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Forecasting the Counter-Cyclical Payment Rate for U.S. Corn

An Application of the Futures Price Forecasting Model

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Abstract

The 2002 Farm Act provides for counter-cyclical payments when prices are below specified levels. Producers and policy analysts within USDA have a need to forecast counter-cyclical payments to plan for these program benefits/outlays. The counter-cyclical payment (CCP) is the product of payment rate, payment acres, and CCP payment yield. Since both payment acres and payment yields are predetermined, a model is presented that forecasts the counter-cyclical payment rate for U.S. corn. A payment rate is calculated from a forecast of the season-average corn price received and predetermined policy parameters: target price, national average loan rate, and direct payment rate. The season-average price received is forecast by a model that relies on monthly futures prices, monthly farm prices received, basis values (farm price received less futures), and marketing weights.¹

Keywords: Corn, counter-cyclical payments, marketing, basis (producer price received less nearby futures), marketing weights, futures prices, producer price received, season-average price received, and forecasting.

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¹ The futures forecast model and forecasts are available at (<http://www.ers.usda.gov/Data/Priceforecast/>).

Introduction

Price forecasts are critical to market participants making production and marketing decisions and to policymakers who administer commodity programs and assess the market impacts of domestic or international events. Price information has become even more important for market participants due to changes in U.S. agricultural policy. Passage of the 2002 Farm Act provides domestic support programs that are linked to the season-average price, such as the new counter-cyclical program.² Producers and policymakers are interested in the level of counter-cyclical payments, and thus have a renewed interest in forecasts of the season-average price. Producers need to know how these potential safety net payments will affect their cash flow. Program analysts prepare budget estimates and must forecast government outlays for counter-cyclical payments.

The 2002 Farm Act introduced the counter-cyclical payment program after several years of ad hoc emergency spending bills. Leading up to the 2002 Act, many farm and commodity organizations testified before the House and Senate Agriculture Committees in 2001, requesting additional counter-cyclical support be developed as a supplement to marketing assistance loans (marketing loan benefits) and fixed annual (direct) payments (Becker and Womach). Counter-cyclical payments replace supplemental emergency assistance payments. CCPs are based on historical area and yields and are correlated to current season-average prices received by producers.

Under the 2002 Farm Act, landowners were provided a one-time opportunity to update their farms' commodity bases and payment yields for the counter-cyclical program payment. (See the Appendix for more details.) The deadline to make this update decision was April 2003. Producers must enroll annually to be eligible for direct and counter-cyclical payments. For a given commodity, a CCP equals the farm's payment acres (base acres x 0.85) multiplied by the farm's counter-cyclical payment yield multiplied by the national CCP rate. The counter-cyclical payment rate is equal to the target price less the effective price. The effective price is equal to the direct payment rate plus the higher of the U.S. national average market price received by producers or national average loan rate. The 2002 Farm Act sets the target price, direct payment rate, and the national average loan rate for the 2002-07 crops. Thus, the only unknown variable for determining the CCP rate is the national average farm price received for U.S. corn.

Counter-cyclical payments are made to owners of enrolled base acres whenever the effective price (see earlier definition) is less than the target price. Based on the maximum corn payment rate of \$0.34/bu for the 2002/03 marketing year and assuming a season-average price received of \$1.98/bu (also equal to the national average loan rate), this program could have totaled about \$2.9 billion for marketing year 2002/03 (table 1).³ However, a counter-cyclical payment was not made for marketing year 2002/03 or 2003/04 because the effective price was equal to or exceeded the target price (table 2). A counter-cyclical payment will not be made for marketing year 2003/04 despite the fact that an advance of \$0.077/bu was made in October 2003 (USDA (i)). Thus, it is imperative that policy analysts and producers pay close attention to the season-

² On May 13, 2002, the Farm Security and Rural Investment Act of 2002 was signed into law covering a period of 6 years, 2002-07 (USDA (c)). This Act provides income support to the U.S. corn sector through three different programs: counter-cyclical payments, direct payments, and non-recourse marketing assistance loans. (For definitions of these and other farm policy terms in the text, see the ERS glossary of farm policy terms at <http://www.ers.usda.gov/features/farbill/2002glossary.htm>.) The new counter-cyclical payment (CCP) program was established to provide an improved income safety net. This component of the safety net was designed to stabilize producer income when prices are low. CCPs replace ad hoc payments, provided by Congress on an annual basis from 1998 to 2001. The new Act also provides for direct payments, which replace production flexibility contract payments, a type of direct payment from the 1996 Act. The non-recourse marketing assistance loan program is continued from the 1996 Act.

³ A marketing year covers September to December of one year and January to August of the following year.

Table 1—Hypothetical maximum corn counter-cyclical payment for marketing year 2002/03

Maximum payment rate	Estimated ¹ payment acres	Estimated CCP ¹ payment yield	=	Total hypothetical payment
\$0.34/bu	X 74.68 mil. acres	X 114.3 bu/acre	=	\$ 2.9 bil.

¹ Based on Direct and Counter-Cyclical Program authorized by the 2002 Farm Act.

Source: (USDA (g)).

Table 2—Computation of the counter-cyclical payment rate for U.S. corn, marketing years, 2002/03 through 2007/08

Marketing year	Target price	-	Effective price	[(DPR) + (Higher of SAP or NALR)] = CCP rate
———— Dollars per bushel ————				
2002/03	2.60	-	2.60	(0.28) + (2.32 or 1.98) = 0.00
2003/04	2.60	-	2.70	(0.28) + (2.42 ¹ or 1.98) = 0.00
2004/05	2.63	-	2.28	(0.28) + (2.00 ² or 1.95) = 0.35
2005/06	2.63	-		(0.28) + (? or 1.95) = ?
2006/07	2.63	-		(0.28) + (? or 1.95) = ?
2007/08	2.63	-		(0.28) + (? or 1.95) = ?

¹ Based on *Agricultural Prices*, September 29, 2004.

² Based on futures model forecast of season-average price received, October 14, 2004.

average price, in part, because farmers are required to refund counter-cyclical overpayments. Furthermore, on October 22, 2004, USDA announced an advance CCP rate of \$0.14 per bushel for marketing year 2004/05 (USDA (i)).

The U.S. Department of Agriculture analyzes agricultural markets and publishes current-year market information for many commodities, including price projections (except for cotton), on a monthly basis in the *World Agricultural Supply and Demand Estimates* (WASDE) report.⁴ This monthly WASDE price projection, for a given commodity, provides information that can be used to project the counter-cyclical payment rate. However, since producers and/or policy and commodity analysts maintain a keen interest in the magnitude of these payment rates, a weekly forecast of the season-average price may be preferable to a monthly projection. Hoffman (2001) modified a model that uses futures prices to provide weekly forecasts of the corn season-average farm price received. Such forecasts are reliable, easy to provide, and can be used to forecast the counter-cyclical payment rate. This approach provides an alternative season-average price forecast to the WASDE season-average price projection.

Since passage of the 2002 Farm Act, two counter-cyclical payment tools have been developed and posted on the internet. The first tool is by Bradley D. Lubben, Kansas State University (<http://www.agmanager.info/policy/commodity/default.asp>) and the second by the Farmdoc project, University of Illinois (www.farmdoc.uiuc.edu/marketing/CounterCyclical/CCP.asp). Lubben relies on the monthly WASDE releases to compute a projected counter-cyclical payment rate and reports USDA decisions regarding advance payments of the counter-cyclical payment. The Farmdoc counter-cyclical payment tool provides:

⁴ Price projections rely on economic models and analysts' judgment. Econometric price forecasting models, which are used in this process, are re-estimated periodically because of changes in policy and structural change (Westcott and Hoffman, Childs and Westcott, Meyer, and Plato and Chambers).

- a CCP rate for selected commodities based on the monthly WASDE projection of the season-average price received and an estimated weighted average price to date,
- a maximum potential CCP rate,
- a projected weighted average price needed for the remainder of the marketing year to result in no counter-cyclical payment,
- a projected weighted average price needed for the remainder of the year to meet the WASDE projected price,
- an estimated weighted season-average price to date, and
- an estimated percent of the U.S. crop sold to date.

The objectives of this study are to: (1) forecast a season-average farm-level price received for corn on a weekly frequency using a futures-price forecasting model and (2) forecast an annual counter-cyclical payment rate for corn on a weekly frequency. The futures-price forecasting model provides an alternative forecast of the season-average price received.

CCP Rate

The CCP rate equals the target price minus the effective price (fig. 1). Figure 1 reflects corn program provisions for marketing years 2004/05 through 2007/08. The effective price is equal to the sum of: (1) the direct payment rate (DPR) for the commodity and (2) the higher of the national season average price received (SAP) for the marketing year, or the national average loan rate (NALR).

