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[1] Joao Martines-Filho is Manager of the AgMAS and farm.doc Projects in the Department of Agricultural and Consumer Economics at the University of Illinois at Urbana-Champaign. Darrel L. Good and Scott H. Irwin are Professors in the Department of Agricultural and Consumer Economics at the University of Illinois at Urbana-Champaign. The authors gratefully acknowledge the assistance of Jim Epstein at Illinois Ag Market News in obtaining wheat prices. Research assistance of Wei Shi and Rick Webber are appreciated. Valuable comments were received from members of the AgMAS Project Review Panel.

DISCLAIMER

The advisory service marketing recommendations used in this research represent the best efforts of the AgMAS Project staff to accurately and fairly interpret the information made available by each advisory service. In cases where a recommendation is vague or unclear, some judgment is exercised as to whether or not to include that particular recommendation or how to implement the recommendation. Given that some recommendations are subject to interpretation, the possibility is acknowledged that the AgMAS track record of recommendations for a given program may differ from that stated by the advisory service, or from that recorded by another subscriber. In addition, the net advisory prices presented in this report may differ substantially from those computed by an advisory service or another subscriber due to differences in simulation assumptions, particularly with respect to the geographic location of production, cash and forward contract prices, expected and actual yields, carrying charges and government programs.

1999 Pricing Performance of Market Advisory Services for Wheat

Executive Summary

The primary purpose of this research report is to present an evaluation of advisory service pricing performance for the 1999 wheat crop year. In order to evaluate the returns to the marketing advice produced by the services, the **Ag**ricultural **M**arket **A**dvisory **S**ervices (AgMAS) Project purchases a subscription to each of the services included in the study. Staff members of the AgMAS Project read the information provided by each advisory service on a daily basis. A directory of the advisory services included in the study can be found at the AgMAS Project website (http://www.farmdoc.uiuc.edu/agmas/).

Certain explicit assumptions are made to produce a consistent and comparable set of results across the different advisory programs. These assumptions are intended to accurately depict "real-world" marketing conditions. Several key assumptions are: i) with some exceptions, the marketing window for the 1999 crop year is June 1, 1998 through May 31, 2000; ii) cash prices and yields refer to a soft red winter wheat producer in southwest Illinois; iii) all storage is assumed to occur off-farm at commercial sites; and iv) loan deficiency payment (LDP) and marketing loan gain (MLG) recommendations made by advisory programs are followed wherever feasible and applicable.

The average net advisory price across all 23 wheat programs in 1999 is $2.64 per bushel, $0.04 below the market benchmark price. The range of net advisory prices is substantial, with a minimum of $2.18 per bushel and a maximum of $3.38 per bushel. The average revenue achieved by following an advisory service is $163 per acre, $3.00 less than the market benchmark revenue. The spread in advisory revenue also is noteworthy, with the difference between the bottom- and top-performing advisory programs reaching almost $75 per acre.

The average net advisory price achieved by following 17 wheat advisory programs over the 1995-1999 crop years is $3.06 per bushel, $0.21 below the five-year average market benchmark price. The five-year average revenue is $154 per acre, $13 less than the five-year average market benchmark revenue. The advisory prices range from a low of $2.79 to a high of $3.31 per bushel and revenue from a low of $140 per acre to a high of $171 per acre.

An advisory program's net price or revenue received is an important indicator of performance. The tradeoff between pricing performance and risk also is likely to be of interest to producers. Contrary to the prediction of economic theory, a slight negative tradeoff between average net advisory price and risk is found. That is, producing higher net prices generally required that an advisory program over 1995-1999 take on less risk, and *vice versa*. Since the estimated correlation between price and risk is only –0.18, this counter-intuitive result is likely due to random variation and is not expected to persist over a longer sample. Only one advisory program in wheat outperforms the market benchmark when both price and risk are considered, while many have a lower price and higher risk. No program outperforms the benchmark based on average revenue and risk. It is important to emphasize that the pricing and risk performance results are based on five observations. This is a relatively small sample for estimating the true risks of market advisory programs. Hence, the return-risk results should be viewed as exploratory rather than definitive.

Introduction to the AgMAS Project

Wheat producers operate in a highly uncertain economic environment. The roller coaster movement of wheat prices since 1995 is ample evidence of the uncertainty and risk facing wheat producers. In this rapidly changing environment, marketing and risk management play an important role in the overall management of farm businesses. The use of private-sector advisory services has increased over time as producer demand for marketing and risk management advice has increased. Surveys document the high value that many producers place on market advisory services.[1]

Despite their current popularity and expected importance in the future, surprisingly little is known about the marketing and risk management strategies recommended by these services and their associated performance. There is a clear need to develop an ongoing "track record" of the performance of these services. Information on the performance of advisory services will assist producers in identifying successful alternatives for marketing and price risk management.

The **Ag**ricultural **M**arket **A**dvisory **S**ervices (AgMAS) Project, initiated in the fall of 1994, addresses the need for information on advisory services. Dr. Darrel L. Good and Dr. Scott H. Irwin of the University of Illinois at Urbana-Champaign jointly direct the project. Correspondence with the AgMAS Project should be directed to: Dr. Joao Martines-Filho, AgMAS Project Manager, 434a Mumford Hall, 1301 West Gregory Drive, University of Illinois at Urbana-Champaign, Urbana, IL 61801; voice: (217)333-2792; fax: (217)333-5538; e-mail: agmas@uiuc.edu. The AgMAS project also has a website with the following address: http://www.farmdoc.uiuc.edu/agmas.

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[1] Patrick, G.F. and S. Ullerich. "Information Sources and Risk Attitudes of Large Scale Farmers, Farm Managers, and Agricultural Bankers." *Agribusiness.* 12(1996):461-471

Patrick, G.F., W.N. Musser, and D.T. Eckman. "Forward Marketing Practices and Attitudes of Large-Scale Midwestern Grain Farmers." *Review of Agricultural Economics.* 20(1998):38-53

Schroeder, T.C., J.L. Parcell, T.L. Kastens, and K.C. Dhuyvetter. "Perceptions of Marketing Strategies; Farmers vs. Extension Economists." *Journal of Agricultural and Resource Economics.* 23(1998):279-293

Norvell, J. M. and D. H. Lattz. "Value-Added Crops, GPS Technology and Consultant Survey: Summary of a 1998 Survey to Illinois Farmers." Working Paper, College of Agricultural, Consumer, and Environmental Sciences, University of Illinois, July 1999.

Purpose of Report

      The primary purpose of this research report is to present an evaluation of advisory service pricing performance for the 1999 wheat crop. Specifically, the net price received by a subscriber to an advisory service is calculated for the wheat crop harvested in 1999. With some exceptions, the marketing window for the 1999 crop year is from June 1, 1998 through May 31, 2000. Another purpose of this report is to compare the pricing performance results for the 1999 wheat crop with previously released results for the 1995, 1996, 1997 and 1998 crop years.

      A relevant question is whether useful conclusions about pricing performance can be made based on data from five crop years. From a purely statistical standpoint, samples with five observations typically are considered small. This perspective would suggest it is inappropriate to draw too many conclusions from the available data on pricing performance. From a practical, decision-making standpoint, samples with five observations often are considered adequate to reach conclusions. A useful comparison in this context can be made to university yield trials for crop varieties. As an example, the University of Illinois Variety Testing program (http://www.cropsci.uiuc.edu/vt/) presents only two-year or three-year averages of the yields for crop varieties in the trials, and in many cases these cannot be computed because of turnover in the varieties tested from year-to-year. Despite the limitations, this type of yield trial data is widely used by farmers in making varietal selections. On balance, then, it seems reasonable to argue that the five years of data currently available on pricing performance may be used to make some modest conclusions. Caution obviously is in order given the possibility of results being due to random chance in a relatively small sample.

      This report has been reviewed by the AgMAS Review Panel, which provides independent, peer-review of AgMAS Project research. The members of this panel are: Frank Beurskens, Director of Product Strategy for e-markets; Jeffrey A. Brunoehler, Market President of the AMCORE Bank in Mendota, Illinois; Renny Ehler, producer in Champaign County, Illinois; Chris Hurt, Professor in the Department of Agricultural Economics at Purdue University; Terry Kastens, Associate Professor in the Department of Agricultural Economics at Kansas State University and producer in Rawlins County, Kansas; and Robert Wisner, University Professor in the Department of Economics at Iowa State University.

      The next section of the report describes the procedures used to collect the data on market advisory service recommendations. The following section describes the methods and assumptions used to calculate the returns to marketing advice. The third section of the report presents 1999 pricing results. The fourth section presents a summary of the combined results for the 1995, 1996, 1997, 1998 and 1999 crop years. The final section presents results on the tradeoff between pricing performance and risk of market advisory services.

Data Collection

      The market advisory services included in this evaluation do not comprise the full population of market advisory services available to wheat producers. The included services also

are not a random sample of the population of market advisory services. Neither approach is feasible because no public agency or trade group assembles a list of advisory services that could be considered the "population." Furthermore, there is not a generally agreed upon definition of an agricultural market advisory service. To assemble the sample of services for the AgMAS Project, criteria were developed to define an agricultural market advisory service and a list of services was assembled.

The first criterion used to identify services is that a service has to provide marketing advice to producers. Some of the services tracked by the AgMAS Project do provide speculative trading advice, but that advice must be clearly differentiated from marketing advice to producers for the service to be included. The terms "speculative" trading of futures and options versus the use of futures and options for "hedging" purposes are used for identification purposes only. A discussion of what types of futures and options trading activities constitute hedging, as opposed to speculating, is not considered.

The second criterion is that specific advice must be given for making cash sales of the commodity, in addition to any futures or options hedging activities. In fact, some marketing programs evaluated by the AgMAS Project do not make any futures and options recommendations. However, marketing programs that make futures and options hedging recommendations, but fail to clearly state when cash sales should be made, or the amount to be sold, are not considered.

A third, and fairly obvious, criterion is that the advice must be transmitted to subscribers before the action is to be taken. This is largely the reason that only electronically delivered services are evaluated.

The original sample of market advisory services that met the three criteria was drawn from the list of "Premium Services" available from the two major agricultural satellite networks, Data Transmission Network (DTN) and FarmDayta, in the summer of 1994.[2,3] While the list of advisory services available from these networks was by no means exhaustive, it did have the considerable merit of meeting a market test. Presumably, the services offered by the networks were those most in demand by farm subscribers to the networks. In addition, the list of available services was crosschecked with other farm publications to confirm that widely followed advisory firms were included in the sample. It seems reasonable to argue that the resulting sample of services was (and remains) generally representative of the majority of advisory services available to producers.

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[2] When the AgMAS study began in 1994, DTN and FarmDayta were separate companies. The two companies merged in 1996.

[3] This requirement has been relaxed in recent years to reflect the growing importance of alternative means of electronic delivery of market advisory services. Beginning in 1997, a service that meets the original two criteria and is available on a "real-time" basis electronically may be included in the sample.

The total number of advisory programs evaluated for at least one of the five crop years is 31, of which 17 are followed for all five years. The term "advisory program" is used because several advisory services have more than one distinct marketing program. AgLine by Doane, Brock, Pro Farmer, and Stewart-Peterson Advisory Services each have two distinct marketing programs, Risk Management Group has three distinct marketing programs and AgriVisor has four distinct marketing programs.

For a variety of reasons, deletions and additions to the sample of advisory programs has occurred over time. Zwicker Cycle Letter is included in the study for the 1995 - 1998 crop years, however, it merged with AgriVisor for the 1999 crop year. Progressive Ag is included in the study for the 1996 - 1998 crop years, but was not included in 1995 because it had not yet come to the Project's attention and is excluded in 1999 because its recommendations were specifically for spring wheat. Utterback Marketing Services is included in 1997 - 1999 crop years, but was not included in 1995 or 1996 because its marketing programs were not deemed to be clear enough to be followed by the AgMAS Project. Grain Field Report, Harris Weather/Elliott Advisory, North American Ag, and Prosperous Farmer were in the study during 1995 and/or 1996, but are not included in 1997 - 1999 because they no longer provide specific recommendations regarding cash sales. Agri-Edge was included in 1995 and 1996 crop years, but the program was discontinued during the 1997 crop year. AgLine by Doane hedge program is first tracked for the 1998 crop year. Cash Grain and Risk Management Group programs are first tracked for the 1999 crop year.

Two forms of sample selection bias may be potential problems when assembling an advisory program database. The first form is survival bias, which occurs if only advisory programs that remain in business at the *end* of a given period are included in the sample. With survival bias, performance measures are biased upwards since "survivors" typically have higher performance than "non-survivors."[4] This form of bias should not be present in the AgMAS database of advisory programs because all programs ever tracked are included in the sample. The second and subtler form of bias is hindsight bias, which occurs if data from prior periods are "back-filled" at the point in time when an advisory program is added to the database. Statistically, this has the same effect as survivorship bias because data from surviving advisory programs are back-filled. This form of bias should not be present in the AgMAS database because recommendations are not back-filled when an advisory program is added. Instead, recommendations are collected only for the marketing period *after* a decision has been made to add an advisory program to the database.

The actual daily process of collecting recommendations for the sample of advisory programs begins with the purchase of subscriptions to each of the programs. Staff members of the AgMAS Project read the information provided by each advisory program on a daily basis. The information is received electronically, via DTN, websites or e-mail. For the programs that provide two daily updates, typically in the morning and at noon, information is read in the morning and afternoon. In this way, the actions of a producer-subscriber are simulated in "real-time."

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[4] Brown, S.J., W. Goetzmann, R.G. Ibbotson, and S.A. Ross. "Survivorship Bias in Performance Studies." *Review of Financial Studies.* 5(1992):553-580.

The recommendations of each advisory program are recorded separately. As noted above, some advisory services offer two or more distinct marketing programs. This typically takes the form of one set of advice for marketers who are willing to use futures and options (although futures and options are not always used), and a separate set of advice for producers who only wish to make cash sales.[5] In this situation, both strategies are recorded and treated as distinct programs to be evaluated.[6]

When a recommendation is made regarding the marketing of wheat, the recommendation is recorded. In recording recommendations, specific attention is paid to which year's crop is being sold, (e.g., 1999 crop), the amount of the commodity to be sold, which futures or options contract is to be used (where applicable), and any price targets that are mentioned. When price targets are given and not immediately filled, such as a stop order in the futures market, the recommendation is noted until the order is either filled or canceled.

Several procedures are used to check the recorded recommendations for accuracy and completeness. Whenever possible, recorded recommendations are cross-checked against later status reports provided by the relevant advisory service. Also, at the completion of the marketing period, it is confirmed that cash sales total 100 percent, all futures positions are offset, and all options positions are offset or expire.

The final set of recommendations attributed to each advisory program represents the best efforts of the AgMAS Project staff to accurately and fairly interpret the information made available by each advisory program. In cases where a recommendation is considered vague or unclear, some judgment is exercised as to whether or not to include that particular recommendation or how to implement the recommendation. Given that some recommendations are subject to interpretation, the possibility is acknowledged that the AgMAS track record of recommendations for a given program may differ from that stated by the advisory program, or from that recorded by another subscriber.

Calculating the Returns to Marketing Advice

At the end of the marketing period, all of the (filled) recommendations are aligned in chronological order. The advice for a given marketing period is considered to be complete for each advisory program when cumulative cash sales of the commodity reach 100 percent, all futures positions covering the crop are offset, all options positions covering the crop are either offset or expire, and the advisory program discontinues giving advice for that crop year. The returns to each recommendation are then calculated in order to arrive at a weighted average net

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[5] Some of the programs that are depicted as "cash-only" do in fact have some futures-related activity, due to the use of hedge-to-arrive contracts, basis contracts and some use of options.

[6] If a service clearly differentiates strategies based on the availability of on-farm versus off-farm (commercial) storage, recorded recommendations reflect the off-farm storage strategy.

price that would be received by a producer who precisely follows the marketing advice (as recorded by the AgMAS Project).

In order to produce a consistent and comparable set of results across the different advisory programs, certain explicit assumptions are made. These assumptions are intended to accurately simulate "real-world" marketing conditions.

Geographic Location

The simulation is designed to reflect conditions facing a representative soft red winter wheat producer in southwest Illinois. Whenever possible, data are collected for the West Southwest Crop Reporting District in Illinois as defined by the National Agricultural Statistics Service (NASS) of the US Department of Agriculture (USDA). The thirteen counties (Cass, Pike, Scott, Morgan, Sangamon, Christian, Calhoun, Greene, Macoupin, Montgomery, Jersey, Madison, and Bond) that make up this District are highlighted in Figure 1. For ease of reading, this area will be referred to in the remainder of this report as southwest Illinois, unless it is necessary to reference the actual crop or price reporting district.

Analysis presented in a previous AgMAS report suggests a mixed picture regarding the degree to which performance results based on soft red winter wheat production in southwest Illinois can be generalized to other classes and locations of wheat production in the US.[7] On one hand, there appears to be little relationship in wheat yields across classes and locations. On the other hand, there is a highly positive relationship among wheat prices across classes and locations. It is an empirical question whether the lack of a relationship between yields or the positive relationship between prices has the dominant impact on performance evaluations. One plausible outcome is that the low correlation in yields is more than offset by the high correlation in prices, and hence, it is reasonable to generalize performance evaluations for soft red winter wheat production in southwest Illinois to other wheat classes and locations. An equally plausible outcome is that the low correlation in yields more than offsets the high correlation in prices, and hence, it is unreasonable to generalize performance evaluations for soft red winter wheat production in southwest Illinois to other wheat classes and locations. Until empirical evidence is available on this question, caution is suggested before attempting to generalize the performance results to other wheat classes and locations.[8]

Marketing Window

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[7] Jirik, M.A., S.H. Irwin, D.L. Good, T.E. Jackson and J. Martines-Filho. "The 1995 through 1998 Pricing Performance of Market Advisory Services for Wheat." AgMAS Project Research Report 2000-02, June 2000. This report is available at the AgMAS website (http://www.farmdoc.uiuc.edu/agmas/reports).

