estimates. World soybean carryout down 1.12 mmt. An increase in bean export demand is friendly; however, the production increase really makes it a nonissue. Beans should trade lower today barring any major rally in corn or wheat

Wheat carryout fell modestly and was slightly below the average trade guess. World wheat carryout up over 3 mmt. This morning's numbers should be seen as mostly neutral for wheat. Look for another wide trading range today

Via Agweb.com comments and Joe Vaclavik and Doug Bergman, Advantage Grain

response to the market information (Fig. 14.3). As one can see from viewing Table 14.4 and Fig. 14.3, it is difficult to extract whether the release of the USDA information had any direct impact on the corn market price for the day of the release beyond the general uptrend in the market price. Might have the USDA Crop Production Report confirmed this price trend? Agricultural economics researchers analyzing the impact of public information capture futures price data, prior market sentiment, and released data, to evaluate the total (not just one day) effect that specific information has on market prices.

Information Affects Prices

The impact of information is often measured relative to the improved accuracy of a forecast. Commodity futures markets represent one type of such forecast model, for which it is relatively easy to evaluate information effects on forecast accuracy and market price bias. Commodity futures market contract prices are important for most agricultural value-chain participants because firms base short-term buy and sell decisions on expected prices and resource allocation decisions using deferred prices. Stein (1981) shows that the optimality of resource allocation depends on the accuracy of the forecast at the time a decision is made. As Armstrong (1985) notes, the value of improving forecast accuracy depends on what decisions are affected and the current level of forecast accuracy. However, Clement (1999) argues that stable

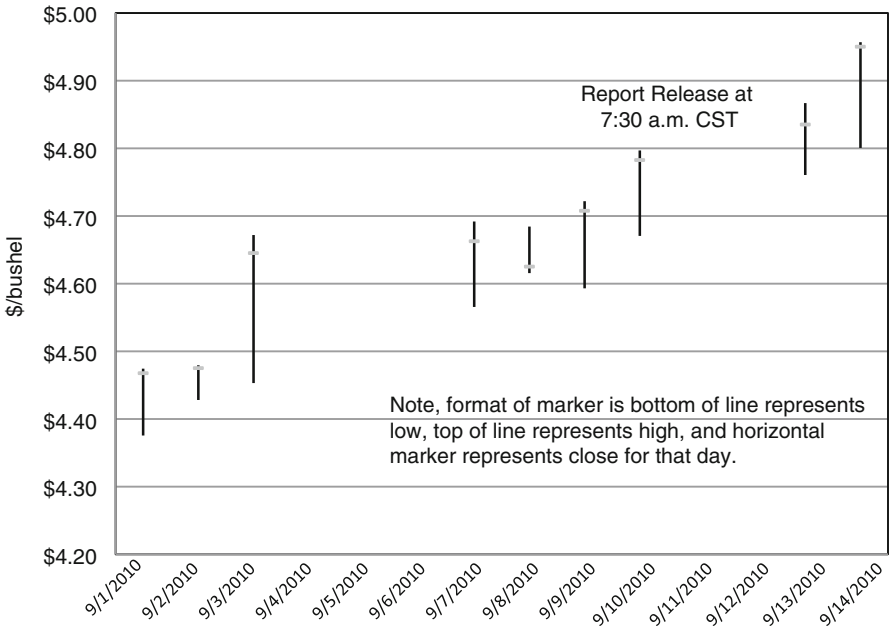

Fig. 14.3 Tracking the Chicago Mercantile Exchange December corn futures September 1–14, 2010

forecasts protect the credibility of forecasters (Isengildina et al. 2004), and Nordhaus (1987) theorizes that public servants may purposefully smooth forecasts so not to report unstable results.

Extensive literature exists on the evaluation of futures price response to information from public crop report releases (e.g., Colling et al. 1996; Patterson and Brorsen 1993; Fortenbery and Sumner 1993; and Kastens and Schroeder 1996), for public livestock reports (e.g., Colling and Irwin 1990; Grunewald et al. 1993; Schroeder et al. 1990) and for additional commodity reports (e.g., Baur and Orazem 1994; Roll 1984; Ward and Kilmer 1989). Readers interested in how information affects market prices are encouraged to review proceedings papers from the NCCC-134 Applied Commodity Price Analysis, Forecasting, and Market Risk Management annual research conference. The most typical conceptual model is to test market price efficiency by analyzing futures market price changes. As we have previously noted, the general consensus from the literature is that markets are efficient. Therefore, commodity futures market price responses to information, and not just public information, are generally limited.