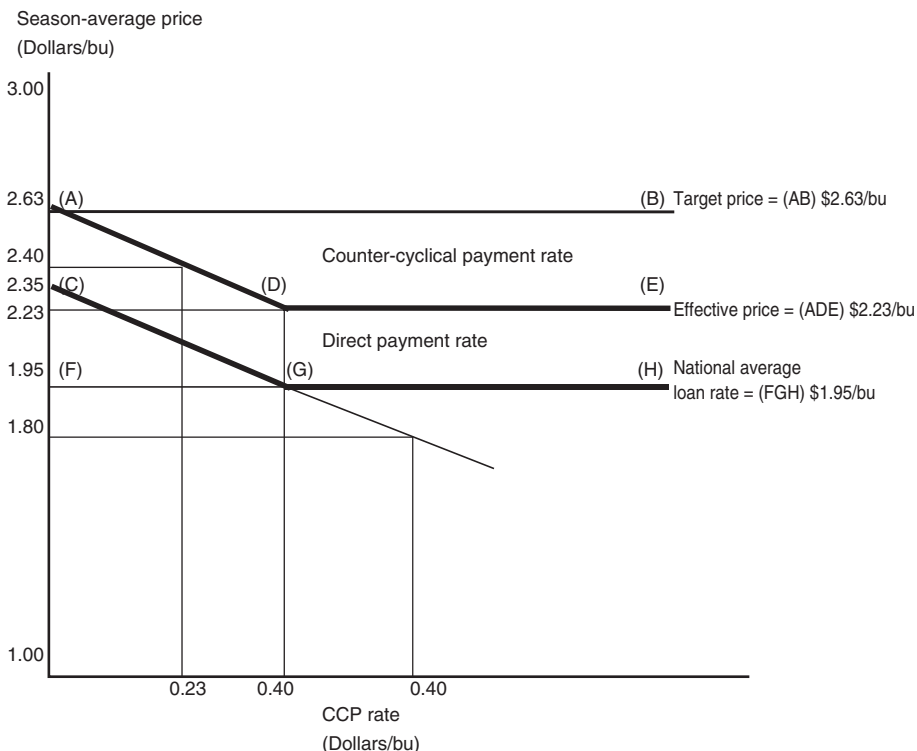
Equations 1 and 2 (see below) consist of six variables to determine the CCP rate, illustrated with 2002/03 and 2003/04 corn program provisions. The effective price, season-average price, and counter-cyclical payment rate are initially unknown, but the value for the target price, national average loan rate, and direct payment rate are set under the 2002 Farm Act (table 2). Policy parameters change slightly for later years as seen in equations 3 and 4. After the season-average price is derived through a forecast, the effective price can be determined and then the counter-cyclical payment rate.

Policy parameters needed to compute the CCP rate for marketing years 2002/03 and 2003/04

Eq. 1. CCP rate (\$? /bu) = Target price (\$2.60/bu) — Effective price (\$? /bu).

Figure 1

Relationship of U.S. season-average corn price and policy parameters to the counter-cyclical payment rate, marketing years 2004/05 through 2007/08



Eq. 2. Effective price = DPR(\$0.28/bu) + [(Higher of SAP (\$? /bu) or NALR(\$1.98/bu)].

Policy parameters needed to compute the CCP rate for marketing years 2004/05 through 2007/08

Eq. 3. CCP rate (\$? /bu) = Target price (\$2.63/bu) — Effective price (\$? /bu).

Eq. 4. Effective price = DPR(\$0.28/bu) + [Higher of SAP (\$? /bu) or NALR(\$1.95/bu)].

The season-average price and counter-cyclical payment rate relationship is illustrated in figure 1 for marketing years 2004/05 through 2007/08. When the market price is \$1.95/bu (also equal to the NALR) or lower, the counter-cyclical payment rate is at its maximum of \$0.40/bu but declines to zero as the market price rises to \$2.35/bu or greater. The market price of \$2.35/bu is called the CCP trigger price because a counter-cyclical payment can be expected if the season-average price is less than \$2.35 per bushel.⁵ Note the difference between line segment ADE and CGH is \$0.28/bu, or the direct payment rate. The difference between the target price (line segment AB) and the effective price (line segment ADE) equals the counter-cyclical payment rate. This rate remains zero as long as the effective price is equal to or greater than the target price of \$2.63/bu, but the payment rate increases to \$0.40/bu as the effective price declines to \$2.23/bu.

⁵ The trigger price is equal to the target price less the direct payment. When the season-average price is less than the trigger price, the counter-cyclical payment rate becomes positive.

Counter-cyclical payments for the 2002 through 2006 crops are to be made in three installments: (1) up to 35 percent of the expected amount in October of the year the crop is harvested (first partial), (2) up to 70 percent after February 1 of the following year (second partial), and (3) the remainder after the end of the 12-month marketing year (final) (USDA (f)). Counter-cyclical payments for corn, first partial, second partial, or final, were not made for marketing year 2002/03 (table 3). A first partial payment rate of \$0.077/bu was announced on October 13, 2003, for the 2003/04 corn marketing year. However, higher subsequent prices in the 2003/04 marketing year negated the need for corn CCPs, as the final season-average price received for corn was \$2.42/bu. By statute, producers must refund to the Commodity Credit Corporation (CCC) any counter-cyclical overpayments that were received in the first or second partial payment (USDA (h)).

Table 3—Actual and forecasted annual counter-cyclical payments for U.S. corn, marketing years, 2002/03-2004/05

Payment rate	X	Payment acres ¹	X	Payment yield ¹	=	Total payment
Actual for marketing year 2002/03						
\$0.00/bushel	X	74.68 million acres	X	114.3 bushels per acre	=	\$0.0 bil.
Actual for marketing year 2003/04						
\$0.00/bushel ²	X	73.8 million acre	X	114.4 bushels per acre	=	\$0.0 bil.
Forecast for marketing year 2004/05						
\$0.35/bushel ²	X	73.8 million acres	X	114.4 bushels per acre	=	\$3.0 bil.

¹ Source (USDA (g)).

² Based on futures model forecast of season-average price received, October 14, 2004.

Futures Forecast Model

Price forecasts have always been useful to market participants when making production and marketing decisions, and many market participants use futures prices as an indicator of expected cash prices.

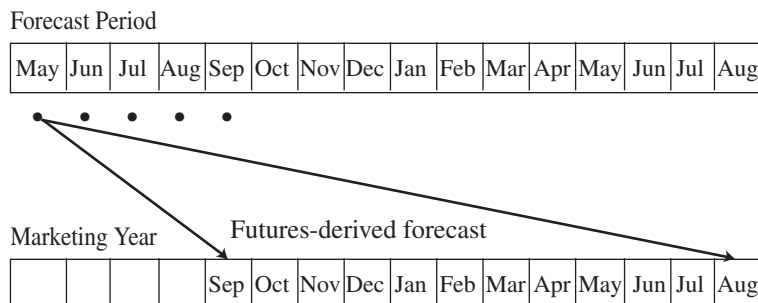
The futures forecast model consists of several components: futures prices, farm prices received, basis values (farm price received less futures), and marketing weights. The season-average price-received forecast is derived from a summation of weighted forecasts of the producer price received for each month of the marketing year. These monthly forecasts are derived from the futures contracts traded throughout the marketing year. For each marketing year month, the forecast begins with the nearby futures contract price except when the contract expires in that month, in which case the next nearby contract is used. Next, the monthly futures price is adjusted by a basis (derived from a 5-year moving average farm price less a 5-year moving average futures price) to compute the U.S. monthly farm price forecast.⁶ These monthly farm price forecasts are then weighted based on monthly marketing volumes reported by USDA.

Thus, the forecast of the season-average corn price received is derived from 12 monthly farm price forecasts, which in turn are based on five futures contracts traded throughout the marketing year. The forecast period for each marketing year covers 16 months, beginning in May, 4 months before the start of the marketing year, and concluding with August, the last month of the marketing year.⁷ The forecasts are made weekly on each Thursday.⁸ The season-average forecast is initially based on futures prices, but these prices are replaced with the actual monthly average price received by farmers, as they become available from USDA's National Agricultural Statistics Service. A midmonth farm price received for September, the first month of the marketing year, becomes available in late September with the release of the *Agricultural Prices* report.⁹ Consequently, the season-average price forecast becomes a composite of futures forecasts and farm prices received beginning mostly with the October forecast, the 6th month of the 16-month forecasting period. Sometimes the monthly farm price received (September 2004) is available before the last weekly forecast of September and thus can be included in the September forecast.

An example of the model's timeline is provided below:

Example forecast period 1

May through September—Forecasts of the season-average price received during these months use only futures-derived forecasts of the monthly price received.



⁶ This procedure provides a spot forecast based on the nearby or deferred contract, but the national average monthly price reported by the National Agricultural Statistics Service (NASS) is the price actually paid for the crop that was delivered for a given month, which may be more than or less than the simple average of the daily average of prices posted by elevators for spot delivery. For example, July and August 2004 NASS prices were above the average of daily spot prices because farmers were delivering grain at prices that were contracted in the spring when corn prices were higher. Thus, there may be some error introduced by a time lag from when the farmer priced the grain to when it was actually delivered and recorded by NASS. Futures prices are always the prices for grain based on “today’s” values.

⁷ The forecast period for each marketing year is the same for both the futures model forecast and USDA’s WASDE projection.

⁸ Thursday is picked because there are fewer holidays on that weekday and no beginning- or end-of-week surprises.

