



# Valuing Counter-Cyclical Payments

## Implications for Producer Risk Management and Program Administration

Gerald E. Plato, David W. Skully, and D. Demcey Johnson



## Visit Our Website To Learn More!

Want to learn more about counter-cyclical payments? Visit our website at **[www.ers.usda.gov](http://www.ers.usda.gov)**.

You can also find additional information about ERS publications, databases, and other products at our website.

## National Agricultural Library Cataloging Record:

Plato, Gerald E. (Gerald Emmett), 1943-  
Valuing counter-cyclical payments: implications for producer risk management and program administration. (Economic research report (United States. Dept. of Agriculture. Economic Research Service); no. 39)

1. Farm produce—Seasonal variations—United States.
2. Agricultural subsidies—United States.
3. Agriculture—Risk management—United States.
- I. Skully, David W.
- II. Johnson, D. Demsey.
- III. United States. Dept. of Agriculture. Economic Research Service.

HD9005

Photo credit: BrandX Pictures.

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and, where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD).

To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.



United States  
Department  
of Agriculture

Economic  
Research  
Report  
Number 39

February 2007



A Report from the Economic Research Service

[www.ers.usda.gov](http://www.ers.usda.gov)

# Valuing Counter-Cyclical Payments

## Implications for Producer Risk Management and Program Administration

**Gerald E. Plato, David W. Skully,  
and D. Demcey Johnson**

### Abstract

USDA's current method for estimating expected counter-cyclical payment rates produces unintentionally biased estimates because it does not consider the variability of marketing year prices. Estimates with positive bias increase the risk of overpayment to producers who accept advance payments. According to statute, producers must reimburse the Government for any overpayments, which can lead to cash-flow problems. A model developed for this analysis improved upon the USDA method of estimating counter-cyclical payment rates by accounting for the variability in market price forecast errors. This enhanced method produced unbiased estimates. Forecasters and producers can also use the model to calculate the probabilities of repayment. Producers can use call options on commodity futures contracts to hedge against losses in expected counter-cyclical payments. Hedging, however, is only moderately effective and varies by commodity.

**Keywords:** 2002 Farm Act, farm and commodity policy, counter-cyclical payments, risk management, price uncertainty.

### Acknowledgments

We thank our reviewers Darrel Good, University of Illinois; Chad Hart, Iowa State University; Mario Miranda, Ohio State University; Philip Sronce, USDA, Farm Service Agency; and William Tierney, formerly USDA, World Agricultural Outlook Board. From USDA, Economic Research Service, we thank Mary Fant for constructing figures and Wynnice Pointer-Napper for preparing the document for publication. We thank our editor John Weber, our review coordinator Mary Ann Normile, and Barry Krissoff for their assistance. We thank Paul Westcott and Ed Young for their comments and guidance.

# Contents

|                                                                                                       |     |
|-------------------------------------------------------------------------------------------------------|-----|
| Summary .....                                                                                         | iii |
| Introduction .....                                                                                    | 1   |
| The Counter-Cyclical Policy Instrument .....                                                          | 4   |
| Forecasting Expected Counter-Cyclical Payment Rates .....                                             | 8   |
| Estimating Counter-Cyclical Repayment Frequencies<br>and Repayment Rates .....                        | 12  |
| Hedging Expected Counter-Cyclical Payments .....                                                      | 16  |
| Implications and Discussion .....                                                                     | 19  |
| References .....                                                                                      | 20  |
| Glossary .....                                                                                        | 21  |
| Appendix A—Equivalence of Counter-Cyclical Payment Rate<br>and Put Option Returns .....               | 23  |
| Appendix B—Option Pricing Procedure Used To Estimate<br>Expected Counter-Cyclical Payment Rates ..... | 24  |
| Appendix C—Procedure for Estimating Forecast<br>Error Variability .....                               | 26  |
| Appendix D—Determination of Time Value in the<br>Counter-Cyclical Payment Rate .....                  | 27  |
| Appendix E—Hedging the Counter-Cyclical Payment Rate<br>With Call Options on Futures Contracts .....  | 29  |

## Summary

The 2002 Farm Act instituted a new program called counter-cyclical payments. The payments supplement the incomes of producers with established base acres in wheat, soybeans, upland cotton, corn, grain sorghum, barley, oats, rice, or peanuts. Eligible producers receive payments when a designated crop's marketing-year average price falls below its effective target price, which is established by legislation. Counter-cyclical payments are tied to a fixed production base rather than actual production. Thus, producers cannot augment their payment amounts by changing their planting decisions.

The counter-cyclical payment rate after a marketing year ends equals the effective target price minus the larger of the marketing-year average price for a commodity and the commodity's national marketing loan rate, a price level specified in the Farm Act. Each month, USDA updates the forecasts of the marketing-year average prices (published in the *World Agricultural Supply and Demand Estimates* (WASDE) report). The October and February forecasts are used to calculate advance counter-cyclical payments for the current marketing year.

### What Is the Issue?

USDA's current method for estimating expected counter-cyclical payment rates produces unintentionally biased estimates because it does not consider the variability of marketing year prices. Estimates with positive bias increase the risk of overpayment to producers who accept advance payments. According to statute, producers must reimburse the Government for any overpayments, which can lead to cash-flow problems for producers.

### What Did the Study Find?

A model developed for this analysis improved upon the USDA method of estimating counter-cyclical payment rates by accounting for the variability in market price forecast errors. This enhanced method produced unbiased estimates. Forecasters and producers can also use the model to calculate the probabilities of repayment. Producers can use call options on commodity futures contracts to hedge against losses in expected counter-cyclical payments. Hedging, however, is only moderately effective and varies by commodity.

### How Was the Study Conducted?

The model developed here uses an approach based on option pricing theory to derive an unbiased estimate of expected counter-cyclical payments and the probabilities that advance payments will have to be repaid. Data required to run the model included the policy parameters in the 2002 Farm Act, a forecast of a crop's marketing-year average price, and an estimate of forecast variability (based on the past history of WASDE forecasts).

This report also describes a simulation exercise to evaluate hedging opportunities. Expected counter-cyclical payments were hedged with call options on futures contracts. In principle, by hedging with call options, producers can reduce the risk of lower counter-cyclical payments (due to a price increase), while retaining potential gains in payments (from a price decline). Simulated price data—both marketing-year average and futures contract price forecast and outcome—were used to estimate expected payoffs from the hypothetical hedge. The correlations and variances of the simulated prices matched those found in historical price data.