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Counter Cyclical Payments Versus Crop Insurance

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The Commodity Title of the 2002 Farm Bill legislates three different types of income support programs for farmers, providing: (1) direct payments, (2) counter cyclical payments, and (3) loan deficiency payments. In the case of "direct payments," the level of support to a farm is fixed from 2002 through 2007, regardless of changes in market prices or in the quantity of crop produced. In contrast, the size of the counter-cyclical payment is determined by average market price during the year in which the crop is marketed, while loan-deficiency payments are determined by both market price and production.

How do these programs influence farmers' production decisions? The direct payment program should have virtually no effect on production decisions because the level of payment does not depend on price, yield, or crop grown. Regardless of what is planted (with the exception of fruits and vegetables) and regardless of market price, the payment is fixed. In the case of the loan program, a loan-rate price offers the farmer a "price floor" on current production. Thus, the loan program provides a strong pricing signal when the market price is near or below the loan rate. Production decisions during times of low prices are often based as much on loan-rate levels as on market prices.

Counter-Cyclical Effects

The influence of the counter-cyclical (CC) program on production decisions is less clear. CC payments received by farmers between 2002 and 2007 will not depend on how much is produced on the farm during this 2002-2007 period. The bushels used in calculating CC payments are based on acre and yield options selected during the Farm Bill's sign-up period. CC payments, however, will vary with market prices. Lower market prices can lead to higher CC payments and vice versa. Consequently, it is sometimes argued that this relationship causes an insurance effect where CC payments help offset the negative impacts of low prices.

The "insurance" characteristic of the CC program can be revealed with an extreme example. Before planting, assume that new-crop prices are $2.50 for corn and $6.00 for soybeans. Now consider the unrealistic but conceptually useful situation where, after harvest, prices are one of the two following cases: (1) corn price = $2.50 and soybean price = $0.00, or (2) corn price = $0.00 and soybean price = $6.00. Assume that all production is priced after harvest, there is no loan program, and a CC program exists for corn but not for soybeans. Under these conditions, the only planting decision which could lead to no revenue is all soybeans since soybean price can go to zero and there is no soybean CC program. However, the existence of a corn CC program means that planting all corn will never lead to no revenue.

While the above illustration suggests that the CC program may provide an "insurance effect," how important is this effect in reducing revenue risk, and how does it relate to relate to existing crop insurance products offered through the Federal Crop Insurance Corp., such as APH, RA-BP, CRC, GRP, and GRIP? We touch on these questions in this article, and refer to these products as multi-peril crop insurance (MPCI). (Descriptions of the products can be found at *www.farmdoc.uiuc.edu/cropins/guidelines01.html*.)

CC Insurance Characteristics

To help quantify insurance characteristics, a simulation model is used that reflects the probabilities associated with revenue outcomes for a "typical" corn and soybean Illinois farm. In general, the simulation is based on estimated distributions for corn and soybean farm yields, county yields, futures prices, local prices, season average prices, and on measures controlling how these distributions are related to each other (example, farm yield to county yield, soybean yield to corn yield, farm yield to futures price, etc.) Each simulation generates a distribution of 3,500 revenue outcomes, allowing us to estimate probabilities, correlations, averages, and other statistics for a particular scenario being considered.

Impacts of the CC program are illustrated under conditions facing a farmer in a southeastern Illinois county. The general conclusions remain the same across most counties in Illinois. We assume that planted acres as well as base acres are 50% corn and 50% soybeans.

Each scenario assumes a starting point in March, when a farmer is looking ahead at the risks and returns for the crop that will be planted in the next two months. For the analysis done here, scenarios are distinguished by the futures or new-crop prices facing the producer in March.

It is important to keep in mind that this analysis is based on this "March to October" perspective. A fundamental difference between the "insurance" provided by the CC program (as well as the loan program) and that provided through MPCI stems from the time frame to which the insurance applies. Government income-support programs set parameters, such as the loan rate or CC rate, which change little if at all from year to year. The corn loan rate of about $2.00 represents the minimum price that a farmer can receive each year, regardless of whether the market price is $1.50 or $2.50. In this sense, the program provides an **inter**-year safety net, where the program's value depends primarily on the market price level. If corn is $2.50 per bushel, then the loan program is of little value to the producer. If corn is $1.50, then the loan rate of $2.00 represents a put option with an intrinsic value of $0.50 cents per bushel.