⁹ The midmonth price received becomes available before the actual monthly price received. This midmonth price is used for 1 month, then when the actual price received becomes available, it replaces the midmonth price for the remainder of the forecast period. The term “actual price” received refers to either the midmonth price or actual price received.

Futures Prices

Five #2 yellow corn futures contracts are used for this model: December, March, May, July, and September. These contracts are traded on the Chicago Board of Trade (CBOT). The closing futures prices of these contracts are used to compute current season-average price forecasts and historical basis values.

Farm Price Received

The monthly price received by U.S. corn producers is updated by the National Agricultural Statistics Service (NASS). Through sampling, NASS collects sales from producers to first buyers. The price is determined by dividing sales by quantity sold. This price represents all grades and qualities. These prices are reported monthly and also annually. The monthly quantity sold, expressed as a percent of total marketing year quantity sold, is used in the model to compute a monthly price weight.

Basis

The basis used in this model is equal to the farm price received less the futures price. The basis is computed as a 5-year moving average of the monthly U.S. corn price received by producers less a monthly average of the nearby futures closing price observed for the particular month (tables 4, 5, 6, and 7). For example, the September basis is equal to the September 5-year average farm price received by producers less September's average closing price for the nearby (December) futures contract. This basis calculation reflects a composite of basis-influencing factors because it represents an average of U.S. conditions, rather than a specific geographic location.¹³

Marketing Weights

Monthly marketings are used to construct a weighted season-average price. Each month's weight represents the proportion of the marketing year's crop marketed in that month, expressed as a percentage. This weight is used to compute a price weight for each month. A 5-year moving average of these monthly weights is constructed and updated annually (tables 8 and 9). The monthly price weight is equal to the monthly farm price received multiplied by the monthly marketing weight.

Data and Sources

The futures forecasting model requires monthly data by marketing year for the following items: (1) monthly closing prices from the nearby futures contracts; (2) monthly (mid- and full-month) farm price received; and (3) monthly marketing weights. These data are collected for marketing years 1975 through the current year and are used to construct the 5-year moving average basis and marketing weights. The 5-year average basis values and monthly marketing weights begin with 1975-79 data and are updated to the present. While the entire historical data series is not needed for the analysis reported below, it is provided to illustrate how the data are maintained and updated (tables 4 to 9).

¹³ Some basis-influencing factors include local supply and demand conditions for the commodity and its substitutes, transportation and handling charges, transportation bottlenecks, availability and costs of storage, drying capacities, grain quality, and market expectations.

Table 4—Average monthly closing price for the nearby corn futures contract, marketing years, 1975/76 through 2003/04

Marketing year	Nearby futures contracts											
	December			March			May		July		September	
	Marketing year months											
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	<i>Dollars/bu</i>											
1975/76	3.02	2.91	2.69	2.68	2.68	2.69	2.72	2.67	2.84	2.98	2.92	2.79
1976/77	2.83	2.66	2.43	2.52	2.59	2.56	2.59	2.53	2.44	2.35	2.14	1.89
1977/78	2.01	2.09	2.22	2.25	2.24	2.26	2.44	2.57	2.56	2.57	2.37	2.19
1978/79	2.22	2.31	2.29	2.33	2.32	2.37	2.47	2.54	2.67	2.87	3.06	2.82
1979/80	2.78	2.78	2.68	2.87	2.74	2.72	2.70	2.68	2.80	2.79	3.17	3.43
1980/81	3.54	3.61	3.81	3.80	3.72	3.61	3.60	3.65	3.55	3.41	3.47	3.11
1981/82	2.95	2.91	2.77	2.72	2.73	2.68	2.70	2.78	2.79	2.73	2.59	2.33
1982/83	2.24	2.20	2.33	2.42	2.55	2.73	2.96	3.13	3.10	3.11	3.12	3.53
1983/84	3.58	3.48	3.49	3.36	3.30	3.25	3.47	3.54	3.49	3.49	3.08	2.97
1984/85	2.86	2.78	2.73	2.79	2.71	2.68	2.75	2.83	2.76	2.75	2.47	2.30
1985/86	2.20	2.23	2.38	2.47	2.47	2.39	2.31	2.30	2.35	2.32	1.74	1.61
1986/87	1.67	1.69	1.70	1.67	1.58	1.50	1.60	1.69	1.90	1.89	1.71	1.57
1987/88	1.75	1.83	1.83	1.90	1.96	2.00	2.07	2.04	2.14	2.90	3.16	2.89
1988/89	2.93	2.89	2.69	2.77	2.78	2.70	2.79	2.68	2.71	2.61	2.45	2.30
1989/90	2.32	2.39	2.38	2.40	2.44	2.43	2.53	2.72	2.85	2.83	2.66	2.48
1990/91	2.30	2.30	2.26	2.36	2.37	2.40	2.54	2.56	2.49	2.40	2.33	2.49
1991/92	2.52	2.51	2.43	2.51	2.58	2.65	2.72	2.53	2.58	2.56	2.33	2.19
1992/93	2.18	2.09	2.12	2.20	2.18	2.12	2.24	2.29	2.29	2.18	2.41	2.37
1993/94	2.40	2.49	2.74	2.70	3.02	2.91	2.85	2.67	2.66	2.68	2.24	2.19
1994/95	2.20	2.16	2.09	2.29	2.32	2.33	2.46	2.49	2.61	2.73	2.88	2.83
1995/96	3.03	3.23	3.28	3.50	3.62	3.74	3.90	4.54	4.81	4.66	3.86	3.64
1996/97	3.20	2.84	2.68	2.64	2.68	2.81	3.03	2.99	2.81	2.66	2.45	2.63
1997/98	2.64	2.81	2.76	2.73	2.71	2.69	2.71	2.49	2.48	2.42	2.33	2.06
1998/99	2.08	2.19	2.19	2.21	2.17	2.15	2.24	2.18	2.20	2.17	1.97	2.14
1999/00	2.15	2.01	1.96	2.02	2.16	2.20	2.31	2.27	2.40	2.08	1.85	1.78
2000/01	1.93	2.04	2.11	2.22	2.19	2.11	2.14	2.06	1.99	1.93	2.16	2.17
2001/02	2.22	2.08	2.05	2.15	2.10	2.05	2.07	1.99	2.08	2.12	2.35	2.59
2002/03	2.72	2.52	2.43	2.36	2.36	2.39	2.33	2.39	2.45	2.39	2.12	2.20
2003/04	2.31	2.26	2.37	2.48	2.67	2.83	3.05	3.16	3.02	2.86	2.37	2.25

Source: CBOT, <http://cbotdataexchange.if5.Com/>, compiled by ERS, <http://www.ers.usda.gov/Data/Priceforecast/>.

Table 5—Monthly and annual price received by U.S. corn producers, marketing years, 1975/76 through 2003/04

Marketing year	Marketing year months												Annual
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	
	<i>Dollars/bu</i>												
1975/76	2.76	2.62	2.33	2.37	2.44	2.48	2.50	2.46	2.61	2.74	2.82	2.64	2.54
1976/77	2.60	2.33	2.02	2.24	2.34	2.34	2.35	2.31	2.25	2.12	1.88	1.63	2.15
1977/78	1.60	1.67	1.88	1.97	2.00	2.03	2.15	2.24	2.29	2.28	2.16	2.01	2.02
1978/79	1.98	1.97	2.02	2.09	2.11	2.18	2.22	2.27	2.35	2.49	2.64	2.54	2.25
1979/80	2.51	2.41	2.27	2.38	2.45	2.39	2.40	2.36	2.42	2.49	2.73	2.92	2.52
1980/81	3.01	2.99	3.10	3.19	3.19	3.22	3.25	3.24	3.24	3.17	3.14	2.87	3.11
1981/82	2.55	2.45	2.34	2.39	2.54	2.44	2.46	2.55	2.60	2.57	2.50	2.30	2.50
1982/83	2.15	1.98	2.13	2.26	2.36	2.56	2.71	2.95	3.03	3.04	3.13	3.35	2.55
1983/84	3.32	3.15	3.17	3.15	3.15	3.11	3.21	3.32	3.34	3.36	3.30	3.12	3.21
1984/85	2.90	2.65	2.55	2.56	2.64	2.62	2.67	2.70	2.68	2.64	2.60	2.44	2.63
1985/86	2.29	2.11	2.21	2.29	2.33	2.32	2.29	2.30	2.39	2.32	2.00	1.73	2.23
1986/87	1.45	1.40	1.47	1.50	1.48	1.42	1.47	1.52	1.66	1.69	1.60	1.47	1.50
1987/88	1.49	1.55	1.61	1.72	1.77	1.83	1.86	1.88	1.94	2.41	2.72	2.65	1.94
1988/89	2.60	2.58	2.51	2.53	2.60	2.59	2.60	2.56	2.58	2.52	2.47	2.27	2.54
1989/90	2.29	2.22	2.24	2.27	2.31	2.32	2.37	2.51	2.62	2.63	2.62	2.51	2.36
1990/91	2.32	2.19	2.16	2.22	2.27	2.32	2.39	2.42	2.38	2.31	2.27	2.33	2.28
1991/92	2.33	2.31	2.29	2.33	2.40	2.46	2.49	2.48	2.49	2.47	2.33	2.15	2.37
1992/93	2.16	2.05	1.98	1.97	2.03	2.00	2.10	2.16	2.14	2.09	2.22	2.25	2.07
1993/94	2.21	2.28	2.45	2.67	2.70	2.79	2.74	2.65	2.60	2.61	2.29	2.16	2.50
1994/95	2.19	2.06	1.99	2.13	2.19	2.23	2.30	2.36	2.42	2.51	2.63	2.63	2.26
1995/96	2.69	2.79	2.87	3.07	3.09	3.37	3.51	3.85	4.14	4.20	4.43	4.30	3.24
1996/97	3.56	2.88	2.66	2.63	2.69	2.65	2.79	2.80	2.69	2.56	2.42	2.50	2.71
1997/98	2.52	2.54	2.51	2.52	2.56	2.55	2.55	2.41	2.34	2.28	2.19	1.89	2.43
1998/99	1.84	1.91	1.93	2.00	2.06	2.05	2.06	2.04	1.99	1.97	1.74	1.75	1.94
1999/00	1.75	1.69	1.70	1.82	1.91	1.98	2.03	2.03	2.11	1.91	1.64	1.52	1.82
2000/01	1.61	1.74	1.86	1.97	1.98	1.96	1.96	1.89	1.82	1.76	1.87	1.90	1.85
2001/02	1.91	1.84	1.85	1.98	1.97	1.93	1.94	1.91	1.93	1.97	2.13	2.38	1.97
2002/03	2.47	2.34	2.28	2.32	2.33	2.34	2.33	2.34	2.38	2.34	2.17	2.15	2.32
2003/04	2.20	2.12	2.20	2.31	2.39	2.61	2.75	2.89	2.87	2.79	2.51	2.34	2.42