[8] An excellent discussion of the wheat quality attributes and associated yield and price relationships can be found in: Smith, V.H. "Wheat Quality and Wheat Yields: Trade-Offs among Price, Yield, Profit, and Risk." Special Report No. 5, Trade Research Center, Department of Agricultural Economics and Economics, Montana State University, June 2000. This report is available at the following website: http://www.trc.montana.edu/publications/specialreports/special.html.

In general, a two-year marketing window, spanning June 1, 1998 through May 31, 2000, is used in the analysis. The beginning date is selected because it reflects a time when new crop sales begin. The ending date is selected to be consistent with the ending date for wheat marketing years as defined by the USDA. There are some exceptions to the marketing window definition to the 1999 crop year. Five advisory programs had cash wheat unsold after May 31, 2000. These cash positions varied from 5 to 100 percent. Three of these programs sold all wheat by the end of September 2000. The remaining two programs sold the remaining wheat in January and March 2001, respectively. In all of these cases, the actual recommendations on the indicated dates are recorded and used in the analysis.

Prices

The cash price assigned to each cash sale recommendation is the West Southwest Illinois Price Reporting District closing, or overnight, bid. The West Southwest Illinois Price Reporting District is highlighted in Figure 2. Similarly, the forward contract price assigned to all pre-harvest forward sales is the forward bid for the West Southwest Price Reporting District. The cash and forward contract data are collected and reported by the Illinois Department of Ag Market News.[9] Prices in this 19-county area best reflect prices for the assumed geographic location of the representative southwest Illinois producer (West Southwest Illinois Crop Reporting District).

Pre-harvest bids collected by the Illinois Department of Ag Market News are used when available. These bids are available for wheat from December 18, 1998 through June 2, 1999. Since the marketing window for the 1999 wheat crop begins in June 1998, and the Illinois Department of Ag Market News did not begin reporting actual cash forward bids until December 18, 1998, pre-harvest prices need to be estimated for the first few months of the marketing window. For a date between June 1, 1998 and December 17, 1998, a two-step estimation procedure is adopted. First, the forward basis for the period in question is estimated by the average forward basis for the first five days that actual forward contract bids are reported by the Illinois Department of Ag Market News.[10] Second, the estimated forward basis is added from the settlement price of the Chicago Board of Trade (CBOT) 1999 July wheat futures contract between June 1, 1998 and December 17, 1998. This estimation procedure is expected to be a reasonably accurate reflection of actual forward cash prices for the early period of the marketing window, as the actual price of the harvest futures contract is used and only the forward basis is estimated.

For the 1999 crop year, none of services recommended post-harvest forward contracts. In the future, if forward contracts recommended by advisory programs either do not match the delivery periods reported by the Illinois Department of Ag Market News or are made after the Illinois Department of Ag Market News stops reporting post-harvest forward contract prices, the following procedure will be used to estimate the post-harvest forward contract prices needed in

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[9] The daily prices can be found at the following website: http://www.ams.usda.gov/mnreports/GX_GR113.txt.

[10] The five-day average forward basis for the 1999 crop year is -$0.35.

the analysis. First, three elevators in southwest Illinois who agreed to supply data on spot and forward contract prices on the dates when advisors made such recommendations will be contacted. Each of these elevators is in a different county in the West Southwest Illinois Crop Reporting District. Second, the spread between each elevator's forward price and spot price will be calculated for the relevant date. Third, the forward spread will be averaged across the three elevators for the same date. Fourth, the average forward spread from the three elevators will be added to the southwest Illinois cash price (discussed at the beginning of the section) to arrive at an estimated post-harvest forward contract price for central Illinois.

The fill prices for futures and options transactions generally are the prices reported by the programs. In cases where a service did not report a specific fill price, the settlement price for the day is used. This methodology does not account for liquidity costs in executing futures and options transactions.[11]

Quantity Sold

Since most of the advisory program recommendations are given in terms of the proportion of total production (e.g., "sell 10 percent of 1999 crop today"), some assumption must be made about the amount of production to be marketed. For the purposes of this study, if the per-acre yield is assumed to be 50 bushels, then a recommendation to sell 10 percent of the wheat crop translates into selling 5 bushels. When all of the advice for the marketing period has been carried out, the final per-bushel selling price is the average price for each transaction weighted by the amount marketed in each transaction.

The above procedure implicitly assumes that the "lumpiness" of futures and/or options contracts is not an issue. Lumpiness is caused by the fact that futures contracts are for specific amounts, such as 5,000 bushels per CBOT wheat futures contract. For large-scale producers, it is unlikely that this assumption adversely affects the accuracy of the results. This may not be the case for small- to intermediate-scale producers who are less able to sell in 5,000-bushel increments.[12]

Yields and Harvest Definition

When making hedging or forward contracting decisions prior to harvest, the actual yield is unknown. Hence, an assumption regarding the amount of expected production per acre is necessary to accurately reflect the returns to marketing advice. Prior to harvest, the best estimate of the current year's expected yield is likely to be a function of yield in previous years. In this

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[11] Liquidity costs reflect the fact that non-floor traders must buy at the ask price and sell at the bid price. The difference between the bid and ask prices, termed the bid-ask spread, is the return earned by floor traders for "making the market."

[12] The practical importance of "lumpiness" problems even for small farms may be limited, due to the availability of "mini-contracts" at the Mid-America Exchange. These futures and options contracts are specified in 1,000 bushel increments.

study, the assumed yield prior to harvest is the calculated trend yield, while the actual reported yield is used from the harvest period forward. The expected yield is based upon a linear regression trend model of actual yields from 1972 through 1998 for the West Southwest Illinois Crop Reporting District. Previous research suggests a regression trend model produces relatively accurate yield forecasts.[13]

When actual yield is substantially below trend, and forward pricing obligations are based on trend yields, a producer may have difficulty meeting such obligations. This raises the issue of updating yield expectations in "short" crop years to minimize the chance of defaulting on forward pricing obligations. A relatively simple procedure is used to update yield expectations in short crop years. First, trend yield is used as the expected yield until the May USDA *Crop Production Report* is released, typically around May 10th. Second, if the USDA wheat yield estimate for Illinois is 20 percent (or more) lower than trend yield, a "reasonable" producer is assumed to change yield expectations to the lower USDA estimate. Third, as with normal crop years, the adjustment to actual yield is assumed to occur on the first day of harvest.

The 20 percent threshold is intentionally relatively large for at least three reasons. First, it is desirable to make adjustments to the trend yield expectation on a limited number of occasions. Given the large variability in annual yields, a small threshold could result in frequent adjustments. Second, it is not uncommon for early yield estimates to deviate significantly from the final estimate. A small threshold could result in unnecessary adjustments prior to harvest. Third, yield short-falls of less than 20 percent are unlikely to create delivery problems for a producer. In southwest Illinois, 1995, 1997, 1998 and 1999 are classified as "normal" crop years and 1996 is classified as a "short" crop year.[14]

In southwest Illinois, the expected 1999 yield for wheat is calculated to be 54.42 bushels per acre (bpa). Therefore, recommendations regarding the marketing quantity made prior to harvest, are based on yields of 54.42 bpa. For example, a recommendation to forward contract 20 percent of expected 1999 production translates into a recommendation to contract 10.88 bpa (20 percent of 54.42). The actual reported wheat yield in southwest Illinois in 1999 is 62 bpa.

It is assumed that after harvest begins, producers have reasonable ideas of what their actual realized yield will be. Since harvest occurs at different dates each year, estimates of harvest progress as reported by NASS in southwest Illinois are used. Harvest progress estimates typically are not made available soon enough to identify precisely the beginning of harvest, so an estimate is made based upon available data. Specifically, the date on which 50 percent of the crop is harvested is defined as the "mid-point" of harvest. The entire harvest period then is defined as a three-week window, beginning one and one-half weeks before the harvest mid-point,

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[13] Fackler, P.L., D.L. Young, and G.A. Carlson. "Estimates of Trend and Variability Patterns in U.S. Crop Yields," in *Quantifying Long Run Agricultural Risks and Evaluating Farmers' Responses to Risk*. Proceedings of a seminar sponsored by the Southern Regional Project S-252, Jekyll Island, Georgia, March 1993.

[14] At the time of the May 1996 USDA report release, expected yield for the 1996 crop is reduced from 54 bpa to the USDA estimate of 41 bpa.

and ending one and one-half weeks after the harvest mid-point. In most years, a three-week window includes at least 80 percent of the harvest. For 1999, the harvest period for wheat is defined as June 18, 1999 through July 8, 1999. Therefore, recommendations made after June 18 are applied on the basis of the actual yield of 62 bpa.

The issue of changing yield expectations typically is not dealt with in the recommendations of the advisory programs. For the purpose of this study, the actual harvest yield must exactly equal total cash sales of the crop at the end of the marketing time frame. Hence, an adjustment in yield assumptions from expected to actual levels must be applied to cash transactions at some point in time. In this analysis, an adjustment is made in the amount of the first cash sale made after the beginning of the harvest period. For example, if a program advises forward contracting 50 percent of the wheat crop prior to harvest; this translates into sales of 27.21 bpa (50 percent of 54.42). However, when the actual yield is applied to the analysis, sales-to-date of 27.21 bpa imply that only 43.89 percent of the actual crop has been contracted ([27.21/62]*100). In order to compensate, the amount of the next cash sale is adjusted to align the amount sold. In this example, if the next cash sale recommendation is for a 10 percent increment of the 1999 crop, making the total recommended sales 60 percent of the crop, the recommendation is adjusted to 16.11 percent of the actual yield (9.99 bushels), so that the total crop sold to date is 60 percent of 62 bushels per acre (27.21 + 9.99 = 37.2 = 0.6*62). After this initial adjustment, subsequent recommendations are taken as percentages of the 62 bpa actual yield, so that sales of 100 percent of the crop equal sales of 62 bpa.

While the amount of cash sales is adjusted to reflect the change in yield information, a similar adjustment is not made for futures or options positions that are already in place. For example, assume that a short futures hedge is placed in the July 1999 contract for 25 percent of the 1999 crop prior to harvest. Since the amount hedged is based on the trend yield assumption of 54.42 bpa, the futures position is 13.61 bpa (25 percent of 54.42). After the yield assumption is changed, this amount represents a short hedge of 21.95 percent ([13.61/62]*100). The amount of the futures position is not adjusted to move the position to 25 percent of the new yield figure. However, any futures (or options) positions recommended after the beginning of harvest are implemented as a percentage of the actual yield.

Brokerage Costs

Brokerage costs are incurred when producers open or close positions in futures and options markets. For the purposes of this study, it is assumed that brokerage costs are $50 per contract for round-turn futures transactions, and $30 per contract to enter or exit an options position. Further, it is assumed that CBOT wheat futures or options contracts are used, and the contract size for each commodity is 5,000 bushels. Therefore, per-bushel brokerage costs are 1 cent per bushel for a round-turn futures transaction and 0.6 cents per bushel for each options transaction.

LDP and Marketing Assistance Loan Payments

While the 1996 "Freedom-to-Farm" Act did away with government set-aside and target price programs, price protection for producers in program crops such as wheat is not eliminated entirely. Minimum prices are established through a "loan" program. Specifically, if market prices are below the Commodity Credit Corporation (CCC) loan rate for wheat, producers can receive payments from the US government that make up the difference between the loan rate and the lower market price.[15] There is considerable flexibility in the way the loan program can be implemented by producers. This flexibility presents the opportunity for advisory programs to make specific recommendations for the implementation of the loan program. Additionally, the price of wheat was below the loan rate during significant periods of time in the 1999 marketing period, so that use of the loan program was an important part of marketing strategies for this period. As a result, net advisory program prices may be substantially impacted by the way the provisions of the loan program are implemented.

Most of the advisory programs tracked by the AgMAS Project for the 1999 crop year make specific recommendations regarding the timing and method of implementing the loan program for the entire wheat crop.[16] These recommendations are implemented as given wherever feasible. Several decision rules have to be developed even in this case, in particular, for pre-harvest forward contracts. For a few programs, loan recommendations are incomplete or not made at all. For these cases, it is necessary to develop a more complete set of decision rules for implementing the loan program in the marketing of wheat. All loan-related decision rules are based on the assumption of a "prudent" or "rational" producer, within the context of the intent of the loan program. More specifically, it is assumed that a producer will take advantage of the price protection offered by the loan program, even in the absence of specific advice from an advisory program.

Before describing the decision rules, it is useful to provide a brief overview of the loan program mechanics. Then, the rules developed to implement the loan program in the absence of specific recommendations can be described more effectively.

Program Mechanics

There are two mechanisms for implementing the price protection benefits of the loan program. The first mechanism is the loan deficiency payment (LDP) program. LDPs are computed as the difference between the loan rate for a given county and the posted county price (PCP) for a particular day. PCPs are computed by the USDA and change each day in order to reflect the "average" market price that exists in the county. For example, if the county loan rate

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[15] For a complete description of the programs discussed in this section, see the following Farm Service Agency fact sheets: *Nonrecourse Marketing Assistance Loans and Loan Deficiency Payments,* March 1998 and *Wheat*, November 1998. These can be found at the following website: http://www.fsa.usda.gov/pas/publications/facts/pubfacts.htm.

[16] Twenty of the 23 wheat programs make a complete set of loan recommendations (100 percent of actual production) for the 1999 crop year.

for wheat is $2.50 per bushel and the PCP for a given day is $2.00 per bushel, then the next day LDP is $0.50 per bushel. If the PCP increases to $2.10 per bushel, the LDP will decrease to $0.40 per bushel. Conversely, if the PCP decreases to $1.90 per bushel, the LDP will increase to $0.60 per bushel.[17]

LDPs are made available to producers over the period beginning with wheat harvest and ending March 31st of the calendar year following harvest. Producers have flexibility with regard to taking the LDP. They may simply elect to take the payment when the crop is sold in a spot market transaction (before the end of March in the particular marketing year). Or, producers, after harvest, can choose to take the LDP before the crop is delivered and sold. Note that LDPs for the 1999 crop cannot be taken after a crop has been delivered and title has changed hands.

The second mechanism is the nonrecourse marketing assistance loan program. A loan cannot be taken on any portion of the crop for which an LDP has been received. Under this program, producers may store the crop (on the farm or commercially), maintain beneficial interest, and receive a loan from the CCC using the stored crop as collateral. The loan rate is the established rate in the county where the crop is stored and the interest rate is established at the time of loan entry. Wheat can be placed under loan anytime after the crop is stored through March 31st of the following calendar year. The loan matures on the last day of the ninth month following the month in which the loan was made.

Producers may settle outstanding loans in two ways: i) repaying the loan during the 9-month loan period, or ii) forfeiting the crop to the CCC at maturity of the loan. Under the first alternative, the loan repayment rate is the lower of the county loan rate plus accrued interest or the marketing loan repayment rate, which is the PCP. If the PCP is below the county loan rate, the economic incentive is to repay the loan at the posted county price. The difference between the loan rate and the repayment rate is a marketing loan gain (MLG). If the PCP is higher than the loan rate, but lower than the loan rate plus accrued interest, the incentive is also to repay the loan at the PCP. Interest is charged on the difference between the PCP and the loan rate. If the PCP is higher than the loan rate plus accrued interest, the incentive is to repay the loan at the loan rate plus interest.

Under the second alternative, the producer stores the crop to loan maturity and then transfers title to the CCC. The producer retains the proceeds from the initial loan. This was generally not an attractive alternative in the 1999 marketing year since the PCP, late in the marketing year, was often below the cash price of wheat. Repaying the loan at the PCP and selling the crop at the higher cash price was economically superior to forfeiture.

The nonrecourse loan program establishes the county loan rate as a minimum price for the producer, as does the LDP program. For the 1999 crop, the sum of LDPs plus marketing loan gains for all crops was subject to a payment limitation of $150,000 per person. Forfeiture on the loans provided the mechanism for receiving a minimum of the loan rate on bushels in excess of the payment limitation.

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[17] Technically, PCPs for a given day are used by the USDA to compute LDPs for the following day.

The average loan rate for the 1999 wheat crop across the thirteen counties in the West Southwest Illinois Crop Reporting District (Bond, Calhoun, Cass, Christian, Greene, Jersey, Macoupin, Madison, Montgomery, Morgan, Pike, Sangamon, and Scott) is $2.57 per bushel. Market prices were below that rate during the entire post-harvest period for the 1999 crop. This is reflected in Figure 3, which shows the average wheat LDP or MLG rates for the West Southwest Illinois Crop Reporting District during the 1999 marketing year.[18, 19] LDPs or MLGs vary during harvest, from $0.40 to $0.50 per bushel, and then rise to $0.70 during summer. It declines in the middle of September 1999 to $0.10 and increases to a level at or above $0.25 for most of the remainder of the marketing year. In the beginning of May 2000, it falls to almost zero and then recovers at the end of the month to $0.20.