Farm Crop Insurance Evaluator

Making a crop insurance decision?

A crop insurance evaluator for Illinois, Indiana and Iowa farmers is available through the "crop insurance" link at the *farmdoc* website (*www.farmdoc.uiuc.edu*). The evaluator tool is designed to help farmers who are deciding among crop insurance products. A similar version of the simulation model underlying this farmdoc tool was used in the analysis presented here.

On the other hand, many features of MPCI products are re-set each year, depending on the price that the market is offering in February for the new crop. During March, for example, the level of revenue that can be insured for corn and soybeans harvested the following October depends on the level of market prices offered in February for the new crop. Insuring 80% of corn revenue might mean that one is insuring $300 per acre when the new-crop price of corn is $2.50. But if the new-crop price is $2.00, then the 80% revenue level insured is $240 per acre. Given the market situation in February and March, MPCI represents an **intra**-year safety net. It is analogous to the type of protection that the farmer receives through hedging or forward contracting. The forward-contract price each spring depends on the current year's market conditions.

While this difference between inter- and intra-year safety nets may seem obvious, it often gets lost in policy discussions about the role, effects, and value of support programs, insurance programs, and private market alternatives. As will be illustrated by the present analysis, failure to distinguish between the two types of safety nets can lead to apple-orange comparisons.

Do CC Payments Replicate Insurance Payments?

If CC payments represent a form of insurance, then a reasonable question is whether CC payments behave similarly to payments from existing MPCI products. Do CC payments tend to get made when insurance payments are made? Or, in other words, how much redundancy is there between the MPCI program and the CC program.

One way of examining this issue is to measure the correlation of CC payments with MPCI payments. To do so, several scenarios were considered. The different scenarios are distinguished by what are assumed as new-crop corn and soybean futures prices in March. For each starting price scenario, the correlation between CC payments and payments of various insurance instruments is calculated using the farm crop insurance evaluator (referenced on page 2). The resulting "correlation coefficients" for corn under three price scenarios are reported in Table 1.

A correlation coefficient provides one measure of the relationship between two variables. The coefficient will lie between negative one and one. If two variables tend to move up and down together, the coefficient will be positive. In other words, as one increases, the other tends to increase; or as one decreases, the other tends to decrease. As the relationship gets stronger or

Table 1. Correlation of Insurance Payments with Counter Cyclical Payments for Corn

	Coverage Election			
	60%	**70%**	**85%**	**90%**
Expected Corn Price = $1.80				
APH[a]	-0.105	-0.136	-0.185	NA
RA-BP	0.045	0.119	0.261	NA
CRC	-0.058	-0.042	-0.004	NA
GRP	NA	-0.129	-0.217	-0.245
GRIP	NA	0.095	0.247	0.307
Expected Corn Price = $2.20				
APH	-0.06	-0.095	-0.16	NA
RA-BP	0.092	0.183	0.349	NA
CRC	0.01	0.061	0.155	NA
GRP	NA[b]	-0.074	-0.161	-0.191
GRIP	NA	0.163	0.375	0.44
Expected Corn Price = $2.60				
APH	-0.038	-0.062	-0.106	NA
RA-BP	0.111	0.225	0.371	NA
CRC	0.048	0.129	0.239	NA
GRP	NA	-0.051	-0.105	-0.122
GRIP	NA	0.21	0.442	0.477

[a] APH: yield insurance; RA-BP: gross revenue insurance with base price option; CRC: crop revenue coverage insurance using either base or harvest price; GRP: group risk plan insurance based on county yield; GRIP: group risk income protection based on county revenue.

[b] NA: product not offered at this coverage level.

tighter, the coefficient gets closer to one. A negative relationship implies that as one variable increases, the other tends to decrease. As this negative relationship becomes stronger, the coefficient approaches negative one. A coefficient of zero indicates that no linear relationship exists between the two variables.