Source: USDA, NASS, *Agricultural Prices*, <http://usda.mannlib.cornell.edu/reports/nassr/price/pap-bb/>.

Table 6—Average monthly basis (farm price received less futures) for U.S. corn, marketing years, 1975/76 through 2003/04

Marketing year	Marketing year months											
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	<i>Dollars/bu</i>											
1975/76	-0.26	-0.29	-0.36	-0.31	-0.24	-0.21	-0.22	-0.21	-0.23	-0.24	-0.10	-0.15
1976/77	-0.23	-0.33	-0.41	-0.28	-0.25	-0.22	-0.24	-0.22	-0.19	-0.23	-0.26	-0.26
1977/78	-0.41	-0.42	-0.34	-0.28	-0.24	-0.23	-0.29	-0.33	-0.27	-0.29	-0.21	-0.18
1978/79	-0.24	-0.34	-0.27	-0.24	-0.21	-0.19	-0.25	-0.27	-0.32	-0.38	-0.42	-0.28
1979/80	-0.24	-0.37	-0.41	-0.49	-0.29	-0.33	-0.30	-0.32	-0.38	-0.30	-0.44	-0.51
1980/81	-0.53	-0.62	-0.71	-0.61	-0.53	-0.39	-0.35	-0.41	-0.31	-0.24	-0.33	-0.24
1981/82	-0.40	-0.46	-0.43	-0.33	-0.19	-0.24	-0.24	-0.23	-0.19	-0.16	-0.09	-0.03
1982/83	-0.09	-0.22	-0.20	-0.16	-0.19	-0.17	-0.25	-0.18	-0.07	-0.07	0.01	-0.18
1983/84	-0.26	-0.33	-0.32	-0.21	-0.15	-0.14	-0.26	-0.22	-0.15	-0.13	0.23	0.15
1984/85	0.04	-0.13	-0.18	-0.23	-0.07	-0.06	-0.08	-0.13	-0.08	-0.11	0.13	0.14
1985/86	0.09	-0.12	-0.17	-0.18	-0.14	-0.07	-0.02	0.00	0.04	0.00	0.26	0.12
1986/87	-0.22	-0.29	-0.23	-0.17	-0.10	-0.08	-0.13	-0.17	-0.24	-0.20	-0.11	-0.10
1987/88	-0.26	-0.28	-0.22	-0.18	-0.19	-0.17	-0.21	-0.16	-0.20	-0.49	-0.44	-0.24
1988/89	-0.33	-0.31	-0.18	-0.24	-0.18	-0.11	-0.19	-0.12	-0.13	-0.09	0.02	-0.03
1989/90	-0.03	-0.17	-0.14	-0.13	-0.13	-0.11	-0.16	-0.21	-0.23	-0.20	-0.03	0.03
1990/91	0.02	-0.11	-0.10	-0.14	-0.10	-0.08	-0.15	-0.14	-0.11	-0.09	-0.06	-0.16
1991/92	-0.19	-0.20	-0.14	-0.18	-0.18	-0.19	-0.23	-0.05	-0.09	-0.09	0.00	-0.04
1992/93	-0.02	-0.04	-0.14	-0.23	-0.15	-0.12	-0.14	-0.13	-0.15	-0.09	-0.19	-0.12
1993/94	-0.19	-0.21	-0.29	-0.03	-0.32	-0.12	-0.11	-0.02	-0.06	-0.07	0.05	-0.03
1994/95	-0.01	-0.10	-0.10	-0.16	-0.13	-0.10	-0.16	-0.13	-0.19	-0.22	-0.25	-0.20
1995/96	-0.34	-0.44	-0.41	-0.43	-0.53	-0.37	-0.39	-0.69	-0.67	-0.46	0.57	0.66
1996/97	0.36	0.04	-0.02	-0.01	0.01	-0.16	-0.24	-0.19	-0.12	-0.10	-0.03	-0.13
1997/98	-0.12	-0.27	-0.25	-0.21	-0.15	-0.14	-0.16	-0.08	-0.14	-0.14	-0.14	-0.17
1998/99	-0.24	-0.28	-0.26	-0.21	-0.11	-0.10	-0.18	-0.14	-0.21	-0.20	-0.23	-0.39
1999/00	-0.40	-0.32	-0.26	-0.20	-0.25	-0.22	-0.28	-0.24	-0.29	-0.17	-0.21	-0.26
2000/01	-0.32	-0.30	-0.25	-0.25	-0.21	-0.15	-0.18	-0.17	-0.17	-0.17	-0.29	-0.27
2001/02	-0.31	-0.24	-0.20	-0.17	-0.13	-0.12	-0.13	-0.08	-0.15	-0.15	-0.22	-0.21
2002/03	-0.25	-0.18	-0.15	-0.04	-0.03	-0.05	0.00	-0.05	-0.07	-0.05	0.05	-0.05
2003/04	-0.11	-0.14	-0.17	-0.17	-0.28	-0.22	-0.30	-0.27	-0.15	-0.07	0.14	0.09

Table 7—5-year average monthly basis (farm price received less futures) for U.S. corn, marketing years, 1980/81 through 2004/05

Marketing year	5-yr avg.	Marketing year months											
		Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
<i>Dollars/bu</i>													
1980/81	1975-79	-0.28	-0.35	-0.36	-0.32	-0.25	-0.23	-0.26	-0.27	-0.28	-0.29	-0.28	-0.28
1981/82	1976-80	-0.33	-0.41	-0.43	-0.38	-0.30	-0.27	-0.29	-0.31	-0.30	-0.29	-0.33	-0.29
1982/83	1977-81	-0.36	-0.44	-0.43	-0.39	-0.29	-0.28	-0.29	-0.31	-0.30	-0.27	-0.30	-0.25
1983/84	1978-82	-0.30	-0.40	-0.41	-0.37	-0.28	-0.26	-0.28	-0.28	-0.25	-0.23	-0.25	-0.25
1984/85	1979-83	-0.30	-0.40	-0.42	-0.36	-0.27	-0.25	-0.28	-0.27	-0.22	-0.18	-0.13	-0.16
1985/86	1980-84	-0.25	-0.35	-0.37	-0.31	-0.22	-0.20	-0.24	-0.23	-0.16	-0.14	-0.01	-0.03
1986/87	1981-85	-0.12	-0.25	-0.26	-0.22	-0.15	-0.14	-0.17	-0.15	-0.09	-0.10	0.11	0.04
1987/88	1982-86	-0.09	-0.22	-0.22	-0.19	-0.13	-0.11	-0.15	-0.14	-0.10	-0.10	0.10	0.02
1988/89	1983-87	-0.12	-0.23	-0.23	-0.19	-0.13	-0.11	-0.14	-0.14	-0.13	-0.19	0.01	0.01
1989/90	1984-88	-0.14	-0.23	-0.20	-0.20	-0.13	-0.10	-0.13	-0.12	-0.12	-0.18	-0.03	-0.02
1990/91	1985-89	-0.15	-0.23	-0.19	-0.18	-0.15	-0.11	-0.14	-0.13	-0.15	-0.20	-0.06	-0.04
1991/92	1986-90	-0.16	-0.23	-0.18	-0.17	-0.14	-0.11	-0.17	-0.16	-0.18	-0.21	-0.13	-0.10
1992/93	1987-91	-0.16	-0.21	-0.16	-0.17	-0.16	-0.13	-0.19	-0.14	-0.15	-0.19	-0.10	-0.09
1993/94	1988-92	-0.11	-0.16	-0.14	-0.18	-0.15	-0.12	-0.17	-0.13	-0.14	-0.11	-0.05	-0.06
1994/95	1989-93	-0.08	-0.14	-0.16	-0.14	-0.18	-0.12	-0.16	-0.11	-0.13	-0.11	-0.05	-0.07
1995/96	1990-94	-0.08	-0.13	-0.15	-0.15	-0.18	-0.12	-0.16	-0.09	-0.12	-0.11	-0.09	-0.11
1996/97	1991-95	-0.15	-0.20	-0.22	-0.21	-0.26	-0.18	-0.21	-0.20	-0.23	-0.18	0.04	0.05
1997/98	1992-96	-0.04	-0.15	-0.19	-0.17	-0.23	-0.18	-0.21	-0.23	-0.23	-0.19	0.03	0.03
1998/99	1993-97	-0.06	-0.20	-0.21	-0.17	-0.23	-0.18	-0.21	-0.22	-0.23	-0.20	0.04	0.02
1999/00	1994-98	-0.07	-0.21	-0.21	-0.21	-0.18	-0.17	-0.23	-0.25	-0.26	-0.23	-0.01	-0.05
2000/01	1995-99	-0.15	-0.25	-0.24	-0.21	-0.21	-0.20	-0.25	-0.27	-0.28	-0.22	-0.01	-0.06
2001/02	1996-00	-0.14	-0.23	-0.21	-0.18	-0.14	-0.15	-0.21	-0.16	-0.18	-0.16	-0.18	-0.24
2002/03	1997-01	-0.28	-0.28	-0.24	-0.21	-0.17	-0.14	-0.19	-0.14	-0.19	-0.17	-0.22	-0.26
2003/04	1998-02	-0.30	-0.27	-0.22	-0.18	-0.15	-0.13	-0.15	-0.14	-0.18	-0.15	-0.18	-0.24
2004/05	1999-03	-0.24	-0.22	-0.20	-0.19	-0.18	-0.15	-0.18	-0.16	-0.17	-0.14	-0.17	-0.18