Decision Rules for Programs with a Complete Set of Loan Recommendations

If an advisory program makes a complete set of loan recommendations, the specific advice is implemented wherever feasible. However, specific decision rules are still needed regarding pre-harvest forward contracts because it is possible for an advisory program to recommend taking the LDP on those sales before the crop is actually harvested and available for delivery in southwest Illinois. To begin, it is assumed that amounts sold for harvest delivery with pre-harvest forward contracts are delivered first during harvest. Since LDPs must be taken when title to the grain changes hands, LDPs are assigned as these "forward contract" quantities are harvested and delivered. This necessitates assumptions regarding the timing and speed of harvest. Earlier it was noted that a three-week harvest window is used to define harvest. This window is centered on the day nearest to the mid-point of harvest progress as reported by NASS. Various assumptions could be implemented regarding harvest progress during this window. Lacking more precise data, a reasonable assumption is that harvest progress for an individual, representative farm is a linear function of time.

Table 1 summarizes the information used to assign LDPs to pre-harvest forward contracts. The second column shows the amount harvested assuming a linear model. The third column shows the LDP available on each date of the harvest window and the third column presents the average LDP through each harvest date. An example will help illustrate use of the table. Assume that an advisory program recommends, at some point before harvest, that a producer forward contract 50 percent of expected wheat production. This translates into 27.21 bpa when the percentage is applied to expected production (0.50*54.42 = 27.21). Next, convert the bpa to a percentage of actual production, which is 43.89 percent ([27.21/62]*100) = 43.89). To determine the LDP payment on the 43.89 percent of actual production forward contracted, simply read down Table 1 to June 28, which is the date when 46.7 percent of harvest is assumed

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[18] LDP and MLG data were obtained from the interactive LDP database at the Center for Agricultural and Rural Development (CARD) at Iowa State University. They can be found at the following website: http://www.card.iastate.edu/.

[19] The time period for Figure 3 begins on the first day of harvest (6/18/1999), as determined for this study, and ends on May 31, 2000.

to be complete. The average LDP up to that date (June 18, 1999 to June 28, 1999) is $0.44 per bushel. This is the LDP amount assigned to the forward contract bushels.

Note that LDPs for any sales (spot, forward contracts, futures or options) recommended during harvest are taken only after all forward contract obligations are fulfilled. In addition, crops placed under loan by an advisory program do not accumulate interest opportunity costs because proceeds from the loan can be used to offset interest costs that otherwise would accumulate.

Decision Rules for Programs with a Partial Set of Loan Recommendations
Or No Loan Recommendations

If an advisory program makes a partial set of loan recommendations, the available advice is implemented wherever feasible. In the absence of specific recommendations, it is assumed that crops priced before March 31, 2000 are not placed under loan. Those crops receive program benefits through LDPs. After March 31, 2000, eligible crops (unpriced crops for which program benefits have not yet been collected) are assumed to be under loan until priced.

In the absence of specific recommendations, rules for assigning LDPs and MLGs are developed under the assumption that loan benefits are established when the crop is priced or as soon after pricing that is allowed under the rules of the program. This principle is consistent with the intent of the loan program to fix a minimum price when pricing decisions are made. Two rules are most important in the implementation of this principle. First, LDPs on pre-harvest sales (forward contracts, futures or options) are established as the crop is harvested. Second, if the LDP or MLG is zero on the pricing date, or the first date of eligibility to receive a loan benefit, those values are assigned on the first date when a positive value is observed, assuming a beneficial interest in that portion of the crop has been maintained. Specific rules for particular marketing tools and situations follow:

1) *Pre-harvest forward contracts.* The same decision rules are applied as discussed in the previous section. Specifically, it is assumed that amounts sold for harvest delivery with pre-harvest forward contracts are delivered first during harvest. LDPs, if positive, are assigned as these "forward contract" quantities are harvested and delivered. This necessitates assumptions regarding the timing and speed of harvest. A linear model of harvest progress is assumed in the three-week harvest window. The specific information used to assign LDPs to pre-harvest forward contracts is again found in Table 1. As a final point, note that LDPs for any other sales (spot, futures or options) recommended during harvest are taken only after all pre-harvest forward pricing obligations are fulfilled.

2) *Pre-harvest short futures.* Pre-harvest pricing using futures contracts is treated in the same manner as pre-harvest forward contracts. LDPs are assigned on open futures positions as the crop is harvested, or as soon as a positive LDP is available, if the futures position is still in place and cash sales have not yet been made. These are assigned after forward contracts have been satisfied. If the underlying crop is sold before there is a positive LDP, then that portion of the crop receives a zero LDP. If the futures position is offset before a positive

LDP is available and the crop has not yet been sold in the cash market, that portion of the crop is eligible for loan benefits on the next pricing recommendation.

3) *Pre-harvest put option purchases.* Long put options positions, which establish a minimum futures price, are treated in the same manner as pre-harvest short futures.

4) *Post-harvest forward contracts.* The main issue with respect to post-harvest forward contracts is when to assign the LDPs or MLGs. Those can be established on the date the contract is initiated, on the delivery date of the contract, or anytime in between. Following the general principle outlined earlier, LDPs and MLGs for post-harvest contracts are assigned on the date the contract is initiated or the first day with positive benefits prior to delivery on the contract.

5) *Post-harvest short futures.* As with post-harvest forward contracts, the main issue with post-harvest short futures positions is when to assign loan benefits. These are assigned when the short futures position is initiated or as soon as a positive benefit is available if the futures position is still in place and cash sales have not been made. If the underlying crop is sold before a positive LDP is available, that portion of the crop receives a zero LDP. If the short futures position is offset before a positive LDP is available and the cash crop has not yet been sold, that portion of the crop is eligible for loan benefits on the next pricing recommendation.

6) *Post-harvest long put positions.* Long put options positions established after the crop is harvested are treated in the same manner as post-harvest short futures.

7) *Spot sales before March 31, 2000.* If a spot cash sale of wheat is recommended before March 31, 2000, it is assumed that the LDP, if positive, is established that same day.

8) *Loan program after March 31, 2000.* Since LDPs are not available after March 31, 2000, it is assumed that any wheat in storage and not priced as of this date, for which loan benefits have not been established, are entered in the loan program on that date. This is a reasonable assumption since spot prices were below the loan rate for wheat in southwest Illinois on March 31 and a prudent producer would take advantage of the price protection offered by the loan program. When the crops are subsequently priced (cash sale, forward contract, short futures, or long put options), the marketing loan gain, if positive, is assigned on that day. Forfeiture is not an issue for these bushels because all cash sales were made before the end of nine-month loan period (December 31, 2000). Note also that the $150,000 payment limitation is not considered in the analysis, as production is based on one acre of wheat.

Carrying Charges

An important element in assessing returns to an advisory program is the economic cost associated with storing grain instead of selling grain immediately at harvest. The cost of storing grain after harvest (carrying costs) consists of two components: physical storage charges and the

opportunity cost incurred by foregoing sales when the crop is harvested. Physical storage charges can apply to off-farm (commercial) storage, on-farm storage, or some combination of the two. Opportunity cost is the same regardless of the type of physical storage.

For the purposes of this study, it is assumed that all storage occurs off-farm at commercial sites.[20] This is assumed for several reasons. First, commercial storage costs reflect the full economic costs of physical storage, whereas on-farm storage cost estimates may not, due to differing accounting methods and/or time horizons. Second, commercial storage costs are relatively consistent across producers in a given area, whereas on-farm storage costs likely vary substantially among producers. Third, commercial storage cost data are readily available, whereas this is not the case for on-farm storage.

Storage charges are assigned beginning July 9, the first date after the end of the 1999 harvest window. Physical storage charges have a fixed component (in-charge) of 4 cents per bushel that is assigned the day storage begins. The variable component is 2.5 cents per bushel per month, with this charge pro-rated to the day when the cash sale is made. The storage costs represent the typical storage charges for the 1999 wheat crops quoted in a telephone survey of southwest Illinois elevators.

The interest rate is assumed to be 9.0 percent for 1999 and is applied to the average harvest-time price, which is $2.13 per bushel. This interest rate is the average rate for all commercial agricultural loans for the third quarter of each year as reported in the *Agricultural Finance Databook* published by the Board of Governors of the Federal Reserve Board. The third quarter rate represents the interest opportunity costs at the end of harvest for a wheat producer. The interest charge for storing grain is the interest rate compounded daily from the end of harvest to the date of sale.[21]

The calculation of carrying charges may be impacted by an advisory program's loan recommendations and/or the decision rules discussed in the previous section. Specifically, during the period wheat is placed under loan, interest costs are not accumulated, as the proceeds from the loan can be used to offset interest opportunity costs that otherwise would accumulate. This most commonly occurs after March 31, 2000, when it is assumed that all unpriced grain for which loan benefits have not been established is placed under loan until priced. If a crop is priced while under loan (the loan is assumed to be repaid on the same date), but stored beyond the time of pricing, interest opportunity costs are accumulated from the day of pricing until the time storage ceases.

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[20] As mentioned earlier in this report, there are some instances where a service clearly differentiates strategies based on availability of on-farm versus off-farm (commercial) storage. In these instances, recorded recommendations reflect the off-farm storage strategy.

[21] The daily interest rate, r, for 1999 crop year is computed as follows:

$$r = (1.09)^{\frac{1}{365}} - 1 = 0.000236131 \text{ or } 0.0236131 \text{ percent per day}.$$

Benchmark Prices

In addition to comparing the net price received across advisory programs, it is useful to compare the results to simple market benchmark prices. These prices are intended to provide information about the actual prices that are available for a particular crop, and provide an indication of how producers might fare using some basic marketing strategies that do not require professional marketing advice.

The development of an appropriate market benchmark for advisory service performance analysis is considered in a earlier AgMAS research report. [22] In this report, it is argued that a useful benchmark should: i) be *simple* to understand and to calculate; ii) represent the returns to a marketing strategy that could be *implemented* by producers; iii) be directly *comparable* to the net advisory price received from following the recommendations of a market advisory program; iv) not be a function of the actual recommendations of the advisory programs or of the actual marketing behavior of producers, but rather should be *external* to their marketing activities; and v) be *stable*, so that it represents the range of prices made available by the market throughout the marketing period instead of representing the price during a small segment of the marketing period.

Three potential specifications are considered in the aforementioned research on market benchmarks for corn and soybeans: the average price received by farmers, the harvest cash price, and the average cash price over a two-year time span that extends from one year prior to harvest through one year after harvest. The average price received by farmers is reported by the USDA and is widely cited as a measure of the economic condition of the farm sector. It is not directly comparable to the net advisory price, however, because it includes quality discounts and premiums. The average price received also is a function of farmers' actual marketing behavior. The harvest cash price is straightforward and easy to calculate because production risk and storage costs are not included. However, in a given year, the harvest cash price may not represent the average price that is available to farmers for that crop.

The average cash price benchmark meets all of the selection criteria listed above, except it may not be easily implemented by producers since it involves marketing a small portion of the crop every day of the two-year marketing window. It is shown for corn and soybeans, though, that the price realized via a more manageable strategy of routinely selling twelve times during the marketing window very closely approximates the average cash price. Therefore, it is determined that the average cash price meets all five selection criteria and is the most appropriate market benchmark to be used in evaluating the pricing performance of market advisory programs.

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[22] A full discussion of the selection of the appropriate market benchmark price can be found in Good, D.L., S.H. Irwin and T.E. Jackson. "Development of a Market Benchmark Price for AgMAS Performance Evaluations," AgMAS Project Research Report 1998-02, December 1998. This report is available at the AgMAS website (http://www.farmdoc.uiuc.edu/agmas/reports).

Consistent with AgMAS corn and soybean evaluations, the market benchmark price for wheat used in this study is the 24-month average cash price stated on a harvest equivalent basis. [23] For the 1999 crop year, the benchmark is based on the average price from June 1, 1998 through May 31, 2000. Cash forward prices for West Southwest Illinois Price Reporting District are used during the pre-harvest period, while daily spot prices for the West Southwest Illinois Price Reporting District are used for the post-harvest period. The same forward and spot price series applied to advisory program recommendations are used to construct the benchmark. Details on the forward and cash price series can be found in the earlier "Prices" section of this report.

Three adjustments are made to the daily cash prices to make the 1999 average cash price benchmark consistent with the calculated net advisory prices for each marketing program. The first is to take a weighted average price, to account for changing yield expectations, instead of taking the simple average of the daily prices. This adjustment is consistent with the procedure described previously in the "Yields and Harvest Definition" section. The daily weighting factors for pre-harvest prices are based on the calculated trend yield, while the weighting of the post-harvest prices is based on the actual reported yield for southwest Illinois. The second adjustment is to compute post-harvest cash prices on a harvest equivalent basis, which is done by subtracting carrying charges (storage and interest) from post-harvest spot cash prices. The daily carrying charges are calculated in the same manner as those for net advisory prices.

The third adjustment to the average cash price benchmark is needed due to the operation of the loan program. In the context of evaluating advisory program recommendations, it was argued earlier that a "prudent" or "rational" producer would take advantage of the price protection offered by the loan program, even in the absence of specific advice from an advisory program. This same logic suggests that a "prudent" or "rational" producer will take advantage of the price protection offered by the loan program when following the benchmark average price strategy. Based on this argument, the average cash price benchmark is adjusted by the addition of LDPs and MLGs. Bushels marketed in the 1999 pre-harvest period according to the benchmark strategy (approximately 46 percent) are treated as forward contracts with the LDPs assigned at harvest. LDPs for the forward cash prices were assumed to be $0.44 per bushel. Bushels marketed each day in the 1999 post-harvest period (approximately 54 percent) are awarded the LDP or MLG in existence for that particular day. Finally, just as in the case with comparable advisory program recommendations, interest opportunity costs are not charged to the benchmark after March 31 to reflect the assumption that stored grain is placed under loan.

Pricing Performance Results for the Advisory Programs

Pricing performance results for the 1999 wheat crop are presented in Tables 2 and 3 and Figure 4. For a specific example of how marketing recommendations are translated into a final

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[23] Martines-Filho, J., D.L. Good and S.H. Irwin."1999 Pricing Performance of Market Advisory Services for Corn and Soybeans." AgMAS Project Research Report 2000-04, December 2000. This report is available at the AgMAS website (http://www.farmdoc.uiuc.edu/agmas/reports).

net advisory price that incorporates similar parameters, please refer to the 1996 AgMAS Corn and Soybean Pricing Report.[24]

Program-by-program results of the 1999 wheat evaluations are contained in Table 2. This table shows the breakout of the components of the net advisory price as well as the net advisory price itself. The average net advisory price for all 23 programs is $2.64 per bushel. It is computed as the unadjusted cash sales price ($2.28 per bushel) minus carrying charges ($0.23 per bushel) plus futures and options gains ($0.09 per bushel) minus brokerage costs ($0.02 per bushel) plus LDP/MLG gain ($0.52 per bushel).[25] The net advisory price is $0.04 below the market benchmark price. The range of net advisory prices is large, with a minimum of $2.18 per bushel and a maximum of $3.38 per bushel.[26]

Table 3 lists the program-by-program results of the wheat revenue analysis. The average revenue achieved by following both the programs offered by an advisory program is $163 per acre, $3 per acre below the market benchmark revenue for 1999 crop year. The spread in advisory revenue also is especially noteworthy, with the difference between the bottom- and top-performing advisory programs reaching almost $75 per acre.

For comparison purposes, the annual subscription cost of each advisory program is listed in the last column of Table 3. Subscription costs average $330 per program, about equal to the average advisory revenue for two acres of production. Subscription costs do not appear to be substantial relative to total farm revenue, whether a large or small farm is considered. For a 1,000 acre farm, subscription costs average about two-tenths of one percent of total average advisory revenue. For a 250 acre farm, subscription costs average about eight-tenths of one percent of

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[24] Jackson, T.E., S.H. Irwin and D.L. Good. "1996 Pricing Performance of Market Advisory Services for Corn and Soybeans" AgMAS Project Research Report 1998-01, January 1998, pp. 10-13. This report is available at the AgMAS website (http://www.farmdoc.uiuc.edu/agmas/reports).

[25] The components on Table 2 may not sum exactly to the average net advisory price due to rounding.

[26] A point to consider when examining Table 2 is the assumption that a representative farmer considers the full (fixed plus variable) cost of physical storage. This is the only reasonable assumption if storage occurs off-farm, with commercial storage charges presumably reflecting the full cost of storage. However, this may not be the case for farmers with existing on-farm storage. Since the fixed costs of storage are incurred in this situation whether inventory is stored or not, short-run storage decisions may be based only on the variable costs of storage. To reflect this storage scenario, the available data on physical storage charges at commercial elevators would need to be broken into fixed and variable components. Then, net advisory prices and the market benchmark could be re-computed using only the variable component of physical storage charges. Unfortunately, the proportions of fixed versus variable costs are not available for the commercial storage rates used in this study. Some perspective on this storage issue can be gained by assuming that physical storage charges equal zero, which amounts to assuming that both fixed and variable costs are irrelevant in the short-run. While, admittedly, this is an extreme assumption, it should provide relevant information on the sensitivity of advisory service pricing performance to alternative storage cost assumptions. Excluding the costs of commercial storage entirely (but continuing to subtract interest costs), the average net advisory price increases to $2.80 for the 1999 crop year. As noted, the calculation of the market benchmark price also is impacted by such a change in the storage cost assumption. The market benchmark price increases to $2.77 per bushel. Therefore, if physical storage charges are assumed to be zero in the short run, the average net advisory price would be $0.03 above the market benchmark. Hence, the pricing performance of advisory services in 1999 may be marginally sensitive to storage cost assumptions.

total advisory revenue. Note that subscription costs are not subtracted from any of the revenue figures presented in Table 2.