Accuracy in agricultural forecasts is similarly of high importance. Economists have a long history of assessing USDA forecasts in terms of information content (Carter and Galopin 1993), accuracy (Kastens et al. 1998), and market impact (Sumner and Mueller 1989), dating back more than one half century to Baker and Paarlberg (1952). Gunnelson et al. (1972) found crop forecasts to have improved from 1929 to 1970, but they also concluded that the USDA tends to underestimate

crop size and year-over-year production changes, and it tends to under compensate for errors in prior forecasts when making revisions. Good and Irwin (2003) found the forecast accuracy between 1970 and 2003 is consistent for both corn and soybeans. They also found that USDA corn production forecasts are more accurate than private firm forecasts for the time period and that private firm soybean production forecasts are more accurate than USDA soybean production forecasts early in the growing season. A concise summary of this work would be that USDA forecasts provide incremental information that influences agricultural markets. It should be noted that multiple studies suggest futures market-based forecasts are more accurate than those provided by the USDA. However, it is important to further note that futures markets inherently reflect information provided by the USDA as the futures markets internalize all available information (private and public) as the "longs" and "shorts" engage in futures market transactions (Manfredo and Sanders 2004). Moreover, agricultural sectors operating without futures market forecasts available to them may benefit from well-devised forecasts from the USDA (Manfredo and Sanders 2004). Accordingly, the role of USDA information in agricultural markets, even for commodities with sound futures markets, should not be quickly dismissed.

A markedly smaller body of research exists on the influences of private information. Here, a number of studies on the impacts of public announcements by private firms are reviewed. Research by Lusk and Schroeder (2002), Parcell and Kalaitzandonakes (2004), and Robenstein and Thurman (1996) offer examples of how firm-level information sharing, in the form of public releases and media announcements, affect market prices. Lusk and Schroeder (2002) found that meat recall announcements had little impact on livestock futures prices. Parcell and Kalaitzandonakes (2004) found no evidence that firm-level bans against bioengineered crops significantly influenced domestic soybean futures prices and the Tokyo Grain Exchange conventional and non-GMO futures prices. For a portfolio of livestock futures contracts, Robenstein and Thurman (1996) found no statistically significant price adjustment to media announcements associating concerns of heart health with red meat consumption. These three studies are examples of the broader research interest in how information released to the public by the private sector affects price levels. Next, consider the impact of public information on market price levels.

Information Affects Knowledge

The type of information provided by the USDA and its market impact has certainly changed over time. With the transition from commodity to value added or differentiated products has come growth in the use of alternative marketing arrangements and erosion of traditional price-coordinated spot markets for some agricultural products. In relation to efficiency measures, these events have generated concern that reported spot prices may no longer be reflective of actual trade and raise questions about efficiency measures.

Such occurrences have been particularly evident in the livestock industry and have resulted in changes in public information provision to inform and monitor

these markets. Availability and analysis of voluntarily reported market prices and receipts in thinning markets for cattle and hogs provide insights regarding current and future reliability of market prices as representative of industry trade (Tomek 1980; Franken and Parcell 2011). Koontz and Ward (2011) provide a detailed summary of research outputs related to voluntary and mandatory price reporting. Livestock voluntary price reporting preceded the 1999 Mandatory Price Reporting Act (MPR). Voluntary price reporting is based on the premise that sellers report in good faith, sales volume and price for separate transactions to the AMS, USDA. Transactions may be confirmed with buyers and all transactions for a reporting period are aggregated to keep reported information confidential. By definition, voluntary price reporting allows any seller to opt out of reporting all together or opt out of reporting certain transactions. Livestock mandatory price reporting requires that all transactions be reported. Primary support for mandatory price reporting is that no transaction goes unreported and the public views price and sales information reported from mandatory collection of data to be unbiased and representative.

Enactment of MPR for large markets in these sectors may have enhanced market participants' reliance on and trust in some spot price series. Pendell and Schroeder (2006) find improved price responsiveness to supply and demand shocks among spatially dispersed cattle markets following MPR. Franken et al. (2010) find evidence that pricing in declining volume hog markets stems from price discovery in the mandatorily reported Iowa–Southern Minnesota regional market. Additionally, a study by Lee et al. (2010) indicates that MPR of alternative marketing arrangement prices for cattle and hogs may have shifted market participants' focus to these reports as sources of reliable market information. Analyses of USDA ARMS data indicate that production contracting arrangements in the hog industry increase total factor productivity (Key and McBride 2003), and regulations limiting the use of such contracts would impose substantial welfare losses on risk-averse producers (Zheng et al. 2008), which speaks to concerns about allocative and distributive efficiencies.