To illustrate the model's use in forecasting prices, Thursday's weekly closing prices from the nearby futures contracts are collected for marketing year 2003/04. For each week, these futures prices are used to produce a cash price forecast for marketing year 2003/04. The development of a weekly season-average price forecast requires futures prices, a 5-year average basis for each marketing year month, available monthly farm prices received, and a 5-year average marketing weight for each marketing year month.

Historical daily closing prices by contract (December, March, May, July, and September) are obtained from the Chicago Board of Trade for marketing years 1975 through the current marketing year. Prices received by producers are obtained from *Agricultural Prices*, published by USDA's National Agricultural Statistics Service. Marketing weights by month for 1975 and 1976 marketing years are published in the 1977 December issue of *Crop Production*. The marketing weights for the remaining marketing years, 1977 through 2003, are published in the various annual summaries of *Agricultural Prices*. For comparison to the futures model price forecasts, price projections from the U.S. Department of Agriculture are obtained from *World Agricultural Supply and Demand Estimates* (WASDE) published by USDA's World Agricultural Outlook Board. Policy parameters—target price, direct payment rate, and the national average loan rate—used to calculate the implied CCP rate are from the 2002 Farm Act.

Table 8—Monthly marketing weights for U.S. corn, marketing years, 1975/76 through 2002/03

Marketing year	Marketing year months											
	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
	<i>Share of marketing year total</i>											
1975/76 ¹	0.02	0.15	0.13	0.09	0.12	0.08	0.08	0.06	0.07	0.07	0.06	0.06
1976/77 ¹	0.02	0.13	0.14	0.10	0.12	0.08	0.08	0.07	0.06	0.07	0.07	0.08
1977/78 ¹	0.02	0.12	0.15	0.09	0.11	0.08	0.09	0.08	0.07	0.07	0.06	0.06
1978/79 ¹	0.02	0.12	0.12	0.07	0.12	0.08	0.07	0.08	0.07	0.09	0.09	0.07
1979/80 ¹	0.02	0.10	0.14	0.09	0.10	0.07	0.08	0.06	0.07	0.08	0.09	0.09
1980/81 ¹	0.02	0.19	0.12	0.08	0.15	0.07	0.08	0.07	0.05	0.05	0.06	0.06
1981/82 ¹	0.02	0.11	0.15	0.09	0.12	0.07	0.09	0.09	0.07	0.07	0.07	0.06
1982/83 ¹	0.02	0.12	0.13	0.09	0.14	0.08	0.08	0.06	0.06	0.07	0.07	0.07
1983/84 ¹	0.02	0.14	0.12	0.09	0.15	0.08	0.12	0.08	0.06	0.05	0.07	0.05
1984/85 ¹	0.03	0.13	0.17	0.08	0.12	0.07	0.10	0.08	0.07	0.06	0.07	0.05
1985/86 ¹	0.03	0.13	0.17	0.13	0.13	0.05	0.05	0.07	0.07	0.06	0.05	0.05
1986/87	0.07	0.10	0.11	0.08	0.11	0.08	0.09	0.10	0.08	0.07	0.05	0.07
1987/88	0.09	0.13	0.08	0.05	0.11	0.08	0.09	0.06	0.07	0.10	0.09	0.07
1988/89	0.11	0.14	0.07	0.08	0.12	0.06	0.08	0.06	0.07	0.07	0.06	0.08
1989/90	0.06	0.16	0.12	0.07	0.15	0.07	0.08	0.08	0.06	0.06	0.04	0.05
1990/91	0.05	0.12	0.14	0.07	0.14	0.08	0.07	0.08	0.05	0.06	0.08	0.08
1991/92	0.11	0.17	0.08	0.08	0.15	0.09	0.08	0.04	0.04	0.05	0.06	0.06
1992/93	0.06	0.09	0.14	0.13	0.13	0.07	0.09	0.07	0.05	0.05	0.07	0.06
1993/94	0.08	0.14	0.16	0.10	0.15	0.07	0.07	0.04	0.05	0.05	0.06	0.06
1994/95	0.05	0.11	0.12	0.09	0.16	0.08	0.08	0.05	0.06	0.06	0.07	0.07
1995/96	0.08	0.17	0.13	0.08	0.17	0.08	0.09	0.06	0.04	0.03	0.03	0.03
1996/97	0.04	0.11	0.13	0.08	0.15	0.10	0.08	0.06	0.05	0.06	0.07	0.07
1997/98	0.06	0.14	0.11	0.08	0.15	0.07	0.07	0.05	0.05	0.07	0.06	0.07
1998/99	0.08	0.14	0.10	0.07	0.13	0.08	0.09	0.05	0.04	0.06	0.07	0.10
1999/00	0.10	0.14	0.08	0.07	0.17	0.07	0.08	0.06	0.04	0.04	0.06	0.09
2000/01	0.11	0.16	0.09	0.07	0.15	0.05	0.06	0.05	0.05	0.05	0.08	0.08
2001/02	0.08	0.11	0.13	0.07	0.13	0.06	0.06	0.06	0.06	0.08	0.09	0.08
2002/03	0.07	0.14	0.14	0.08	0.13	0.06	0.07	0.07	0.07	0.05	0.06	0.07
2003/04	0.07	0.16	0.12	0.09	0.17	0.07	0.08	0.06	0.03	0.05	0.06	0.05

¹ Marketing weights for marketing years 1975/76 through 1985/86 were converted into 12-month weights. Initially they were reported with weights for 14 months. The conversion summed each month's weight for the marketing year and re-computed each month's percentage of the total.

Source: USDA, NASS, *Agricultural Prices*, <http://usda.mannlib.cornell.edu/reports/nassr/price/pap-bb/>.

Table 9—5-year average monthly marketing weights for U.S. corn, marketing years, 1980/81 through 2004/05