Another view of the pricing performance of the advisory programs is shown in Figure 4. Here, net advisory prices or revenues are ranked from highest to lowest and plotted versus the market benchmark. As shown in the charts, 6 of the 23 wheat marketing programs achieve a net price and net revenue that are equal to or higher than the market benchmark price or revenue for the 1999 crop.

Figure 5 shows the pattern of wheat prices for the 1999 crop year. The top chart shows daily cash prices from June 1, 1998 through May 31, 2000. The pre-harvest prices are the cash forward contract prices for harvest delivery. The middle chart is a repeat of the top chart with daily LDP or MLG added to the daily prices. For the pre-harvest period, the LDP is the average LDP available at harvest time ($0.44 per bushel). The third chart offers a different perspective, in that during the post-harvest period the daily cash price is adjusted for cumulative carrying costs (interest and storage charges). The chart illustrates the pattern of harvest equivalent prices plus LDP or MLG. There were some pricing opportunities prior to harvest, with bids between $2.50 and $3.10 per bushel until January 1999. However, a trend line yield for soft red winter wheat and above trend for hard red winter and hard red spring wheat, coupled with lower than anticipated exports, resulted in prices below the loan rate for most of the remainder of the marketing period. Those advisors who chose early forward contracting were rewarded. Some of the services chose to establish the LDP at harvest and hold the crop unpriced. This strategy was not successful since the post-harvest price recovery did not exceed the cost of storage.

Average Pricing Performance Results for the Advisory Programs

A summary of the results of the pricing performance evaluations for the 1995 through 1999 wheat crop years is contained in Tables 4 through 7 and Figures 6 through 9. The results for the 1995 through 1998 crop years are those contained in the 1998 AgMAS Wheat Pricing Report.[27] Tables 4 and 6 present pricing or revenue results for each year, while Tables 5 and 7 show two-year averages (1998-1999), three-year averages (1997-1999), four-year averages (1996-1999), and five-year averages (1995-1999).[28] Some marketing programs are not included in all of the averages. For example, the five-year average is calculated only for the 17 marketing programs that are evaluated for all five years. The following discussion focuses on the five-year average results.

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[27] Jirik, M.A., S.H. Irwin, D.L. Good, T.E. Jackson and J. Martines-Filho. "The 1995 through 1998 Pricing Performance f Market Advisory Services for Wheat." AgMAS Project Research Report 2000-02, June 2000. This report is available at the AgMAS website (http://www.farmdoc.uiuc.edu/agmas/reports).

[28] In this section and the next, terms like "two-year average" are used to refer to averages of net advisory prices over multiple crop years.

As shown in Table 5, the average net advisory wheat price over the five years for the 17 programs is $3.06 per bushel, $0.21 below the five-year market benchmark price of $3.27 per bushel. The results range from a low of $2.79 to a high of $3.31 per bushel.

The five-year results for advisory revenue are presented in Table 7. The average advisory revenue for the five years is $154 per acre. This is $13 per acre below the five-year market benchmark revenue. The results range from a low of $140 to a high of $171 per acre.

As shown in the top chart in Figure 9, only 1 of the 17 wheat marketing programs achieve a five-year average net advisory price that is above the five-year average market benchmark price of $3.27 per bushel. The bottom chart in Figure 9 shows the comparison of the five-year average advisory revenue versus the five-year average revenue implied by the market benchmark price. Only 1 of the 17 advisory programs achieve a five-year average revenue that is equal or above average market benchmark revenue of $167 per acre.

Pricing Performance and Risk of the Advisory Programs

An advisory program's net price received is an important indicator of performance. However, pricing performance almost certainly is not the only relevant indicator. For example, two advisory programs may generate the same average net price across marketing periods, but the risk of the programs may differ substantially. The difference in risk may be the result of: i) type of recommended pricing tool (cash, forward, futures, options, etc.), ii) timing of sales, and iii) implementation of marketing strategies.

In order to quantify the risk of advisory programs, a definition of risk must be developed. Risk is usually thought of as the possibility or probability of loss. A natural extension of this idea looks at risk as the chance producers will fail to achieve the net price they expect based on following an advisory program. This approach to quantifying risk does not measure the possibility of loss alone. Risk is seen as uncertainty – the likelihood that what is expected will fail to happen, whether the outcome is better or worse than expected. So an unexpected return on the upside or the downside – a net price of $3.00 or $2.00 per bushel when a net price of $2.50 per bushel is expected – counts in determining the "risk" of an advisory program. Thus, an advisory program whose net price does not depart much from its expected, or average, net price is said to carry little risk. In contrast, an advisory program whose net price is quite volatile from year-to-year, often departing from expected net price, is said to be quite risky.

This approach to defining risk can be quantified by using a statistical measure called the standard deviation.[29] It measures the dispersion of year-to-year net advisory prices from the

[29] For a given advisory program, the formula for standard deviation is,

$$\hat{\sigma} = \sqrt{\frac{1}{T-1}\sum_{t=1}^{T}(y_t - \overline{y})^2}$$

where T is the number of years in the sample, y_t is the advisory program's net price for the tth year and $\overline{y}$ is the average net advisory price over the T years.

average net price. One can think of the standard deviation as the "typical" variation in net price from year-to-year. The larger the standard deviation of an advisory program, the less likely a producer is to get exactly the net price expected, though it is possible by chance to get a higher price instead of a lower one for any particular time period.

Separate analysis of market advisory pricing performance and risk will provide valuable information to producers. However, as economic theories of decision-making under risk highlight, it is the tradeoff between pricing performance and risk that is likely to be of greatest interest to producers.[30] Theory suggests that above-average pricing performance should be possible only if marketing strategies are recommended that have above-average risk (and *vice versa*). Faced with such a choice set, producers will choose an advisory program that has a pricing-risk tradeoff that is consistent with their risk preferences.[31]

The basic data needed for assessing the pricing-risk tradeoff of market advisory programs is presented in Table 8. For each advisory program tracked in all five years of AgMAS evaluations, the five-year average net advisory price or revenue and standard deviation of net advisory price or revenue are reported. The standard deviations indicate that the risk of advisory programs varies substantially. The standard deviations of the net advisory prices range from a low of $0.24 per bushel to a high of $1.47 per bushel. The average standard deviation across the 17 wheat programs is $0.82 per bushel, which is higher than the $0.52 per bushel standard deviation of the wheat market benchmark. Revenue standard deviations for the 17 programs range from a low of $18 per acre to a high of $56 per acre. The average revenue standard deviation across the 17 programs is $31 per bushel, higher than the $25 per acre standard deviation of the market benchmark.

The estimated relationship between pricing performance and risk for wheat is presented in Figure 10. Contrary to the prediction of economic theory, there is a slight negative tradeoff between the average price and standard deviation; achieving a higher net advisory price appears to require that an advisory program take on less risk, and *vice versa*. The strength of the relationship is measured by the correlation coefficient, which can take on values between –1 and +1. A negative value means that net price and standard deviation tend to move in opposite directions, while a positive value means they tend to move in the same direction. The closer a correlation coefficient is to –1 or +1, the stronger the tendency. Since the estimated correlation coefficient for wheat is –0.18, the relationship is only weakly negative.

The performance implications of the tradeoff between wheat pricing performance and risk are explored in Figure 11. The chart is the same as in Figure 10, except it is now divided into four quadrants based on the average price and standard deviation of the market benchmark. Advisory programs in the upper left quadrant have a higher price and less risk than the benchmark, which is the most desirable outcome from a producer's perspective. Advisory

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[30] Ingersoll, J. *Theory of Financial Decision Making*. Roman and Littlefield: Savage, Maryland, 1987.

[31] A good non-technical introduction to measuring risk and performance in a return-risk framework can be found in: B.G. Malkiel. *A Random Walk Down Wall Street*. W.W. Norton & Company: New York, New York, 1999.

programs in the lower right quadrant have a lower price and more risk than the benchmark, which is the least desirable outcome from a producer's perspective. The two remaining quadrants reflect a higher price and more risk than the market benchmark or a lower price and less risk than the market benchmark. A producer may prefer an advisory program to the market benchmark in either of these two quadrants, but this depends on personal preference for risk relative to return.

The data plotted in Figure 11 show that there is only one advisory program in wheat that generates a combination of net price and risk superior to the market benchmark (upper left quadrant). In contrast, fifteen advisory programs produce a combination that is inferior to the benchmark (lower right quadrant). Only one program has a lower price and less risk than the benchmark, while no program has a higher price and more risk.

The estimated relationship between performance and risk for wheat revenue is presented in Figure 12. There is virtually no tradeoff between average revenue and standard deviation. The estimated correlation coefficient for revenue is –0.03, indicating a neutral relationship between average revenue and risk.

Based on revenue, the data plotted in Figure 13 show that no advisory program generates a combination of average revenue and risk superior to the market benchmark (upper left quadrant). Twelve advisory programs produce a revenue combination that is inferior to the benchmark (lower right quadrant). Four programs have lower revenue and less risk than the benchmark, while only one program has higher revenue and more risk.

Previous research on financial investments suggests that return-risk results, like those presented above, may be sensitive to alternative specifications of the market benchmark. To investigate this issue, the pricing (or revenue) performance and risk of market advisory programs is compared to a 20-month average cash price and revenue benchmarks in Figures 14 and 15. Compared to the 24-month benchmark, the 20-month benchmark simply deletes the first four months of each marketing window from the computations of the benchmark price. The change has limited impact on the average benchmark price or revenue for the five years of analysis. The average 20-month benchmark price is $3.26 per bushel, compared to $3.27 per bushel for the 24-month benchmark. For revenue, the average 20-month benchmark revenue is $165 per acre, compared to $167 per acre for the 24-month benchmark. The small differences are not surprising given the nature of the average cash price benchmarks. In informationally efficient markets, annual averages of different average cash price benchmarks should be roughly similar when stated on a harvest equivalent basis.

The previous logic does not necessarily carry over to the standard deviations of the alternative benchmarks. Standard deviations for the 20-month benchmark price should be higher than those of the 24-month benchmark because the 20-month benchmark includes less pre-harvest forward contracting than the 24-month benchmark. All else equal, less pre-harvest forward contracting should lead to increased risk. The standard deviation estimates are consistent with this logic. The standard deviation for 20-month benchmark price is $0.64 per bushel, compared to $0.52 per bushel for the 24-month benchmark. The same logic may not

apply for revenue, due to the relationship of the component risks, price and yield. When price performance is multiplied by yield, the standard deviation tends to not be as large because a high price generally is multiplied by a low yield and a low price generally is multiplied by a high yield, resulting in less variation. The standard deviation for 20-month benchmark revenue is $23 per acre, compared to $25 per acre for the 24-month benchmark.

Comparing Figures 14 and 15 with Figures 11 and 13 shows that the risk-return performance of market advisory programs has some sensitivity to the change in market benchmarks. On one hand, five advisory programs are located at the lower-left quadrant under the 20-month benchmark compared to only one under the 24-month benchmark. On the other hand, only one advisory program generates average wheat prices and risk in the upper left quadrant based on either the 20-month or 24-month benchmarks. The same revenue performance results are obtained when using the 20-month or 24-month benchmark.

While return-risk results may be somewhat sensitive to alternative benchmarks, it is important to emphasize, whether a 24-month or 20-month benchmark is considered, about three-quarters of the advisory programs generate average price and risk in the low price/high risk quadrant. Contrary to the theory, over this five-year crop years, taking a higher risk did not lead to higher prices and vice versa.

In sum, the results presented in this section suggest performance analysis is little affected by the inclusion of risk. Whether one-dimension of performance, average price, or two-dimensions, average price and risk, are considered, the implications of the results are similar. Specifically, wheat advisory programs rarely "beat the market." This overall conclusion is not sensitive to the benchmark used in this analysis.

It is important to emphasize at this point that the pricing and risk performance results are based on only five observations. This is a relatively small sample for estimating the true risks of market advisory programs. Hence, the results presented in this section should be viewed as exploratory rather than definitive.

Finally, the approach to performance evaluation presented in this section opens the door to a new type of analysis. Modern Portfolio Theory (MPT) shows how to combine market advisory programs into "portfolios" that have the highest return for a given level of risk. A "portfolio" might consist of 50 percent of wheat marketed by an advisory program *X* and 50 percent marketed by an advisory program *Y*. MPT produces "efficient portfolios" by taking advantage of the diversification opportunities available through combining advisory programs. In fact, it is possible that some portfolios of advisory programs will generate higher prices and less risk than the market benchmark (lie in the upper left quadrant of Figures 11 and 13), even though the individual advisory programs that make up the portfolio do not. The potential improvement in performance depends on the degree to which net advisory prices do *not* tend to move together. The application of MPT to market advisory services represents an interesting area of future research for the AgMAS Project.

Table 1. Linear Model of Harvest Progress and Associated Loan Deficiency Payment (LDP), Wheat, Southwest Illinois, 1999 Crop Year

Date	Harvest Progress Through Date	LDP on Date	Average LDP Through Date
	---percent---	---$/bu.---	---$/bu.---
06/18/1999	6.7	0.39	0.39
06/21/1999	13.3	0.39	0.39
06/22/1999	20.0	0.40	0.39
06/23/1999	26.7	0.46	0.41
06/24/1999	33.3	0.44	0.42
06/25/1999	40.0	0.49	0.43
06/28/1999	46.7	0.48	0.44
06/29/1999	53.3	0.45	0.44
06/30/1999	60.0	0.44	0.44
07/01/1999	66.7	0.42	0.44
07/02/1999	73.3	0.48	0.44
07/05/1999	80.0	0.56	0.45
07/06/1999	86.7	0.64	0.46
07/07/1999	93.3	0.64	0.48
07/08/1999	100.0	0.64	0.49

Note: Progress reported for entire state, as regional harvest progress data for wheat in Illinois is unavailable.

Table 2. Pricing Performance Results for 23 Market Advisory Service Programs, Wheat, 1999 Crop Year

Market Advisory Program	(1) Unadjusted Cash Sales Price	(2) Carrying Charges Interest Costs	(3) Storage Costs	(4) Net Cash Sales Price	(5) Futures & Options Gain	(6) Brokerage Costs	(7) LDP/ MLG	(8) Net Advisory Price
				---$/bushel---				
Ag Profit by Hjort	2.14	0.00	0.05	2.08	0.00	0.00	0.61	**2.69**
Ag Review	2.37	0.12	0.34	1.90	0.01	0.00	0.27	**2.18**
AgLine by Doane (cash only)	2.16	0.05	0.13	1.98	0.00	0.00	0.62	**2.60**
AgLine by Doane (hedge)	2.16	0.05	0.13	1.98	0.00	0.00	0.62	**2.60**
AgResource	2.35	0.01	0.06	2.28	0.65	0.02	0.47	**3.38**
AgriVisor (aggressive cash)	2.19	0.04	0.10	2.06	0.00	0.00	0.61	**2.67**
AgriVisor (aggressive hedge)	2.19	0.04	0.10	2.06	-0.03	0.01	0.61	**2.63**
AgriVisor (basic cash)	2.19	0.04	0.10	2.06	0.00	0.00	0.61	**2.67**
AgriVisor (basic hedge)	2.19	0.04	0.10	2.06	-0.08	0.01	0.61	**2.58**
Allendale (futures only)	2.54	0.32	0.58	1.64	1.18	0.10	0.49	**3.22**
Brock (cash only)	2.26	0.12	0.24	1.89	0.00	0.00	0.70	**2.59**
Brock (hedge)	2.26	0.12	0.24	1.89	0.05	0.02	0.70	**2.62**
Cash Grain	2.48	0.07	0.24	2.17	0.00	0.00	0.30	**2.47**
Freese-Notis	2.37	0.11	0.22	2.05	0.00	0.00	0.28	**2.33**
Pro Farmer (cash only)	2.18	0.13	0.27	1.77	0.00	0.00	0.57	**2.34**
Pro Farmer (hedge)	2.16	0.12	0.26	1.77	-0.01	0.01	0.67	**2.42**
Risk Management Group (cash only)	2.36	0.00	0.00	2.36	0.00	0.00	0.49	**2.85**
Risk Management Group (futures & options)	2.23	0.00	0.00	2.23	0.10	0.01	0.49	**2.81**
Risk Management Group (options only)	2.23	0.00	0.00	2.23	0.00	0.00	0.49	**2.73**
Stewart-Peterson Advisory Reports	2.45	0.09	0.18	2.18	-0.10	0.04	0.40	**2.44**
Stewart-Peterson Strictly Cash	2.42	0.07	0.14	2.21	0.00	0.00	0.41	**2.62**
Top Farmer Intelligence	2.27	0.17	0.33	1.77	0.41	0.03	0.49	**2.64**
Utterback Marketing Services	2.39	0.00	0.00	2.39	-0.22	0.09	0.49	**2.57**
Descriptive Statistics:								
Average	2.28	0.07	0.16	2.04	0.09	0.02	0.52	**2.64**
Median	2.26	0.05	0.13	2.06	0.00	0.00	0.49	**2.62**
Minimum	2.14	0.00	0.00	1.64	-0.22	0.00	0.27	**2.18**
Maximum	2.54	0.32	0.58	2.39	1.18	0.10	0.70	**3.38**
Range	0.41	0.32	0.58	0.75	1.41	0.10	0.43	**1.20**
Standard Deviation	0.12	0.07	0.14	0.20	0.29	0.03	0.13	**0.26**
Market Benchmark Price	2.41	0.04	0.09	2.28	0.00	0.00	0.40	**2.68**

Notes: Net cash sales price is calculated as (1) - (2) - (3). Net advisory price is calculated as (4) + (5) - (6) + (7), and therefore, is stated on a harvest equivalent basis. The market benchmark price is stated on a harvest equivalent basis. LDP stands for loan deficiency payment and MLG stands for marketing loan gain. The market benchmark price is the average daily cash price for the two-year marketing window from June 1, 1998 through May 31, 2000.