Regardless, if livestock transaction data is reported voluntarily or required under congressional mandate, many factors have to be taken into account when creating reporting and interpreting information from the data. Only relevant and viable data should be used to create informational reports. For example, a load for pork or beef trade refers to 40,000 pounds. This is a typical transaction quantity unit. Small buyers or quick sales are negotiated for quantities less than a load, and these transactions may have the bias of representing product unrepresentative of typical trade. Thus, it is important to filter such transactions out of the data. Or, if the data contains many international transactions where the cost of business is different and the product is priced differently, then these transactions must be filtered to allow for information that is reflective of transactions for the relevant market, i.e., North American trade. Consider that price data is reported as a plant price. Meat production across the United States, but a national report aggregates across location. Suppose a morning report has 60% of transactions based on west coast processors and the afternoon report has 60% of transactions based on east coast processors. As you can envision, price change may be representative of more than supply–demand factors. The above discussion is used to illustrate the complexity of converting data into useful information and the challenges of interpreting data to draw conclusions for strategic planning.

Another "hot topic" example is the impact of recall information provided by the USDA's FSIS. For instance, Marsh et al. (2004) found meat demand to be adversely influenced by FSIS recall announcements. This example illustrates the impact that USDA information can have on factors besides expected production quantities, annual prices, and others of traditional interest. In particular, the USDA is increasingly providing information that may impact consumer perceptions of agricultural product quality and may, hence, influence agricultural markets (Tonsor et al. 2010).

Agricultural economists are broad creators of public information, which helps to facilitate and validate new theories, oftentimes using public data but also relying on private data at times. Fredrick Waugh (1928), a US government employee, for example, surveyed farmers' market vendors to examine the price variability across different ranges of a set of quality attributes. Waugh's research on the price–characteristic relationship for tomatoes is one of the earliest research pieces for what is known today as the hedonic pricing model (Ladd and Martin 1976; Ladd and Suvannunt 1976; Rosen 1974). Zvi Griliches (1957) utilized public USDA information to empirically prove his theory of technological innovation in agriculture. Nineteenth century agricultural policy researchers used public data to provide credibility to the analysis of policy implications (e.g., Tweeten 1980) and to examine the role of market functions (e.g., Breimyer 1957). These studies represent a small sample of past research that uses public data to develop public information, empirically verify new theories, or motivate policy changes. All studies ultimately lead to implications for explaining or predicting institutional market changes.

Anderson et al. (1998) examine the effects of limiting information on cattle prices by conducting experiments using the Fed Cattle Market Simulator. They find that reducing information creates inefficiencies and increases price variability. They find that a loss of market information leads to diminished technical/productive efficiency within the beef value chain and that allocative efficiency may erode over time. Their results are particularly interesting because their data are derived from in-class observations of student actions. This is a quintessential example of how information impacts knowledge and learning.

Future of Public Information Provisions

Public information is broad in scope, ranging from corporate quarterly earnings reports (e.g., John Deere earnings outlook), SEC filings (e.g., Berkshire Hathaway stock sale or purchase), news of a firm on industry innovation (e.g., iPhone 4), tragedy (e.g., Deepwater Horizon explosion), surveys from the private sector [e.g., Pro farmer/John Deere crop tour or monthly National Oilseed Processors Association (NOPA) oilseed crush report], private sector outlook reports (e.g., Informa Economics Crop Production forecast), and reports from government agencies (e.g., NASS monthly hogs and pigs report, monthly WASDE global supply and demand crop outlook, AMS weekly mandatory price reporting live cattle price and volume summary, NASS cattle on feed reports, or FAS export intentions). Each public information source listed provides society with free access to information,

but interpretation and evaluation is not costless. And, is the right information being developed?