Marketing year	Marketing year 5-yr avg.	Marketing year months											
		Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
<i>Share of marketing year total¹</i>													
1980/81	1975-79	0.02	0.12	0.14	0.09	0.11	0.08	0.08	0.07	0.07	0.08	0.07	0.07
1981/82	1976-80	0.02	0.13	0.13	0.08	0.12	0.08	0.08	0.07	0.06	0.07	0.07	0.07
1982/83	1977-81	0.02	0.13	0.14	0.08	0.12	0.07	0.08	0.07	0.07	0.07	0.07	0.07
1983/84	1978-82	0.02	0.13	0.13	0.08	0.13	0.07	0.08	0.07	0.07	0.07	0.08	0.07
1984/85	1979-83	0.02	0.13	0.13	0.09	0.13	0.07	0.09	0.07	0.06	0.07	0.07	0.06
1985/86	1980-84	0.02	0.14	0.14	0.08	0.13	0.07	0.09	0.08	0.06	0.06	0.07	0.06
1986/87	1981-85	0.02	0.13	0.15	0.10	0.13	0.07	0.09	0.08	0.07	0.06	0.06	0.05
1987/88	1982-86	0.03	0.12	0.14	0.09	0.13	0.07	0.09	0.08	0.06	0.06	0.06	0.06
1988/89	1983-87	0.05	0.13	0.13	0.08	0.12	0.07	0.09	0.08	0.07	0.07	0.06	0.06
1989/90	1984-88	0.06	0.13	0.12	0.08	0.12	0.07	0.08	0.07	0.07	0.07	0.06	0.06
1990/91	1985-89	0.07	0.13	0.11	0.08	0.12	0.07	0.08	0.07	0.07	0.07	0.06	0.06
1991/92	1986-90	0.07	0.13	0.10	0.07	0.12	0.07	0.08	0.08	0.07	0.07	0.06	0.07
1992/93	1987-91	0.08	0.15	0.10	0.07	0.13	0.08	0.08	0.06	0.06	0.07	0.06	0.07
1993/94	1988-92	0.08	0.14	0.11	0.08	0.13	0.07	0.08	0.07	0.05	0.06	0.06	0.07
1994/95	1989-93	0.07	0.14	0.13	0.09	0.14	0.08	0.07	0.06	0.05	0.05	0.06	0.06
1995/96	1990-94	0.07	0.13	0.13	0.09	0.14	0.08	0.07	0.06	0.05	0.05	0.06	0.07
1996/97	1991-95	0.08	0.14	0.13	0.09	0.15	0.08	0.08	0.05	0.05	0.05	0.06	0.05
1997/98	1992-96	0.06	0.13	0.14	0.09	0.15	0.08	0.08	0.06	0.05	0.05	0.06	0.06
1998/99	1993-97	0.06	0.14	0.13	0.08	0.16	0.08	0.08	0.05	0.05	0.05	0.06	0.06
1999/00	1994-98	0.06	0.14	0.12	0.08	0.15	0.08	0.08	0.06	0.05	0.06	0.06	0.07
2000/01	1995-99	0.07	0.14	0.11	0.08	0.15	0.08	0.08	0.06	0.05	0.05	0.06	0.07
2001/02	1996-00	0.08	0.14	0.10	0.07	0.15	0.07	0.08	0.05	0.05	0.06	0.07	0.08
2002/03	1997-01	0.08	0.14	0.10	0.07	0.14	0.06	0.07	0.05	0.05	0.06	0.07	0.08
2003/04	1998-02	0.09	0.14	0.11	0.07	0.14	0.06	0.07	0.06	0.05	0.06	0.07	0.08
2004/05	1999-03	0.09	0.14	0.11	0.07	0.15	0.06	0.07	0.06	0.05	0.06	0.07	0.07

¹ Rows may not add to 1.0 due to rounding.

Forecast Procedure

This section provides an example of the steps needed to provide the forecast for 1 of the 70 weekly forecasts for marketing year 2003/04. Table 10 illustrates the forecast method used in forecasting the season-average corn price for November 20, 2003.¹⁴ The futures model computes a weekly forecast of the season-average price based on futures closing prices but could be computed daily or monthly should the need arise.

Ten steps are involved in the forecast process:

1. The latest available futures closing prices are gathered for the contracts that are trading. Closing prices for Thursday, November 20, 2003, are used for illustration. Futures quotes are taken from five monthly contracts (December 2003, and March, May, July, and September 2004) and are stored on line 1 of the model's spreadsheet (table 10). Futures quotes for other weeks in marketing year 2003/04 are in table 11.
2. The futures prices for September, October, and November 2003 (line 2, table 10) represent the November 20 closing price of the nearby contract, December 2003. The closing price for the nearby (March) contract is used for December, January, and February. If the forecast month coincides with a month when the futures contract expires, the next nearby contract is used because of greater potential price stability.¹⁵

¹⁴ This week is 3 months into the marketing year and was arbitrarily chosen.

¹⁵ Futures prices for the maturing contract may be affected by a decline in liquidity during the month of maturity. Also, a contract usually closes about the third week of the month, and using the current futures contract during its closing month would lower the number of observations that could be used to calculate the average monthly closing price and corresponding basis.

Table 10—Futures model forecast of U.S. corn producers' season-average price received and CCP rate, marketing year 2003/04

Item	Sep.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.
	<i>Dollars/bu</i>												
1) Current futures price ¹ by contract (settlement)				2.35			2.41		2.45		2.47		2.44
(2) Monthly futures price based on nearby contract	2.35	2.35	2.35	2.41	2.41	2.41	2.45	2.45	2.47	2.47	2.44	2.44	
(3) Plus the historical basis (cash less futures)	-0.30	-0.27	-0.22	-0.18	-0.15	-0.13	-0.15	-0.14	-0.18	-0.15	-0.18	-0.24	
(4) Forecast of monthly average farm price	2.05	2.09	2.13	2.23	2.26	2.28	2.30	2.31	2.29	2.32	2.26	2.20	
(5) Actual monthly farm price	2.20	2.02											
(6) Spliced actual/forecast monthly farm price	2.20	2.02	2.13	2.23	2.26	2.28	2.30	2.31	2.29	2.32	2.26	2.20	
(7) Marketing weights (in percent)	8.64	13.78	10.88	7.14	14.00	6.34	7.26	5.54	5.18	5.66	7.30	8.28	
Forecast of season-average prices received:													
(8) Weighted average	2.21												
(9) Simple average	2.23												

Forecast of the counter-cyclical payment rate (CCP):

(10) CCP rate (\$0.11/bu) = Target price (2.60/bu) - Effective price (2.49/bu).

Effective price (\$ 2.49/bu) = [Direct payment rate (\$0.28/bu) + higher of (national average farm price for the marketing year (\$2.21/bu) or (national average loan rate (\$1.98/bu))]

¹Contract months are December, March, May, July, and September. Futures price quotation from the Chicago Board of Trade, November 20, 2003, closing prices.

3. A 5-year moving average basis (monthly farm price received minus the nearby futures price), for the average 1998-2002 marketing year, is on line 3 of table 10. For this study, the monthly basis for each marketing year is updated at the end of each marketing year and the 5-year moving average basis is also updated. The average basis used in the November calculation can be updated during the first week of October, when the full-month August price received is available, thus completing all the monthly prices received for the prior marketing year. Monthly basis values by marketing year are in table 6, and monthly basis values by 5-year average are in table 7. Monthly average futures prices for the nearby contract are in table 4, and monthly farm prices received by marketing year are in table 5.
4. A forecast of the monthly farm price received (line 4 of table 10) is computed by adding the basis (line 3) to the monthly futures price (line 2).
5. The actual monthly farm price received for corn is shown on line 5 of table 10, as it becomes available. The two prices on line 5, \$2.20/bu through \$2.02/bu, represent the price received for September and mid-month price for October, respectively, reflecting data available from *Agricultural Prices* on October 31, 2003. Historical monthly farm prices received are in table 5.
6. The actual and forecast farm prices are spliced together on line 6 of table 10. The price forecast for marketing year 2003/04, as computed on November 20th, uses farm prices from line 5 for September and October and futures forecasts for November through August (from line 4).

Table 11—Closing price of nearby futures contracts by week, marketing year 2003/04

Current date *	Nearby futures contracts				
	December	March	May	July	September
	Dollars/bu				
2003:					
May 1	2.33	2.41	2.45	2.47	2.42
May 8	2.42	2.48	2.52	2.54	2.49
May 15	2.52	2.56	2.59	2.60	2.50
May 22	2.43	2.49	2.52	2.54	2.46
May 29	2.44	2.50	2.54	2.56	2.45
June 5	2.37	2.43	2.47	2.49	2.41
June 12	2.46	2.52	2.55	2.57	2.45
June 19	2.42	2.47	2.52	2.53	2.42
June 26	2.28	2.34	2.39	2.41	2.39
July 3	2.22	2.30	2.36	2.38	2.37
July 10	2.17	2.25	2.31	2.35	2.36
July 17	2.12	2.20	2.26	2.30	2.32
July 24	2.12	2.21	2.27	2.31	2.32
July 31	2.12	2.21	2.27	2.31	2.32
August 7	2.20	2.29	2.34	2.37	2.36
August 14	2.30	2.37	2.42	2.44	2.41
August 21	2.33	2.39	2.42	2.43	2.38
August 28	2.39	2.45	2.48	2.49	2.42
September 4	2.47	2.52	2.54	2.55	2.48
September 11	2.33	2.41	2.44	2.47	2.43
September 18	2.24	2.31	2.36	2.40	2.38
September 25	2.26	2.34	2.39	2.42	2.39
October 2	2.20	2.29	2.34	2.37	2.36
October 9	2.22	2.29	2.34	2.37	2.38
October 16	2.15	2.22	2.27	2.30	2.32
October 23	2.35	2.41	2.45	2.48	2.43
October 30	2.48	2.53	2.57	2.59	2.52
November 6	2.34	2.40	2.44	2.47	2.44
November 13	2.41	2.47	2.51	2.54	2.49
November 20	2.35	2.41	2.45	2.47	2.44
November 27	2.43	2.47	2.50	2.52	2.48
December 4		2.49	2.52	2.53	2.50
December 11		2.51	2.52	2.54	2.50
December 18		2.50	2.53	2.55	2.50
December 25		2.36	2.40	2.43	2.43