Table 3. Revenue Performance Results and Cost of Service for 23 Market Advisory Programs, Wheat, 1999 Crop Year

Market Advisory Program	Advisory Revenue	Annual Cost of Service
	---$/acre---	---$/year---
Ag Profit by Hjort	**167**	280
Ag Review	**135**	360
AgLine by Doane (cash only)	**161**	300
AgLine by Doane (hedge)	**161**	300
AgResource	**209**	600
AgriVisor (aggressive cash)	**166**	299
AgriVisor (aggressive hedge)	**163**	299
AgriVisor (basic cash)	**166**	299
AgriVisor (basic hedge)	**160**	299
Allendale (futures only)	**200**	300
Brock (cash only)	**161**	240
Brock (hedge)	**163**	240
Cash Grain	**153**	356
Freese-Notis	**144**	360
Pro Farmer (cash only)	**145**	420
Pro Farmer (hedge)	**150**	420
Risk Management Group (cash only)	**177**	500
Risk Management Group (futures & options)	**174**	500
Risk Management Group (options only)	**169**	500
Stewart-Peterson Advisory Reports	**151**	150
Stewart-Peterson Strictly Cash	**163**	99
Top Farmer Intelligence	**164**	180
Utterback Marketing Services	**159**	300
Descriptive Statistics:		
Average	**163**	330
Median	**163**	300
Minimum	**135**	99
Maximum	**209**	600
Range	**74**	501
Standard Deviation	**16**	119
Market Benchmark Revenue	**166**	

Notes: Advisory revenue per acre for wheat is calculated as net advisory price times 62 bushels. Market benchmark revenue per acre for wheat is calculated as market benchmark price times 62 bushels. Advisory revenue per acre and market benchmark revenue are stated on a harvest equivalent basis. The annual cost of a service is not subtracted from advisory revenue per acre. The 1999 crop year is a two-year marketing window from June 1,1998 through May 31, 2000.

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Table 4. Pricing Performance Results for Market Advisory Programs, Wheat, 1995-1999 Crop Years

Market Advisory Program	1995 Net Advisory Price	1996 Net Advisory Price	1997 Net Advisory Price	1998 Net Advisory Price	1999 Net Advisory Price
			---$/bushel---		
Ag Profit by Hjort	4.54	4.08	1.75	1.15	2.69
Ag Review	4.71	3.60	1.97	2.25	2.18
AgLine by Doane (cash only)	4.11	4.47	2.85	2.05	2.60
AgLine by Doane (hedge)	N/A	N/A	N/A	2.01	2.60
AgResource	4.21	4.94	1.34	2.13	3.38
Agri-Edge (cash-only)	4.01	2.98	N/A	N/A	N/A
Agri-Edge (hedge)	3.98	3.11	N/A	N/A	N/A
AgriVisor (aggressive cash)	3.21	4.03	2.20	2.27	2.67
AgriVisor (aggressive hedge)	4.00	4.18	2.20	2.09	2.63
AgriVisor (basic cash)	3.03	3.91	2.20	2.15	2.67
AgriVisor (basic hedge)	3.91	3.84	2.20	2.05	2.58
Allendale (futures only)	3.32	2.95	3.01	2.71	3.22
Brock (cash only)	3.45	3.99	3.32	2.77	2.59
Brock (hedge)	3.33	3.76	3.49	3.33	2.62
Cash Grain	N/A	N/A	N/A	N/A	2.47
Freese-Notis	3.66	4.42	3.23	2.54	2.33
Grain Field Report	3.79	3.60	N/A	N/A	N/A
Harris Weather/Elliott Advisory	4.11	3.65	N/A	N/A	N/A
North American Ag.	4.19	N/A	N/A	N/A	N/A
Pro Farmer (cash only)	3.94	4.09	2.87	2.40	2.34
Pro Farmer (hedge)	4.38	3.76	2.83	2.47	2.42
Progressive Ag	N/A	4.29	2.42	2.54	N/A
Prosperous Farmer	3.30	N/A	N/A	N/A	N/A
Risk Management Group (cash only)	N/A	N/A	N/A	N/A	2.85
Risk Management Group (futures & options)	N/A	N/A	N/A	N/A	2.81
Risk Management Group (options only)	N/A	N/A	N/A	N/A	2.73
Stewart-Peterson Advisory Reports	3.34	3.85	2.98	2.62	2.44
Stewart-Peterson Strictly Cash	3.63	3.90	3.15	2.71	2.62
Top Farmer Intelligence	3.01	3.60	2.55	2.23	2.64
Utterback Marketing Services	N/A	N/A	3.90	2.79	2.57
Zwicker Cycle Letter	3.89	2.74	2.20	2.22	N/A
Descriptive Statistics:					
Average	3.79	3.82	2.63	2.36	2.64
Median	3.90	3.85	2.69	2.27	2.62
Minimum	3.01	2.74	1.34	1.15	2.18
Maximum	4.71	4.94	3.90	3.33	3.38
Range	1.70	2.20	2.56	2.17	1.20
Standard Deviation	0.47	0.52	0.64	0.43	0.26
Market Benchmark Price	3.61	3.95	3.22	2.90	2.68

Notes: N/A denotes "not applicable" -- program did not exist or was not evaluated for that marketing year. Net advisory price and market benchmark price are stated on a harvest equivalent basis. The market benchmark price is the average daily cash price for the two-year marketing window for each crop year.

Table 5. Pricing Performance Results for Market Advisory Programs, Two-Year, Three-Year, Four-Year and Five-Year Averages, Wheat, 1995-1999 Crop Years

Market Advisory Program	1998-99 Two-Year Average	1997-99 Three-Year Average	1996-99 Four-Year Average	1995-99 Five-Year Average
	---$/bushel---			
Ag Profit by Hjort	1.92	1.87	2.42	2.84
Ag Review	2.21	2.13	2.50	2.94
AgLine by Doane (cash only)	2.33	2.50	2.99	3.22
AgLine by Doane (hedge)	2.31	N/A	N/A	N/A
AgResource	2.75	2.28	2.95	3.20
Agri-Edge (cash-only)	N/A	N/A	N/A	N/A
Agri-Edge (hedge)	N/A	N/A	N/A	N/A
AgriVisor (aggressive cash)	2.47	2.38	2.79	2.88
AgriVisor (aggressive hedge)	2.36	2.31	2.77	3.02
AgriVisor (basic cash)	2.41	2.34	2.73	2.79
AgriVisor (basic hedge)	2.31	2.28	2.67	2.92
Allendale (futures only)	2.97	2.98	2.97	3.04
Brock (cash only)	2.68	2.90	3.17	3.23
Brock (hedge)	2.98	3.15	3.30	3.31
Cash Grain	N/A	N/A	N/A	N/A
Freese-Notis	2.43	2.70	3.13	3.24
Grain Field Report	N/A	N/A	N/A	N/A
Harris Weather/Elliott Advisory	N/A	N/A	N/A	N/A
North American Ag.	N/A	N/A	N/A	N/A
Pro Farmer (cash only)	2.37	2.54	2.93	3.13
Pro Farmer (hedge)	2.45	2.57	2.87	3.17
Progressive Ag	N/A	N/A	N/A	N/A
Prosperous Farmer	N/A	N/A	N/A	N/A
Risk Management Group (cash only)	N/A	N/A	N/A	N/A
Risk Management Group (futures & options)	N/A	N/A	N/A	N/A
Risk Management Group (options only)	N/A	N/A	N/A	N/A
Stewart-Peterson Advisory Reports	2.53	2.68	2.97	3.05
Stewart-Peterson Strictly Cash	2.67	2.83	3.09	3.20
Top Farmer Intelligence	2.44	2.48	2.76	2.81
Utterback Marketing Services	2.68	3.09	N/A	N/A
Zwicker Cycle Letter	N/A	N/A	N/A	N/A
Descriptive Statistics:				
Average	2.49	2.55	2.88	3.06
Median	2.44	2.52	2.93	3.05
Minimum	1.92	1.87	2.42	2.79
Maximum	2.98	3.15	3.30	3.31
Range	1.05	1.28	0.88	0.52
Standard Deviation	0.26	0.34	0.23	0.17
Market Benchmark Price	2.79	2.93	3.19	3.27

Notes: N/A denotes "not applicable" -- program did not exist or was not evaluated for that marketing year. Net advisory price and market benchmark price are stated on a harvest equivalent basis. The market benchmark price is the average daily cash price for the two-year marketing window for each crop year.

Table 6. Revenue Performance Results for Market Advisory Programs, Wheat, 1995-1999 Crop Years

Market Advisory Program	1995 Advisory Revenue	1996 Advisory Revenue	1997 Advisory Revenue	1998 Advisory Revenue	1999 Advisory Revenue
	---$/acre---				
Ag Profit by Hjort	204	155	114	59	167
Ag Review	212	137	128	115	135
AgLine by Doane (cash only)	185	170	185	105	161
AgLine by Doane (hedge)	N/A	N/A	N/A	103	161
AgResource	190	188	87	109	209
Agri-Edge (cash-only)	181	113	N/A	N/A	N/A
Agri-Edge (hedge)	179	118	N/A	N/A	N/A
AgriVisor (aggressive cash)	144	153	143	116	166
AgriVisor (aggressive hedge)	180	159	143	107	163
AgriVisor (basic cash)	136	149	143	110	166
AgriVisor (basic hedge)	176	146	143	105	160
Allendale (futures only)	150	112	195	138	200
Brock (cash only)	155	152	216	141	161
Brock (hedge)	150	143	227	170	163
Cash Grain	N/A	N/A	N/A	N/A	153
Freese-Notis	165	168	210	130	144
Grain Field Report	171	137	N/A	N/A	N/A
Harris Weather/Elliott Advisory	185	139	N/A	N/A	N/A
North American Ag.	188	N/A	N/A	N/A	N/A
Pro Farmer (cash only)	177	156	187	122	145
Pro Farmer (hedge)	197	143	184	126	150
Progressive Ag	N/A	163	158	129	N/A
Prosperous Farmer	148	N/A	N/A	N/A	N/A
Risk Management Group (cash only)	N/A	N/A	N/A	N/A	177
Risk Management Group (futures & options)	N/A	N/A	N/A	N/A	174
Risk Management Group (options only)	N/A	N/A	N/A	N/A	169
Stewart-Peterson Advisory Reports	150	146	194	134	151
Stewart-Peterson Strictly Cash	163	148	204	138	163
Top Farmer Intelligence	135	137	166	114	164
Utterback Marketing Services	N/A	N/A	253	142	159
Zwicker Cycle Letter	175	104	143	113	N/A
Descriptive Statistics:					
Average	171	145	171	120	163
Median	175	146	175	116	163
Minimum	135	104	87	59	135
Maximum	212	188	253	170	209
Range	77	83	167	111	74
Standard Deviation	21	20	41	22	16
Market Benchmark Revenue	162	150	209	148	166

Notes: N/A denotes "not applicable" -- program did not exist or was not evaluated for that marketing year. Advisory and market benchmark revenues are stated on a harvest equivalent basis. A crop year is a two-year marketing window from June of the year previous to harvest through May of the year after harvest.

Table 7. Revenue Performance Results for Market Advisory Programs, Two-Year, Three-Year, Four-Year and Five-Year Averages, Wheat, 1995-1999 Crop Years

Market Advisory Program	1998-99 Two-Year Average	1997-99 Three-Year Average	1996-99 Four-Year Average	1995-99 Five-Year Average
	---$/acre---			
Ag Profit by Hjort	113	113	124	140
Ag Review	125	126	129	145
AgLine by Doane (cash only)	133	150	155	161
AgLine by Doane (hedge)	132	N/A	N/A	N/A
AgResource	159	135	148	156
Agri-Edge (cash-only)	N/A	N/A	N/A	N/A
Agri-Edge (hedge)	N/A	N/A	N/A	N/A
AgriVisor (aggressive cash)	141	141	144	144
AgriVisor (aggressive hedge)	135	137	143	150
AgriVisor (basic cash)	138	139	142	141
AgriVisor (basic hedge)	132	136	138	146
Allendale (futures only)	169	178	161	159
Brock (cash only)	151	173	167	165
Brock (hedge)	166	187	176	171
Cash Grain	N/A	N/A	N/A	N/A
Freese-Notis	137	161	163	163
Grain Field Report	N/A	N/A	N/A	N/A
Harris Weather/Elliott Advisory	N/A	N/A	N/A	N/A
North American Ag.	N/A	N/A	N/A	N/A
Pro Farmer (cash only)	134	151	152	157
Pro Farmer (hedge)	138	153	151	160
Progressive Ag	N/A	N/A	N/A	N/A
Prosperous Farmer	N/A	N/A	N/A	N/A
Risk Management Group (cash only)	N/A	N/A	N/A	N/A
Risk Management Group (futures & options)	N/A	N/A	N/A	N/A
Risk Management Group (options only)	N/A	N/A	N/A	N/A
Stewart-Peterson Advisory Reports	142	160	156	155
Stewart-Peterson Strictly Cash	150	168	163	163
Top Farmer Intelligence	139	148	145	143
Utterback Marketing Services	151	185	N/A	N/A
Zwicker Cycle Letter	N/A	N/A	N/A	N/A
Descriptive Statistics:				
Average	141	152	150	154
Median	138	151	151	156
Minimum	113	113	124	140
Maximum	169	187	176	171
Range	56	73	52	31
Standard Deviation	14	20	14	10
Market Benchmark Price	157	175	168	167

Notes: N/A denotes "not applicable" -- program did not exist or was not evaluated for that marketing year. Advisory and market benchmark revenues are stated on a harvest equivalent basis. A crop year is a two-year marketing window from June of the year previous to harvest through May of the year after harvest.

Table 8. Five-Year Averages and Standard Deviations for 17 Market Advisory Programs, Net Advisory Price and Advisory Revenue, Wheat, 1995-1999 Crop Years

Market Advisory Program	Price		Advisory Revenue	
	Average Net Advisory Price	Standard Deviation of Net Advisory Price	Average Revenue	Standard Deviation of Revenue
	---$/bushel---		---$/acre---	
Ag Profit by Hjort	2.84	1.46	140	56
Ag Review	2.94	1.18	145	38
AgLine by Doane (cash only)	3.22	1.03	161	33
AgResource	3.20	1.47	156	55
AgriVisor (aggressive cash)	2.88	0.76	144	18
AgriVisor (aggressive hedge)	3.02	1.00	150	28
AgriVisor (basic cash)	2.79	0.72	141	20
AgriVisor (basic hedge)	2.92	0.90	146	26
Allendale (futures only)	3.04	0.24	159	38
Brock (cash only)	3.23	0.56	165	29
Brock (hedge)	3.31	0.42	171	33
Freese-Notis	3.24	0.85	163	31
Pro Farmer (cash only)	3.13	0.84	157	26
Pro Farmer (hedge)	3.17	0.86	160	30
Stewart-Peterson Advisory Reports	3.05	0.57	155	23
Stewart-Peterson Strictly Cash	3.20	0.56	163	25
Top Farmer Intelligence	2.81	0.52	143	22
Descriptive Statistics:				
Average	3.06	0.82	154	31
Median	3.05	0.84	156	29
Minimum	2.79	0.24	140	18
Maximum	3.31	1.47	171	56
Range	0.52	1.23	31	37
Market Benchmark	3.27	0.52	167	25

Note: Results are shown only for the 17 advisory programs included in all five years of the AgMAS wheat evaluations. With some exceptions, the marketing period is a two-year window from June of previous year through May of next year.