Transactions occur at each level of the agricultural marketing system, where buyers and sellers set prices for a given level of product quantity for a set quality. The twenty-first century industrialization of agriculture adds substantially to the number of transactions as commodities flow from producers to end-users and consumers as multitudes of food, fiber, fuel, health, and industrial products (Schrimper 2001). As the number of levels in the marketing system increases and as the number of differentiated products increases, the cost of collecting sufficient data to accommodate all value chains and marketing system levels is beyond budgetary justification. The historical argument for sustaining historical data availability (AAEA Data Task Force 1999) seems almost mute relative to the question of which data series to maintain to meet future needs and effectively deliver public information to meet societal demands.

The value of public information is well researched and debated (e.g., Hayami and Peterson 1972; Smith and Scherr 1973; Farrell 2006; Gardner 1997; Just 1983; Schneeberger 1982). And, this line of literature has spawned an entirely new research agenda for those interested in how agricultural marketing system participants value private versus public data and their preferred sources of data (e.g., Fausti et al. 2007; Just et al. 2002; Salin et al. 1998; Schroeder et al. 1998). Hopefully, this chapter has added to the debate and now seeks to leave the reader with some final thoughts for how to improve public information availability in the future.

Public Data and Information

> [Ninety-five percent] of the information our firm provides to clientele originates from public (USDA) data sources and the other 5 [percent] of information is from proprietary data. While the 5 [percent] proprietary data differentiates our firm from the competition, it is the business' presentation of the public data that makes our firm.
>
> Paraphrased from Anonymous Consultant, 2008

This statement seems to reflect the general consensus among private and non-governmental public information providers. Access to data seems to be the critical factor, but we also note there are potential pitfalls associated with the mandated information collection. If so, an important consideration moving forward is to ensure the appropriate data are being collected for both public and private entities to generate adequate information to maximize the distribution of welfare benefits relative to the costs associated with data collection and processing.

Even as the domestic agriculture industry changes due to consolidation, vertical integration, vertical coordination, consumer preference, and globalization, access to public data is critical for developing baseline analyses and confirming observed trends or structural shifts. For example, researchers with the multi-institutional Food and Agricultural Policy Research Institute rely heavily on access to public data to develop long-term forecast models and accurately assess policy implications. The five data issues discussed below will increasingly shape the quantity and quality of public information.

Confidentiality

USDA confidential data restrictions can lead to biased information. USDA data users have become far too acquainted with the notation (D), which indicates USDA cannot publish data due to confidentiality restrictions. For fast-changing industries, e.g., pork and poultry, the exchange from a reportable value to (D) may happen at any time. Unavailability of such data can bias information derived from the data. Although understanding the need for confidentiality, it seems logical to assume industry insiders are keenly aware of a competitor's production and business footprint in the agriculture industry. If that assumption is true, then society is worse off by not having access to the confidential data. Moreover, the specific details required to protect confidentiality likely vary across agriculture industries. Accordingly, additional information is needed to assess the benefit and harm to society created by modifying current USDA confidentiality regulations. Such information could be made available only to academic and governmental research professionals who sign confidentiality agreements. Such release would allow these individuals to make policy recommendations based on the data but not disclose individual firm data.

Thin Markets

Thin markets lower the power of hypothesis testing. Anderson et al. (2007) express concern as to whether cash market transactions accurately reflect the market for sectors heavily reliant on alternative marketing agreement use. Congressional creation of the Livestock Mandatory Price Reporting Act of 1999 has alleviated some of this concern for the meat sector, but many agricultural sectors still lack publicly available transaction data. Other private firms, such as Urner Barry, have become more important for facilitating price discovery within thin markets. However, interaction with wholesale pork primal buyers and sellers found consensus that USDA AMS voluntary pork primal price reporting is the established contract base price even though some AMS pork primal price quotes represent less than 5% of trade for the week and some reported pork primal prices go unchanged for weeks at a time. Industry participants seem to trust and prefer publicly released price data, but they use private data sources as a means of checks and balances.

Consistency

Consistency of data as product form changes may bias information. For some agriculture commodities and products, product form changes substantially over time. Thus, a historical price series may not be reflective for developing current information or laying out further scenarios. Moulton (2001) lays out the hedonic model framework used by the Division of Labor's Bureau of Labor Statistics for computing deflator indexes. These indexes deflated nearly 20% of US GDP final expenditures for that time period, and this percentage has increased. Why has not the

agricultural economics research community adopted similar practices in plotting historical prices or price indices? Similarly, commodity product form changes over time to reflect market supply–demand forces. For example, a review of the American Soybean Association's annual soybean quality reports finds a strong upward trend in percent oil content per bushel from 2003 to 2009. The average soybean bushel today is not the same as the average soybean bushel 6 years ago. Thus, soybean prices in 2003 and 2009 reflect the same commodity, but the commodity's inherent characteristic levels have changed over time. This suggests the need for more agricultural economics research that assesses the effects and validity of adjusting prices for commodity quality levels over time.