—Continued

**Table 11—Closing price of nearby futures contracts by week,
marketing year 2003/04—Continued**

Current date *	Nearby futures contracts				
	December	March	May	July	September
	Dollars/bu				
2004:					
January 1		2.46	2.49	2.51	2.50
January 8		2.52	2.55	2.58	2.55
January 15		2.69	2.73	2.76	2.71
January 22		2.76	2.80	2.83	2.76
January 29		2.70	2.74	2.78	2.72
February 5		2.75	2.80	2.83	2.78
February 12		2.81	2.88	2.90	2.85
February 19		2.85	2.91	2.94	2.87
February 26		2.96	3.02	3.04	2.97
March 4			2.97	3.01	2.95
March 11			2.99	3.03	2.95
March 18			3.12	3.16	3.09
March 25			3.07	3.12	3.07
April 1			3.26	3.32	3.29
April 8			3.31	3.38	3.37
April 15			3.08	3.16	3.09
April 22			3.04	3.10	3.07
April 29			3.14	3.20	3.15
May 6				3.10	3.07
May 13				2.95	2.91
May 20				2.92	2.86
May 27				2.99	2.95
June 3				3.11	3.11
June 10				2.86	2.90
June 17				2.78	2.81
June 24				2.73	2.78
July 1					2.63
July 8					2.49
July 15					2.43
July 22					2.19
July 29					2.19
August 5					2.24
August 12					2.18
August 19					2.29
August 26					2.25

* Date on which the closing prices are observed.

7. The monthly weights, expressed as a percentage of total marketings for the marketing year, are on line 7 of table 10. A 5-year moving average is used, 1998-2002 marketing year average, and updated in early October after the release of the September *Agricultural Prices* report. Historical weights by marketing year are in table 8 and historical 5-year moving average weights in table 9.
8. A forecast of the weighted season-average U.S. farm price received is computed (line 8) by multiplying the monthly weights on line 7 by the monthly farm prices on line 6 and summing their products.
9. A simple average price forecast is also computed (line 9).
10. A forecast of the counter-cyclical payment rate is computed (line 10).

Forecast Accuracy

The mean absolute percentage error for the futures forecast model is largest in the beginning of the forecast period, but gradually declines as forecasts are made later in the marketing year, reflecting a greater portion of the forecast price based on known monthly price data and more certain information regarding weather and other variables for the remainder of the marketing year. For example, the mean absolute error ranged from 15 percent in May to 1 percent in August (16 months later) (Hoffman, 2004). This declining rate of error is greatest in the beginning of the forecast period.

The mean absolute percentage error for 1980 through 2002 declined by 2 percentage points between the second and third forecast months (June and July), reflecting, in part, new crop information such as USDA's June *Acreage* report and crop progress. This error rate dropped by another 2 percentage points between July and August, reflecting, in part, information on the new crop's estimated yield and crop progress. Another 2-percentage-point decline in the error is observed between September and October. This decline represents, in part, information from USDA's September 30 *Grain Stocks* report (beginning inventories for the start of the new crop year), production information on the new crop, and an estimate of the midmonth farm price received for September. The percentage error declines by 1 percentage point per month between October and December, reflecting additional information on production, and additional estimates of farm prices received for each month. Additional use information, such as monthly exports, becomes available from the Census Bureau with an approximate 2-month lag. Thereafter, the mean absolute percentage error declines at a much slower rate because new information is less frequent.

WASDE and the futures model forecasts were compared on a monthly basis to assess the accuracy of the forecasts of season-average farm price received. For May, the beginning of the forecast period, the mean absolute percentage error was 15 percent for the futures model and 13 percent for the WASDE projections. The percentage error declined for both WASDE and the futures model forecasts to about 1 percent for August, the last month of the crop year. The analysis found no statistically significant difference between the futures forecasts and WASDE projections.

Results for 2003/04 and 2004/05

The futures model can be used to provide a weekly season-average forecast of the U.S. corn price received by producers for marketing years 2003/04 and 2004/05 (figs. 2 and 3). These price forecasts are used to forecast the CCP rate.

Marketing Year 2003/04

The CCP rate forecast for marketing year 2003/04 using the futures forecast model ranged from \$0.32/bu to \$0.00/bu (fig. 2). Although an advance CCP payment of \$0.077/bu was made on October 13, 2003, for the 2003/04 marketing year, the futures model forecast of the season-average farm price strengthened since then and remained above the CCP trigger price since January 2004.^{15, 16} Despite the advance payment, counter-cyclical payments for corn in marketing year 2003/04 will not be made since the final price of \$2.42/bu, as reported in *Agricultural Prices*, was above the CCP trigger price of \$2.32/bu (tables 2 and 3).

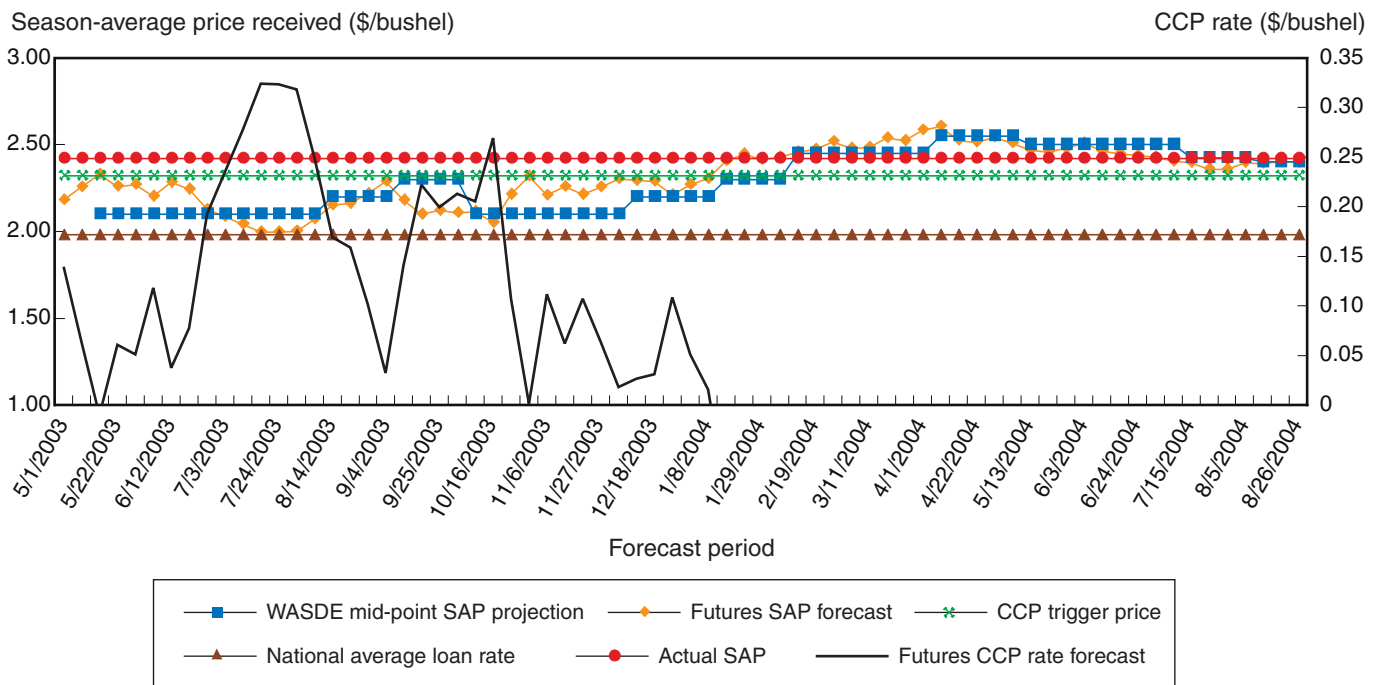
Season-average price forecasts from the futures model are based on expectations reflected in the futures market and, when available, actual monthly farm prices. The futures forecast of the season-average price for 2003/04 as of May 15, 2003, was \$2.33, based somewhat on concerns of planting difficulties (fig. 2). The mid-point of USDA's May 2003 WASDE price projection for 2003/04 corn was \$2.10/bu. The futures forecast was significantly higher than the WASDE projection, sometimes called a weather-uncertainty premium, most

¹⁵ On October 9, 2003, the season-average price forecast from the futures forecast model was \$2.11, implying a \$0.21/bu counter-cyclical payment rate.

¹⁶ The trigger price is equal to the target price less the direct payment. When the season-average price is greater (less) than the trigger price, the counter-cyclical payment rate becomes negative (positive).

Figure 2

Futures forecast of U.S. corn producers' season-average price received (SAP) and CCP rate, marketing year 2003-04



likely due, in part, to planting difficulties causing the market to question whether the crop would achieve trend yields assumed in WASDE.

The USDA outlook for U.S. corn in 2003/04, as of May 2003, was based on March planting intentions, a recent 3-year average of harvested-to-planted relationships and trend yields. These assumptions provided a supply that exceeded the prior year by 5 percent. Total corn use in 2003/04 was expected to expand due to gains in domestic use and exports. Domestic use was expected to rise slightly as expanding industrial use more than offset reduced feed and residual use that reflected a decline in cattle on feed. U.S. corn exports were projected up 225 million bushels due to less competition from foreign corn exporters and reduced global feed wheat supplies. Ending stocks were expected to increase by 250 million bushels, since production was projected to exceed use.