Figure 1. West Southwest Illinois Crop Reporting District

Figure 2. West Southwest Illinois Price Reporting District

Figure 3. Loan Deficiency Payment (LDP) and Marketing Loan Gain (MLG) Rates for Wheat, Southwest Illinois, 1999 Crop Year
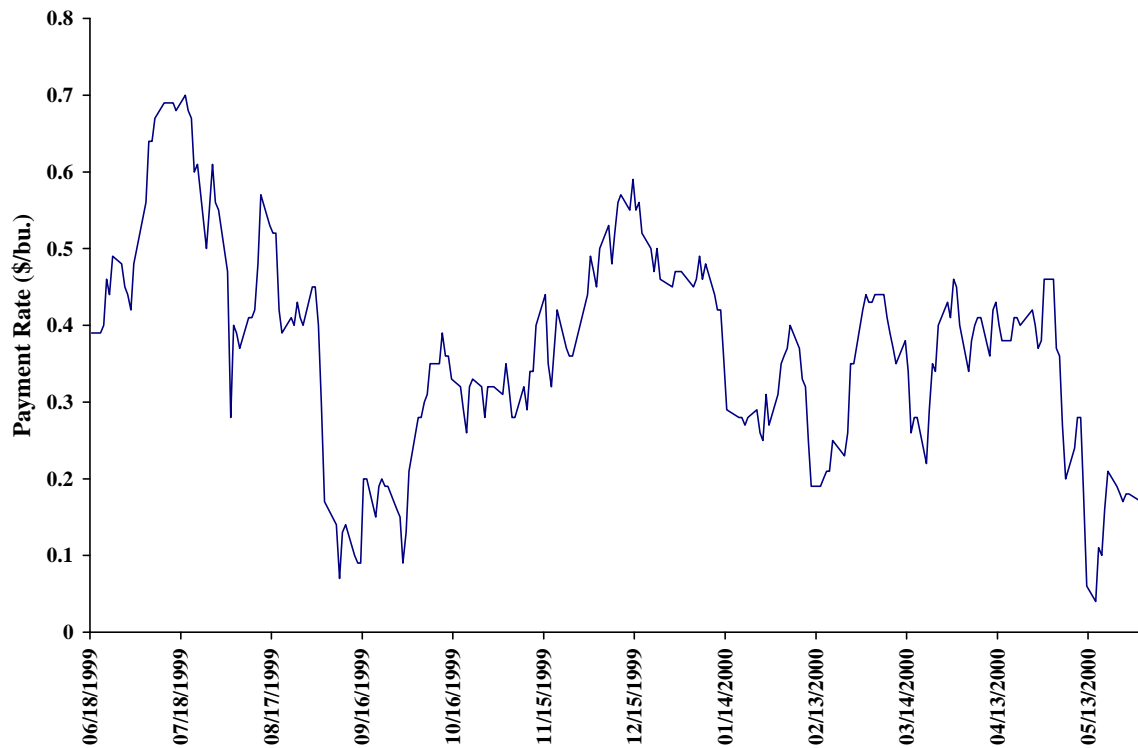
Figure 4. Comparision of Advisory Service Program Performance to Market Benchmark, Wheat, 1999 Crop Year
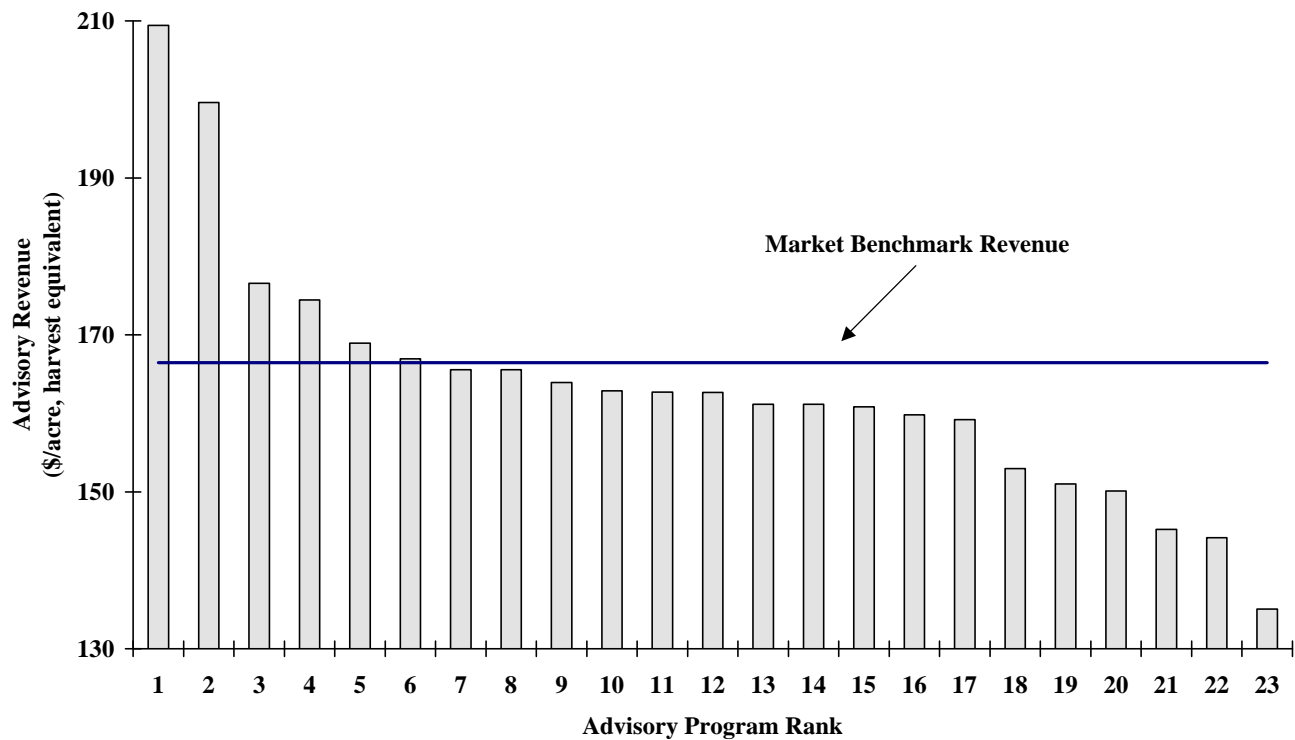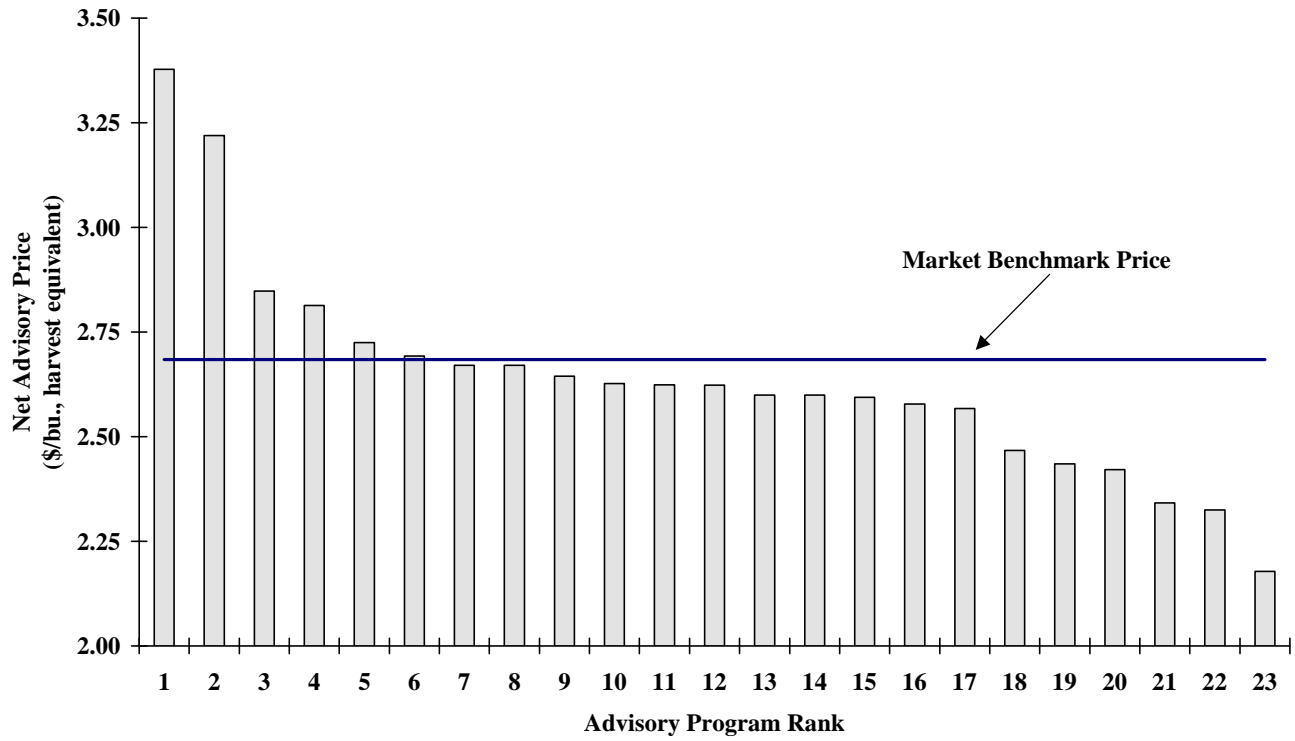
Figure 5. Daily Wheat Prices, Southwest Illinois, 1999 Crop Year
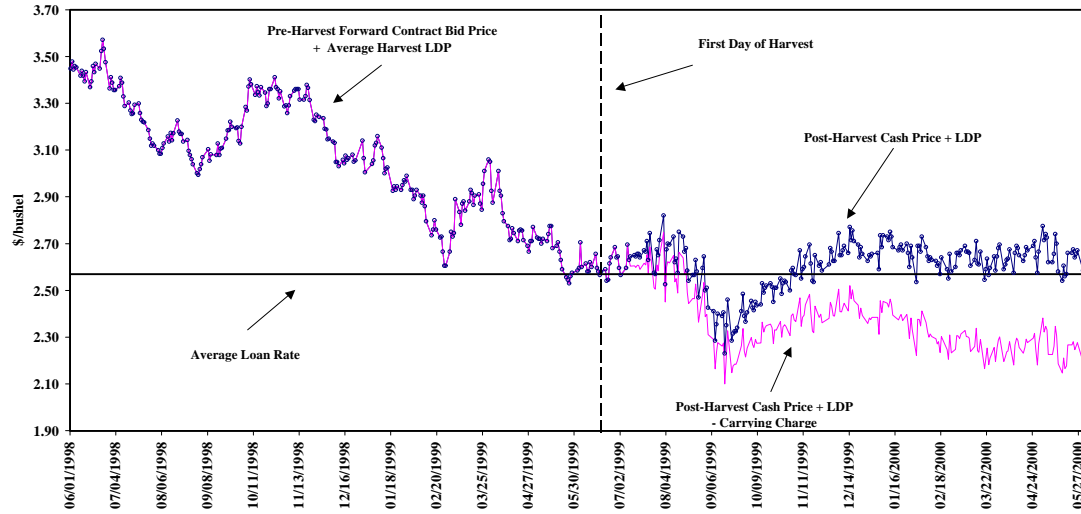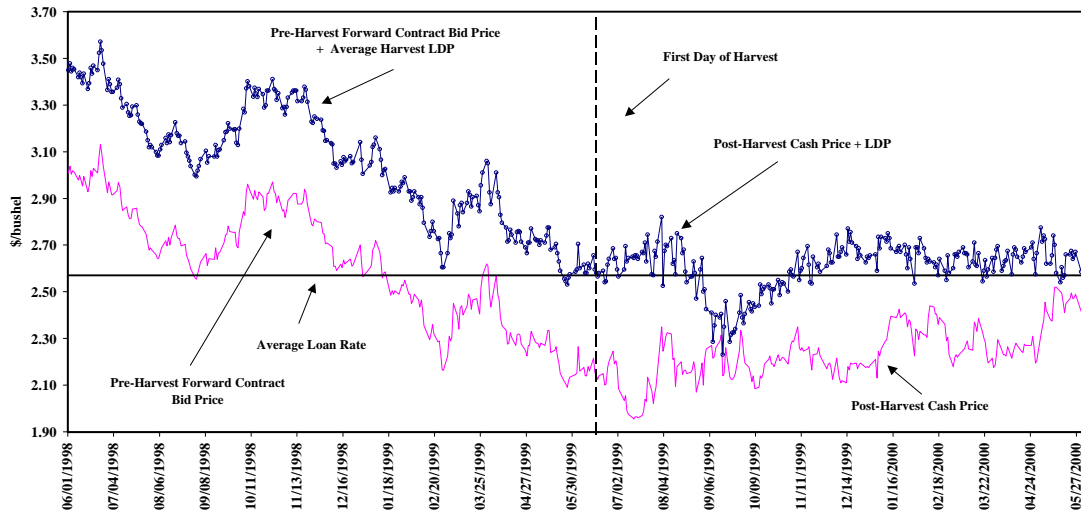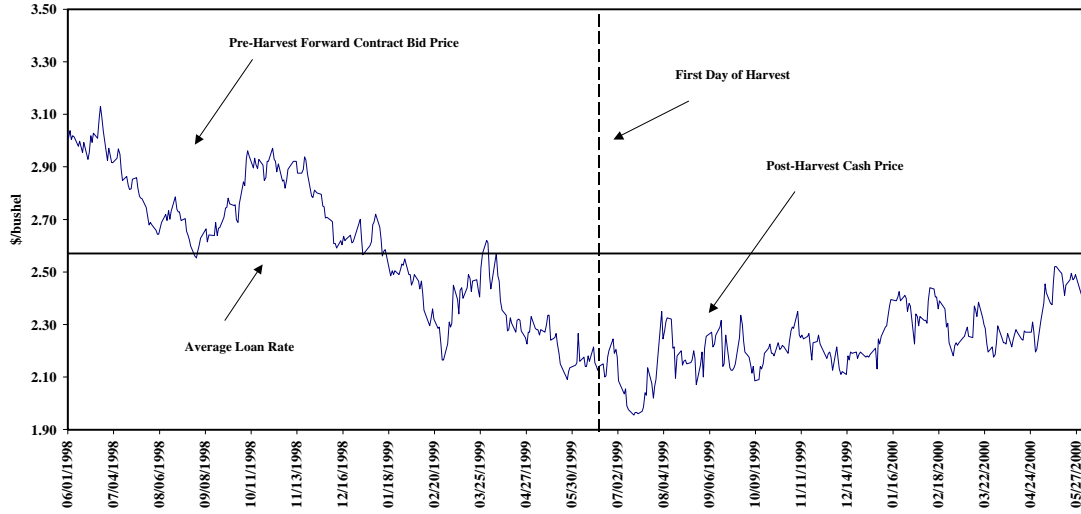
Figure 6. Comparison of Market Advisory Program Performance to Market Benchmark, Wheat, Two-Year Average, 1998-1999 Crop Years
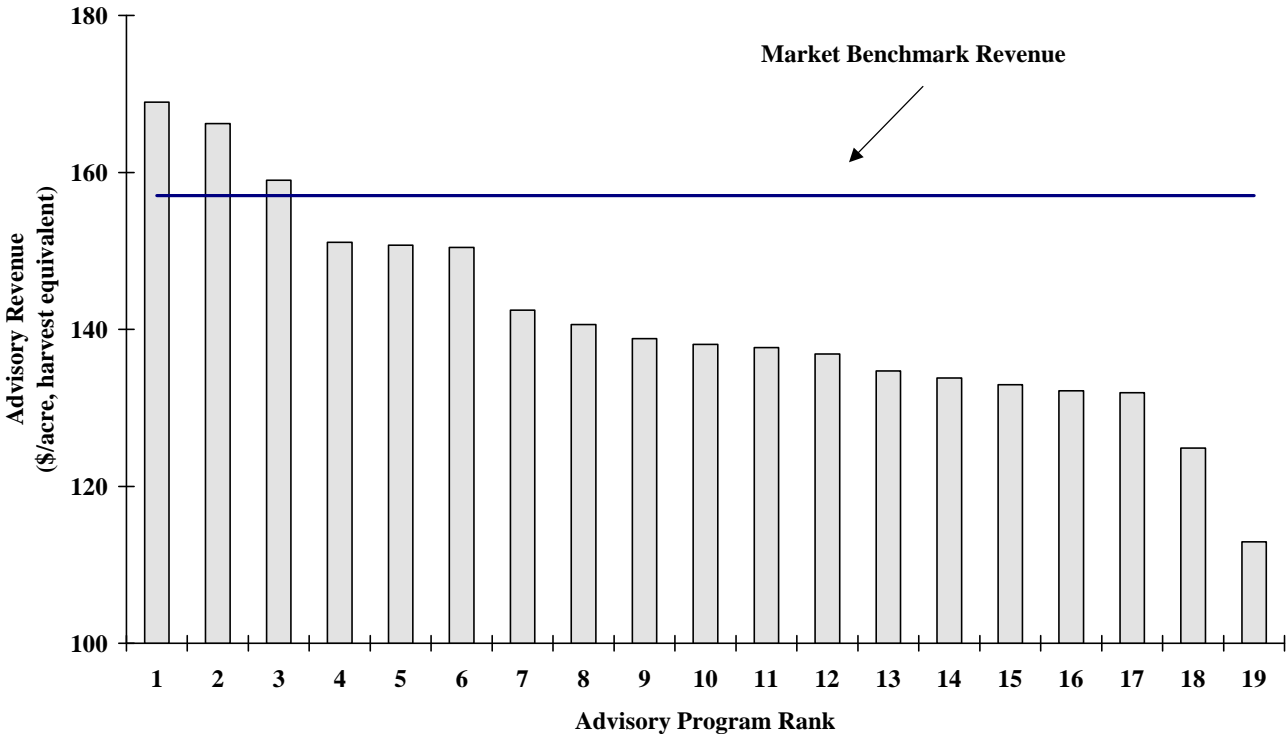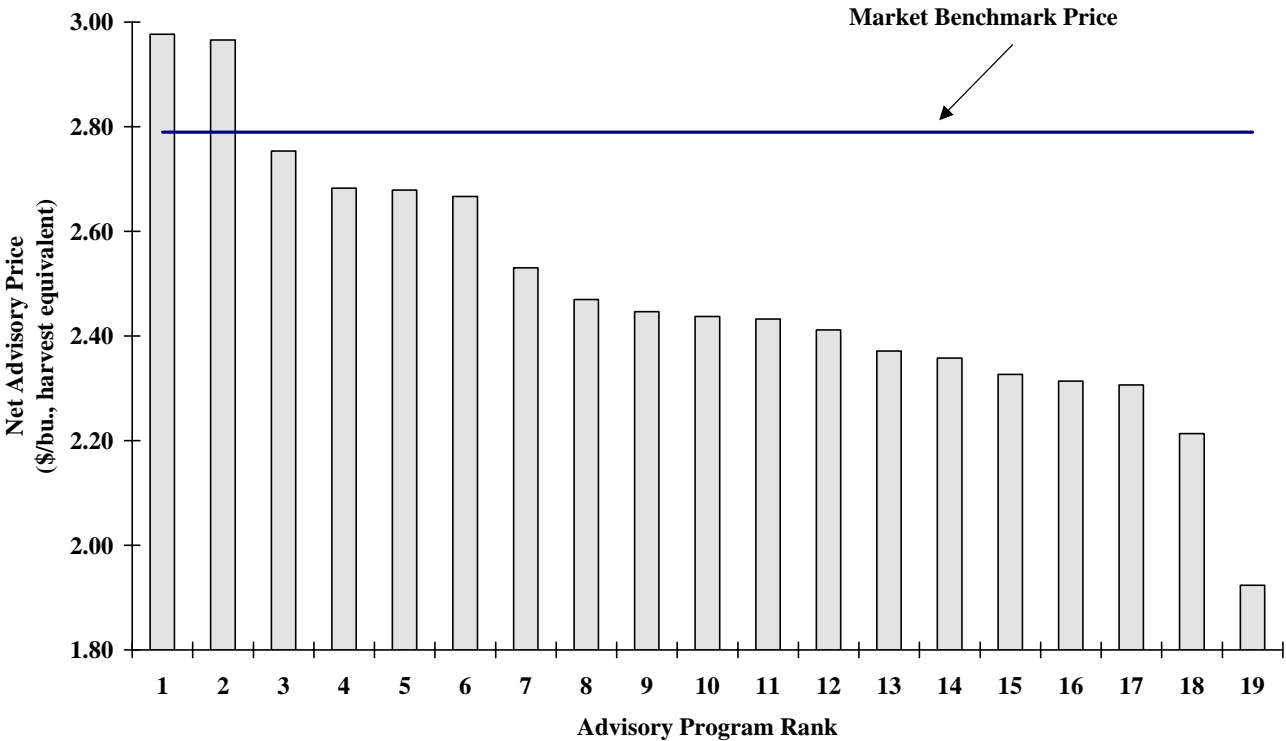
Figure 7. Comparison of Market Advisory Program Performance to Market Benchmark, Wheat, Three-Year Average, 1997-1999 Crop Years