Relevance

Relevance of data allows for timeliness of information. Agricultural economists, as social scientists, incorporate perceptions, demographic factors, risk preferences, and general attitudes into their research. The speed by which agricultural economists conduct research is paramount for addressing policy issues, studying market participant behaviors, assessing technical efficiency innovations, and ensuring allocative efficiency. There are almost 6,000 US farmers markets, but there is no mass collection of vendor or transaction data to develop rigorous economic evaluation on a routine basis. For example, Hahn et al. (2009) find that though proprietary retail meat price scanner data provides more price information than the US Department of Labor's Bureau of Labor Statistics retail meat price series, access and timeliness issues with the proprietary scanner data cause the information to be less useful. Alternatively, Roberts and Schimmelpfennig (2006) find considerable value from real-time information, provided via a web-based information platform, related to the potential for soybean rust outbreaks. This suggests that USDA facilitate and support the development of electronic means to gather and distribute information. Some agencies may develop survey instruments to track perceptions and attitudes over time. Perhaps it is time that the Agricultural and Applied Economics Association membership, in conjunction with USDA personnel, again convene a Data Task Force to assess the current and future relevance of USDA data.

Globalization

The *Globalization* of agricultural market institutions increases the impact that global supply–demand factors have on the performance of domestic markets and the operations of market institutions. Two well-documented examples give credence to the need for global-based information enhancement. In 2009, nearly 20% of US pork production was exported, up from 1% in 1984. The marketing year 2009 soybean exports to domestic soybean production ratio was 44%, which compares to a level of 32% in 1984, but the price level today is 161% of the price level in 1984. Global trade of fruit, nuts, and vegetables is increasingly more dramatic. Domestic market

price response is not only tied to domestic factors but also global economic factors. This suggests that an increase in the quality and reliability of public global price and supply–demand information collection and reporting, will have a positive net welfare gain to society.

Information and a New Society

This chapter concludes with thoughts on six alternative approaches for sustaining the public–private data access and information availability in the future. These approaches span the spectrum from being "fully public" to "fully private" in nature.

Public Data: Public Information

Certain USDA reports (e.g., crop production reports, WASDE forecasts, etc.) will likely maintain political support, though constrained, which will ensure their persistence into the future. There may be increased scrutiny of these forecasts' cost–benefit ratios, as most research finds market prices typically do not react to such reports. It appears that the value, through confirmation, to ensuring allocative efficiency far outweighs the cost to society for maintaining these models and publishing information. Likely characteristics of these public data, public information approaches include commodities produced over wide geographic areas (i.e., corn is produced in most US states) and operational sizes (i.e., data relevant to the cow–calf sector may persist as operations vary widely in size).

Private Data: Public Information

Like all entities, the USDA has limited resources and, at times, is best served by purchasing data from others rather than collecting them itself. One example is the USDA purchasing retail meat scanner data from private firms. As public pressure to reduce the relative resources available to the USDA mounts, these private data, public information approaches may increase in prevalence. Of course, this approach is susceptible to short-term budget shortfalls by USDA as witnessed by the current lag in retail meat scanner data purchases. Society seems more willing to accept private data with public involvement in assessing data credibility and reliability. The caveat to this information model, which is a concern as Hahn et al. (2009) note, is whether timely data delivery allows for sufficient relevance.

Public Data: Public–Private Information

An alternative approach is for public data to be compiled by non-USDA entities in a manner that adds value to the data beyond that typically provided by the USDA itself.

For instance, the Livestock Marketing Information Center (LMIC) is a cooperative effort among land grant university extension specialists, USDA economists, industry collaborators, and center staff. The LMIC provides a "one stop shop" for a host of economic education, data, and information resources that largely originate from USDA sources (i.e., public data). This resulting data and information is public–private in nature as portions are available for free use by the public, and portions are available only to subscribing parties. It is easy to envision growth in the predominance of this approach in the future for other agricultural sectors. An increase in public funding is necessary for growing this type of data–information model.