The futures forecast declined to \$2.00/bu on July 17, 2003, since initial indications were of a record large crop. However, these production estimates were reduced in the August *Crop Production* report. Consequently, the mid-August futures forecast responded by rising to \$2.15/bu. USDA's expected production in August reflected a decline from July, due to reduced acres planted and a drop in yields reflecting a change from trend yields of 142.7 bushels/acre to a survey yield of 139.9 bushels/acre, thereby resulting in a lower supply for 2003/04. Furthermore, total U.S. corn use was not expected to decline as much as supply, thus tightening stocks.

USDA production estimates were increased in October, as expected production was revised to record levels and the futures forecasts declined in October. In contrast, futures forecasts rose in November, perhaps anticipating greater export demand, as USDA's production forecast was revised upward by 71 million bushels over October, but exports were also increased by 75 million bushels. Starting on January 15, 2004, the price received forecast from the futures model rose and remained above the CCP trigger price due mainly to rising use. Three use categories rose above original May 2003 expectations (exports; food, seed, and industrial (FSI) (mainly ethanol); and feed and residual).

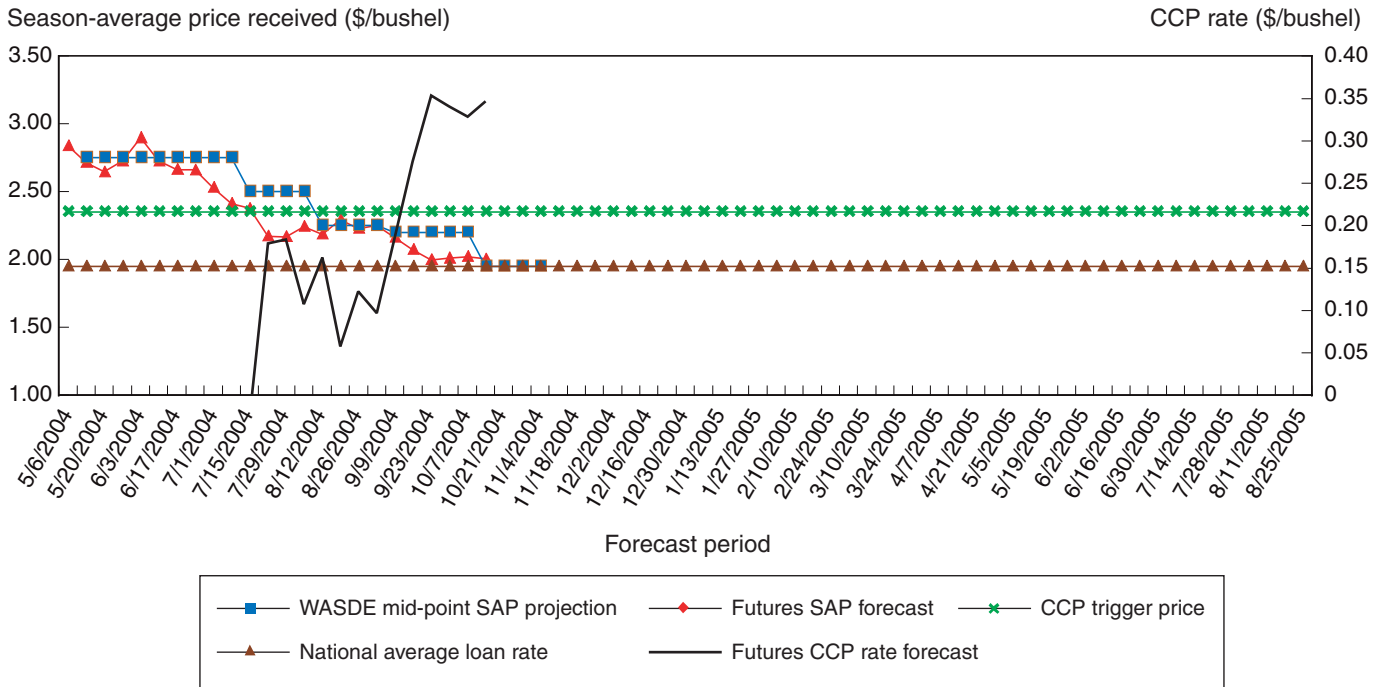
Marketing Year 2004/05

Forecasts of the CCP rate for 2004/05 based on the futures model ranged from \$0.00/bu to \$0.35/bu between May 6, 2004, and October 14, 2004 (fig. 3). Forecasts of the season-average price were above the CCP trigger price of \$2.35 per bushel between May 6, 2004, and July 15, 2004, and so the CCP rate was forecast to be zero. However, beginning with July 22, 2004, through October 14, 2004, a positive CCP rate was forecast as the futures forecast of the season-average price dropped below the CCP trigger price, influenced by a favorable growing season and a record-setting crop. As of October 14, 2004, the futures forecast of the CCP rate was \$0.35/bu, implying a \$3.0-billion counter-cyclical payment for U.S. corn (table 3).

The futures model forecast of the season-average price received mid-point for 2004/05 started at \$2.84/bu in May of 2004, compared with the WASDE mid-point projection of \$2.75/bu. The U.S. 2004/05 corn crop that was projected in May was 10.4 billion bushels, 3 percent above the prior year's

Figure 3

Futures forecast of U.S. corn producers' season-average price received (SAP) and CCP rate, marketing year 2004-05



record. Expected supplies were up only slightly because of the smaller expected carryin stocks. Total use in 2004/05 was expected to expand due to gains in ethanol use and exports. With use exceeding production, 2004/05 ending stocks of corn were expected down slightly from the forecast carryin.

Futures model forecasts for prices received reflect the uncertainty of the crop size between May and mid-October as forecasts dropped from about \$2.84/bu to about \$2.00/bu in late September. Futures forecasts for prices received remained at \$2.00/bu on October 14, 2004, since it appeared that favorable growing conditions would increase the crop size and contribute to increased ending stocks. As a result of the gain in expected production, the counter-cyclical payment rate was forecast by the futures model to range between \$0.05/bu and \$0.35/bu from July through October 14, 2004 (fig. 3). The 2002 Farm Act indicates that advance CCPs shall be made if it is determined that a counter-cyclical payment is expected for the marketing year. An advance of up to 35 percent could be made in October of the production year. As announced by USDA on October 22, 2004, the projected corn CCP rate for 2004/05 was \$0.40/bu and the first partial rate was \$0.14/bu (USDA(i)).

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Appendix: Updating Rules for Base and Yield

Base

Under the 2002 Act, landowners were able to update their base acres if they desired (Young and Westcott). One of five choices could be made:

- (1). Update the crop's base acres to equal the contract acreage that would have been used for 2002 production flexibility contract (PFC) payments.
- (2). Update the crop's base acres to equal the contract acreage that would have been used for 2002 PFC payments, plus average oilseed acreage that was planted in 1998-2001, up to the base acreage maximum.
- (3). Update the crop's base with the PFC acres plus oilseeds, with a PFC offset. This option allows the producer to add the full oilseed plantings but must offset base for the oilseed base added.
- (4). Update the crop's base with the average acreage planted and prevented plantings in 1998-2001.
- (5). Update the crop's base with the PFC acreage and add oilseed base by reducing PFC acres. This option offered greater flexibility to add oilseed base acres than either option 2 or 3.

Preliminary data indicate that about 63 percent of all farmland owners chose to retain their historical PFC acreage (adding oilseeds, if applicable) for their base acreage (Young and Westcott). The national PFC base acreage for corn was 81.6 million acres in 2002, but after updating, the enrolled corn base acres were 87.9 million acres for 2002, a 6.2 million increase above PFC acres (USDA, (g)).

Landowners had a one-time opportunity to select a method for determining base acreage. Anyone not making a decision was assigned option 2. Lastly, base acreage cannot exceed available cropland. Adjustments to base acres can be made when a contract for the conservation reserve program expires or is voluntarily terminated. This updating of base acres could lead to an expectation that base may be allowed to be updated under future farm legislation, and thus could create an incentive for planting program crops (Westcott, Young, and Price).

Payment Acres

Payment acres for counter-cyclical payments are equal to 85 percent of the base acres.

Program Yield

For producers who chose to retain their historical PFC acreage, CCP program yields are equal to their historical PFC yields. For producers who

elected to update base acres to average planted acreage in 1998-2001, CCP program yields are their choice of the historical PFC yields or one of the following 3 yield update options (Young and Westcott):

- (1). Use previously determined program yields.
- (2). Add to program yields 70 percent of the difference between program yields for the 2002 crop and the farm's average yields per planted acre for 1998-2001.
- (3). Use 93.5 percent of the 1998-2001 average yields per planted acre. This updating of payment yields could lead to an expectation that yields may be updated under future farm legislation, and thus could create an incentive for increasing yields (Westcott, Young, and Price).

The national PFC payment yield for corn was 102.6 bushels in 2002. The updated 2002 direct payment yield for corn was 102.3 bushels and the updated CCP payment yield for corn was 114.3 bushels (USDA (g)).