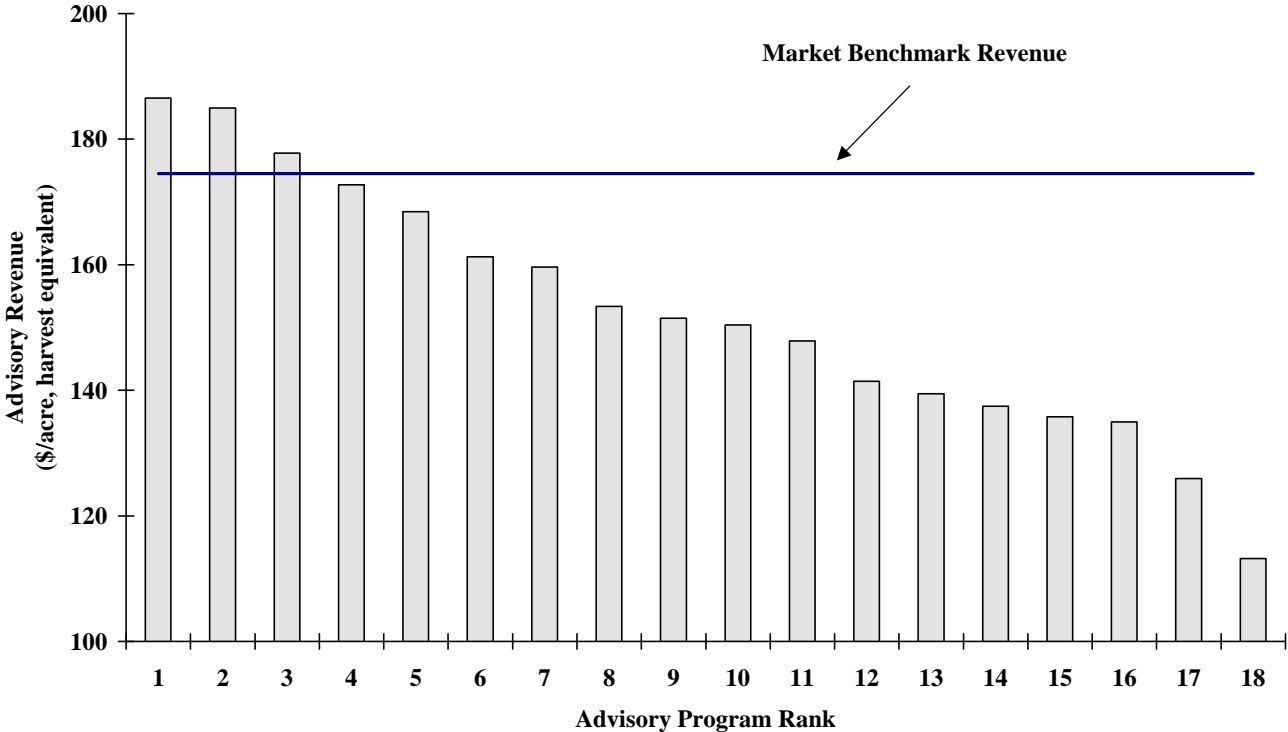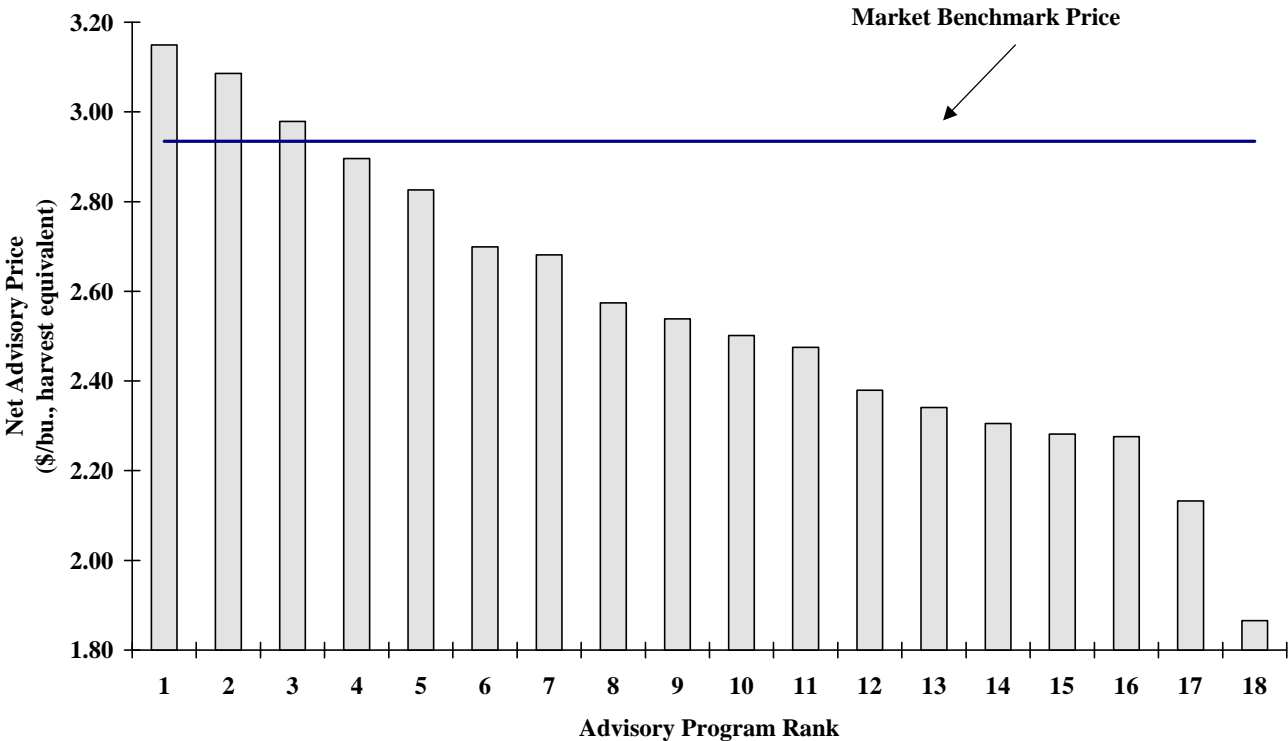
Figure 8. Comparison of Market Advisory Program Performance to Market Benchmark, Wheat, Four-Year Average, 1996-1999 Crop Years
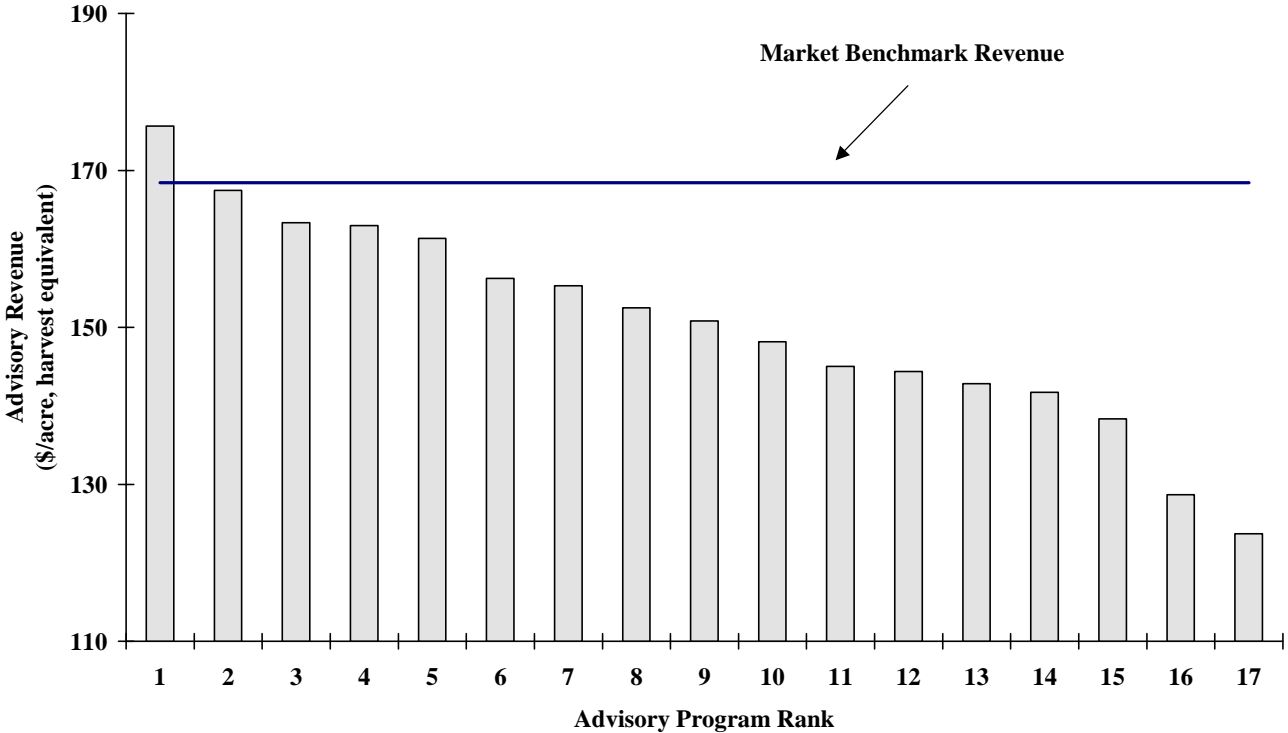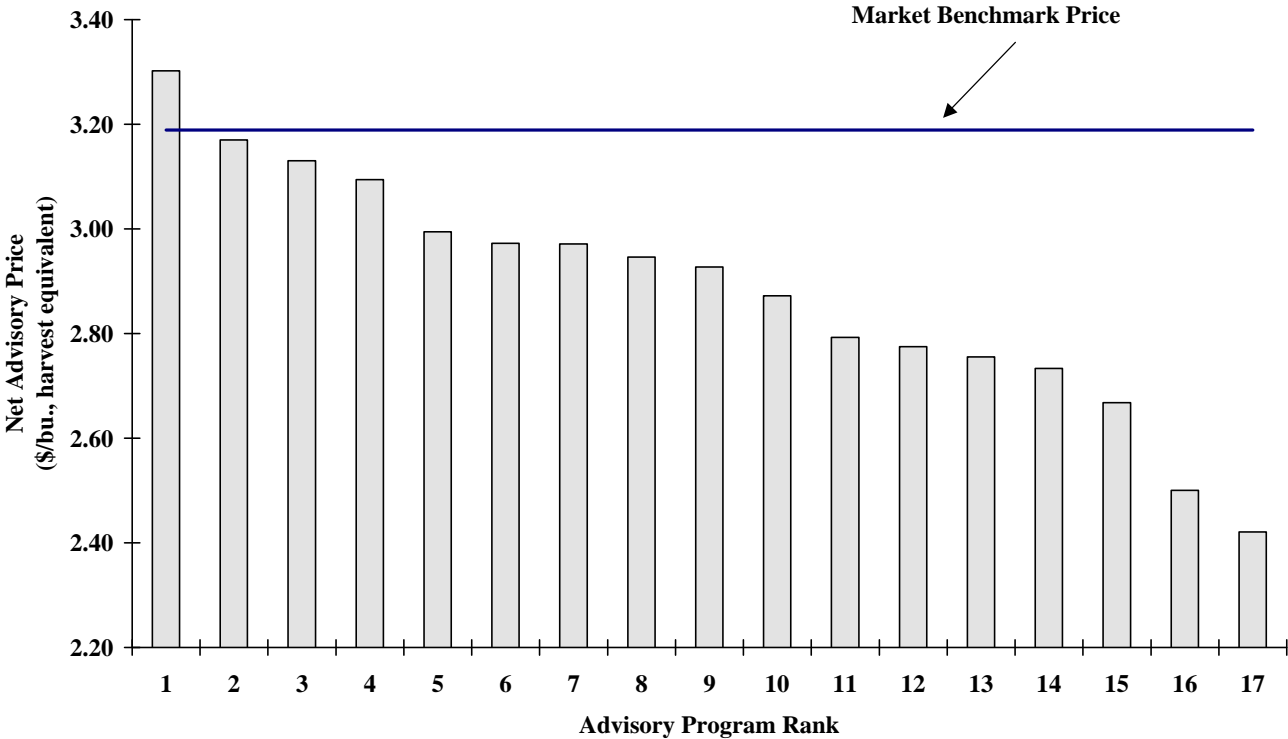
Figure 9. Comparison of Market Advisory Program Performance to Market Benchmark, Wheat, Five-Year Average, 1995-1999 Crop Years
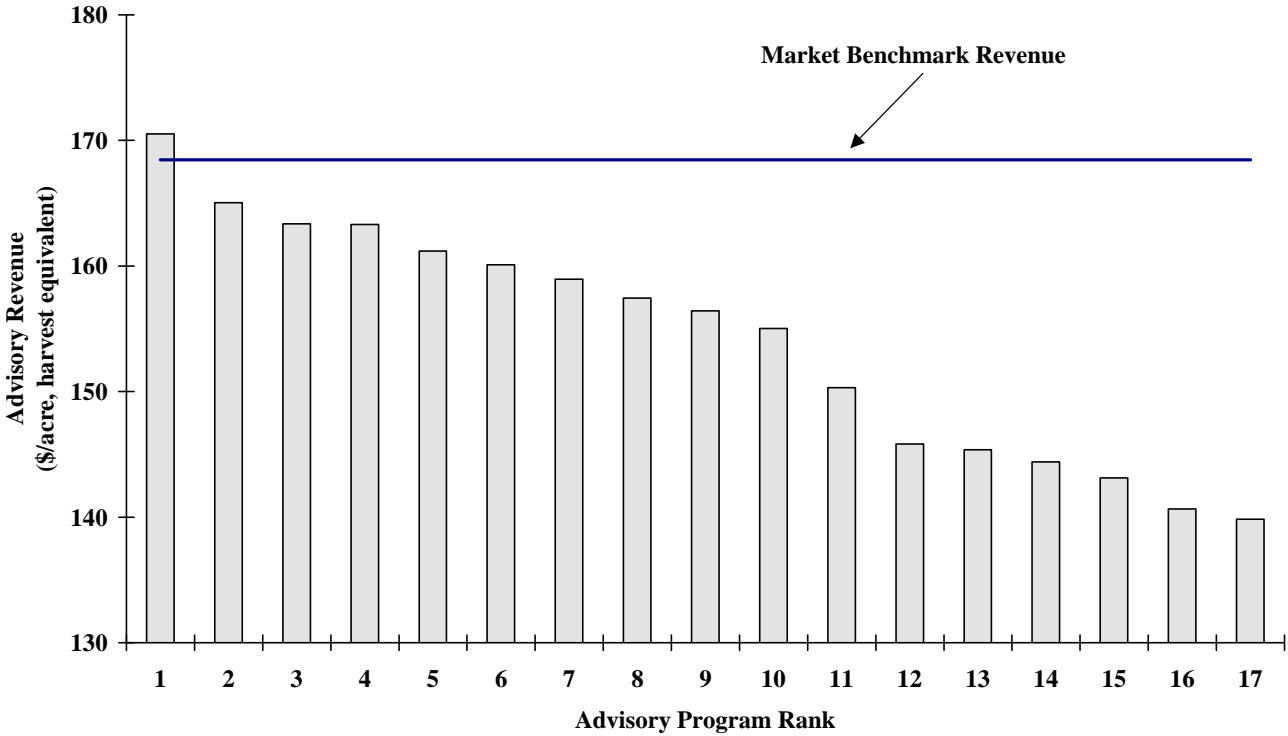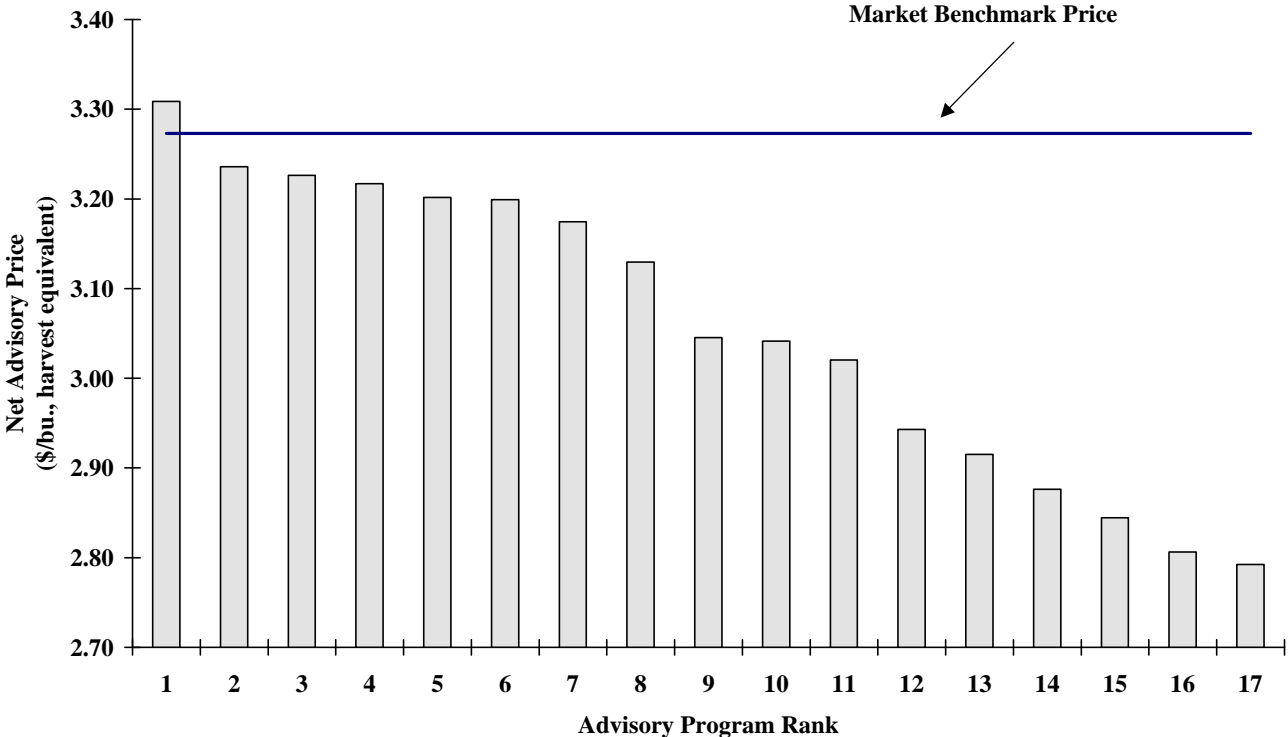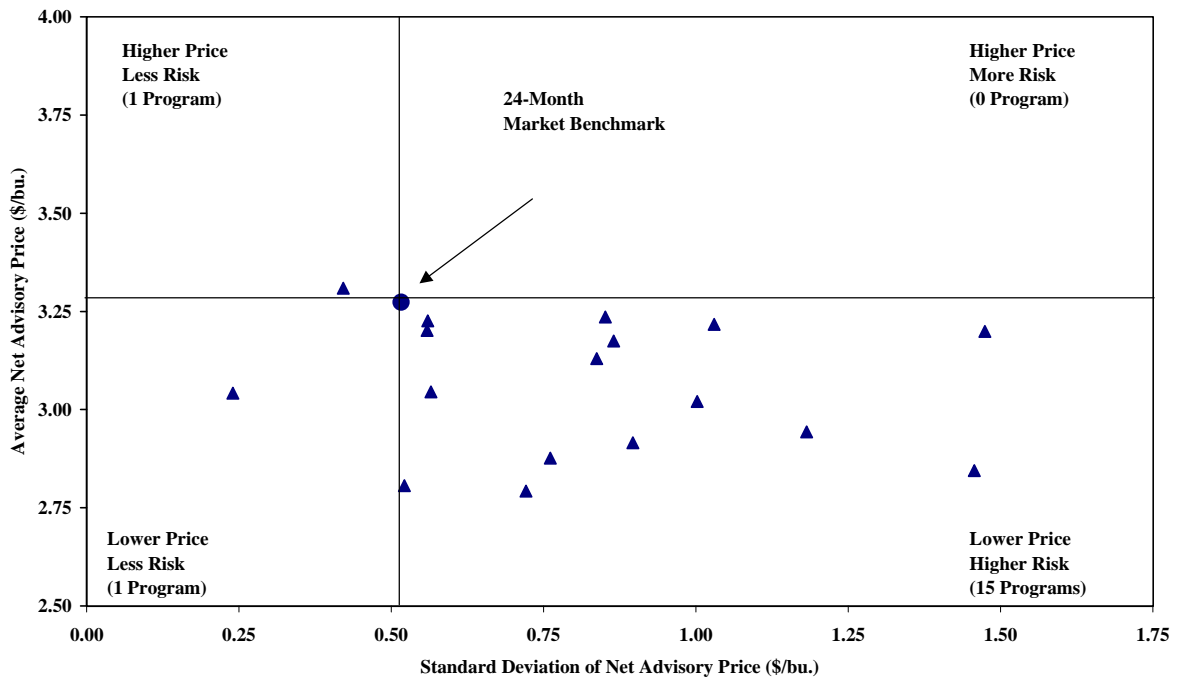
Figure 10. Average Net Advisory Price and Standard Deviation for 17 Market Advisory Programs, Wheat Price, 1995-1999 Crop Years, 24-Month Benchmark
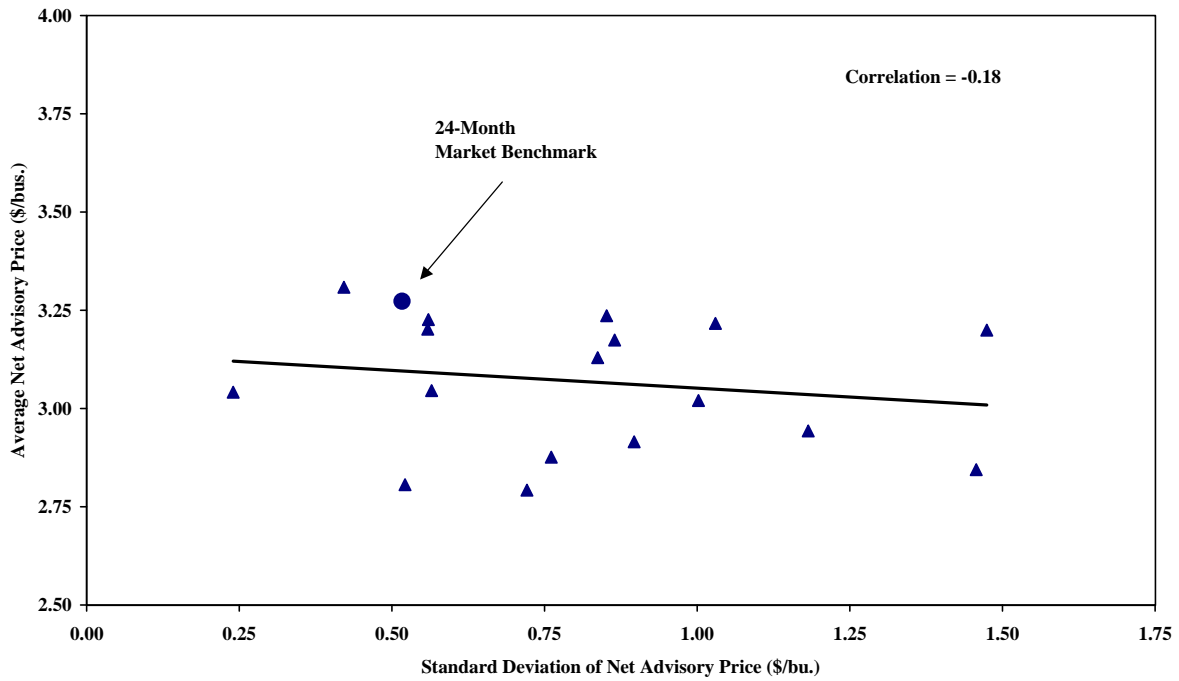
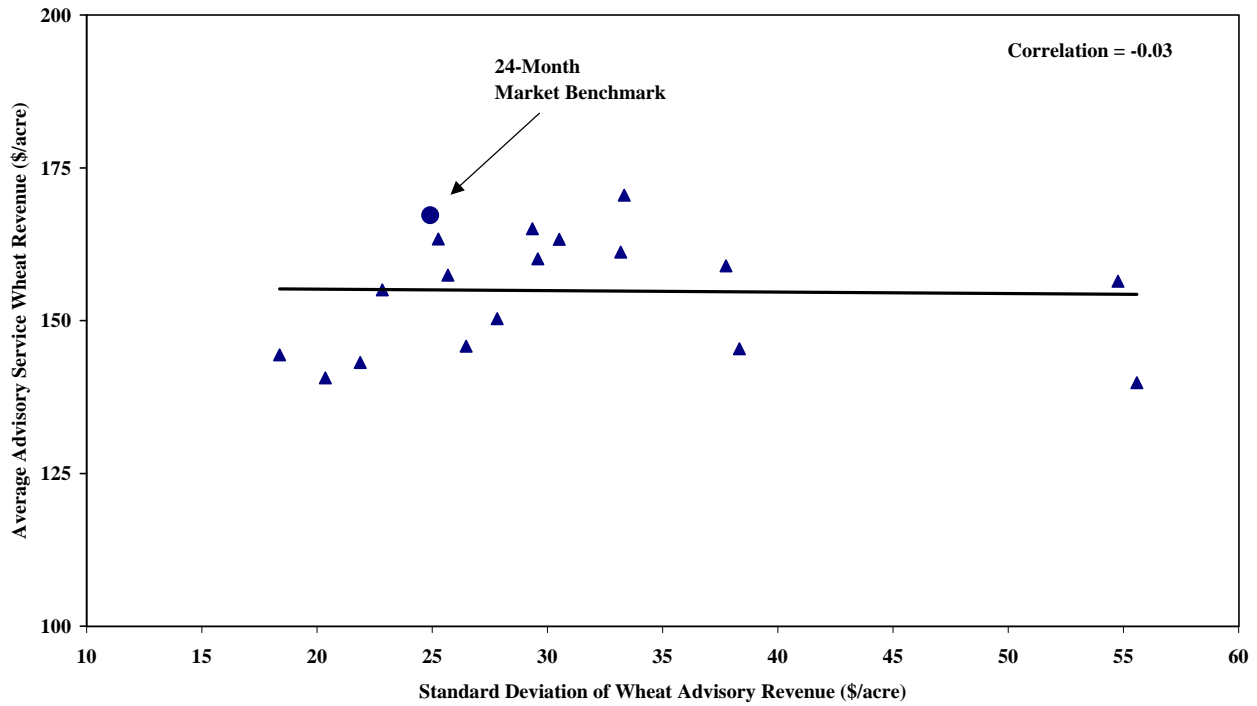**Figure 11. Pricing Performance and Risk of 17 Market Advisory Programs Relative to the Market Benchmark, Wheat Price, 1995-1999 Crop Years, 24-Month Benchmark**