Public Data: Private Information

Several agricultural consulting firms have a competitive advantage in capturing public data upon release and converting the data into information for clientele strategic planning. Outlook firms, profiled in Table 14.2, depend on historical data for developing private crop forecasts. Other firms, e.g., Doane, Informa Economics, and Soyatech, rely on some public data for developing multiclient studies. Technology has further allowed for information innovations. InnovoSoy recently released *Global Food Demand in 3D,* which combines public data with proprietary software for putting decision makers face to face with multidimensional information delivery. This information delivery mode is unique by incorporating the psychology of new-generation learning, much like the 3D games of today, to allow for decision making. This model of data–information will likely expand in the future, and the USDA may need to consider subscribing to such services to help facilitate agency and interagency information development.

Private Data: Private Information

Given budgetary uncertainty with public data and information approaches and the increasingly complex and multifaceted relationships in most modern agriculture industries, the growth in firms collecting, generating, and dispersing data and information privately is hardly surprising. One example is CattleFax, a member-owned information organization that conducts research, gathers data, and disperses information to subscribing members. CattleFax has been carrying on this function effectively for more than 25 years, and industry participants pay to access the information. Another example is AgriStats, which serves the pork and poultry production and processing sectors with cost, profit, and productivity data. The concentration of the pork and poultry industries suggests that the fee work AgriStats provides to clientele is consistent with society expectations for clientele to pay when only a few benefit. Consistent with the role of private firms in the preceding approaches, additional growth in private data/information relationships can be anticipated in the future. However, caution suggests that government not look heavily to these private firms for data to analyze public concerns. This confidentiality issue is much different from the confidential data issue we outline in the prior subsection.

Case Studies

Case studies may provide a viable alternative for developing information that targets underserved areas of the agricultural marketing system. Data access drives a considerable public information portfolio, but case study information better fits situations of limited data, directed objective, and firm/situation centered. Hayenga (2001) recognizes the challenges of commodity research associated with differentiation and fewer data observations. He suggests case studies as a viable alternative when too few data points exist for practical analysis. He also advocates for researchers to enhance their dependence on event analysis to offset information shelf-life degradation due to markets and industries in transition. Case study development requires better individual knowledge of particular industries and situations.

Concluding Comments

Access to information and the role information plays in increasing efficiency with which market institutions function is important for how players in the marketing system convert information into profits and for how consumers benefit from lower prices and better access to goods. Information relates to sending quantity and quality signals from producer to consumer and in the form of sending payment and preference signals from consumers to producers. How information costs are allocated between the public and private sectors is a dynamic argument. The agricultural sector has, and will continue to, undergo structural change. The agricultural structural change causes continued public debate as to the cost–benefit of the need for information (benefits efficiency of market institutions) versus the want for information (oversight and monitoring of an industry sector).

Free access by society is not the same as costless to society. Data collection, data analyses, and public information development and distribution are generally paid for by taxpayers. Efficiently allocating resources in a dynamic market setting to support productive efficiency and ensure allocative efficiency are likely long-term sources of debate.

As agricultural industry diversification occurs, public information providers must rethink their efforts. Researcher roles seem to already be changing by redefining the future of collaborative efforts [see Boland and Akridge (2004) for a discussion of how departments must play niche roles in agribusiness], changing curriculum objectives [see Boland and Daniel (1999) for a discussion of what employers seek in new employees], and facilitating new research relationships [see Schroeder (2004) for a discussion of how academics might leverage consulting opportunities as part of their academic responsibility].

Agricultural sector cost–benefit research on public or private information has not been conducted to date. Hayenga (1979) issues the challenge for agricultural researchers to examine the necessary sample size for relevance in decision making in the agricultural industry. No researcher has yet to respond to his challenge, yet each year

public debate of thin markets and structural change continues. The credibility of the decision-making process is often data drive, and often the decision-making process is criticized for a lack of data. Where is the point in which insufficient data exists to reach objective decisions? Henderson et al. (1983) provide the most recent overview of the challenge with maintaining public information and the effect of structural change on the quality and relevance of public information. Their thoughts pertained to public price reporting. More recently, Koontz and Ward (2011) reviewed the public price reporting literature for voluntary and mandatory livestock price reporting. Both manuscripts offer thought-provoking insights as to the industry value, societal impacts and unintended consequences of public price reporting. However, the breadth of public information is far greater than public price reporting and is much broader than prices. More research is necessary to expand on the value of information.

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