Figure 12. Average Net Advisory Revenue and Standard Deviation for 17 Market Advisory Programs, Wheat Revenue, 1995-1999 Crop Years, 24-Month Benchmark

Figure 13. Pricing Performance and Risk of 17 Market Advisory Programs Relative to the Market Benchmark, Wheat Revenue, 1995-1999 Crop Years, 24-Month Benchmark
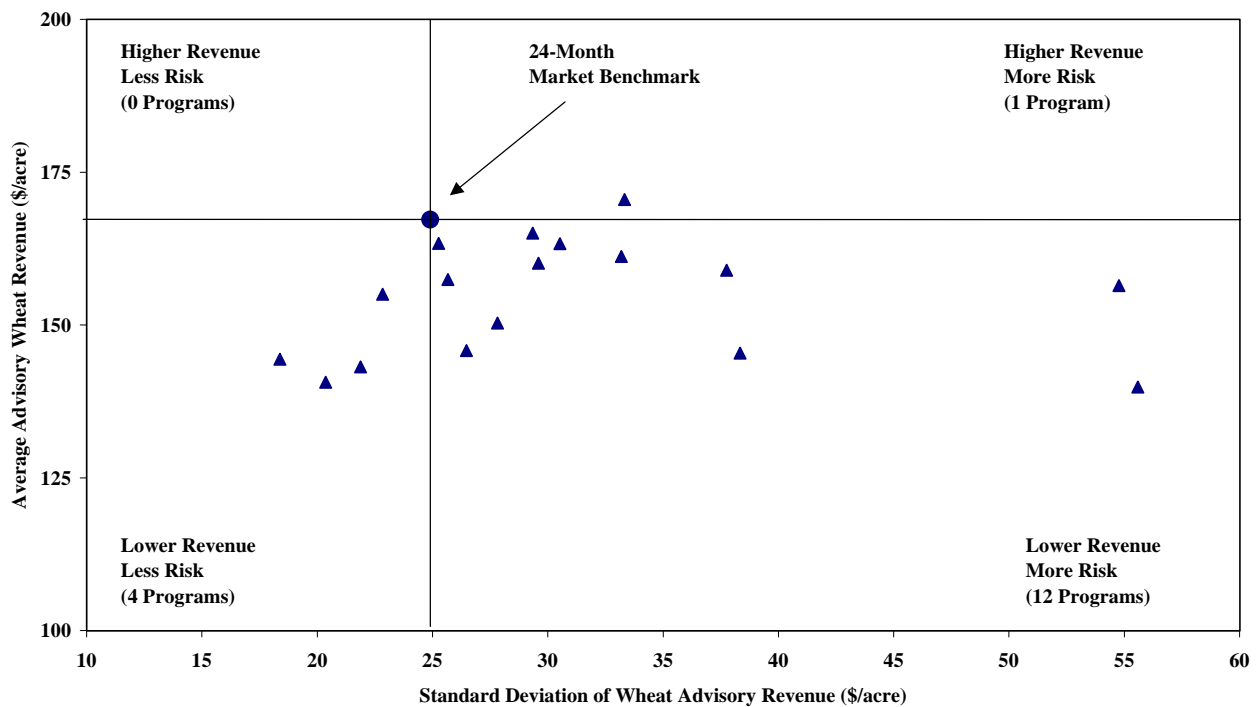
Figure 14. Pricing Performance and Risk of 17 Market Advisory Programs Relative to the Market Benchmark, Wheat Price, 1995-1999 Crop Years, 20-Month Benchmark
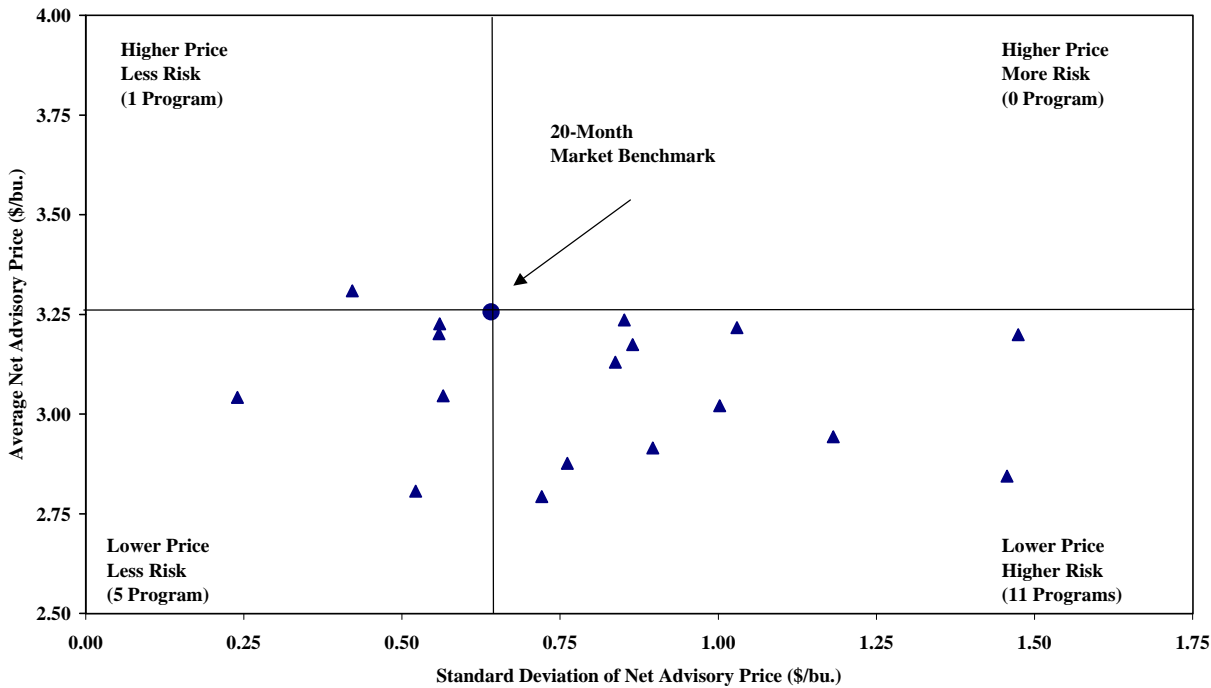

Figure 15. Pricing Performance and Risk of 17 Market Advisory Programs Relative to the Market Benchmark, Wheat Revenue, 1995-1999 Crop Years, 20-Month Benchmark