The three sections of Table 1 report correlations for scenarios where March's new-crop price of corn is $1.80, $2.20, and $2.60. Each scenario considers five MPCI products. The clear and important message of the results is simple--in general, there is little relationship between CC payments and crop insurance payments. Because CC and MPCI payments are triggered differently, it should not be surprising that they are not correlated highly.

CC payments and insurance payments are not highly correlated for several reasons. The principal reason, however, is straightforward: in March, if the new-crop price is relatively low, there is a high probability of a CC payment. In other words, when starting at a low new-crop price, most of the simulated 3,500 outcomes are associated with a CC payment. If the new-crop price is high, then there is a low probability of a CC payment. On the other hand, the probability of receiving an October insurance payment does not depend greatly on whether the new-crop price level (in March) is relatively high or low. This feature where "price matters" for the CC program but not insurance reflects the inter- versus intra-year effect discussed earlier. This effect, coupled with the different bases for payments, leads to little statistical correlation. In this sense, the CC program does not replicate or represent a reasonable replacement of any of the current FCIC insurance products.

Although the correlations are low (which is the main take-home message here), the yield insurance products (APH and GRP) tend to be negatively correlated with CC payments, while the revenue products (RA-BP, CRC, GRIP) usually have positive correlations. Revenue-insurance indemnities are price sensitive enough to cause the positive correlation. The small, negative relationship between yield and price causes the slight negative correlations of the yield insurance products.

Revenue Relationships

Another perspective on the effectiveness of insurance is provided by (1) the degree of correlation between the indemnity payment and revenue and (2) the average payment amount. Revenue in this case is market revenue (harvest price times yield) plus the loan deficiency payment (LDP). Correlations between this revenue and MPCI indemnity payments are presented in the upper half of Table 2 under two price scenarios. As expected, all correlations are negative, reflecting the

Table 2. Correlations and Averages of Insurance Payments Under Low and High Price

	Expected Corn Price = $1.80			Expected Corn Price = $2.60		
	60%	70%	85/90%	60%	70%	85/90%
	Correlation with Market Revenue Plus LDP					
APH	-0.33	-0.5	-0.73	-0.23	-0.34	-0.47
RA-BP	-0.33	-0.46	-0.6	-0.3	-0.47	-0.7
CRC	-0.38	-0.53	-0.7	-0.3	-0.45	-0.64
GRP	NA	-0.26	-0.48	NA	-0.15	-0.24
GRIP	NA	-0.22	-0.34	NA	-0.26	-0.55
	Average Insurance Payment Per Acre					
APH	$0.57	$1.99	$9.06	$0.79	$2.75	$12.56
RA-BP	$0.65	$2.70	$12.94	$0.90	$3.72	$17.81
CRC	$1.11	$4.00	$17.68	$1.51	$5.45	$24.21
GRP	NA	$1.30	$11.65	NA	$1.78	$16.05
GRIP	NA	$1.67	$18.00	NA	$2.34	$24.79

purpose of multi-peril crop insurance. Note, however, that the correlation often changes considerably between the low price scenario (expected corn price = $1.80) and the high price scenario (price = $2.60). The cause of this change stems mostly from including LDP's in the revenue calculation. For example, when starting at a March new-crop price of $1.80, most revenue outcomes will be equal to the LDP price ($2.09 in the county being considered) times yield. In this situation where the effective price is almost constant, revenue changes are mostly a result of yield changes and thus the negative correlation between yield insurance payments (APH and GRP) are relatively high. Under the high price scenario ($2.60), revenue is much more a function of both market price and yield, and thus the yield-insurance correlations move closer to zero.

In the case of two revenue-insurance products (RA-BP and GRIP), the increased responsiveness of revenue to price causes the correlation to be more strongly negative.

Although not reported here, the correlations between insurance payment and market revenue (revenue that does not include LDP's) are close to those under the $2.60 scenario. These correlations with market revenue and MPCI payments change little when considering one price scenario versus another, as opposed to the significant changes illustrated in Table 1. This result reflects the intra-year safety net feature of insurance, and is analogous to noting that the probability of collecting insurance two years from now is the same as three years or four years from now. Each year may start (during insurance sign-up) with a different set of price expectations, but given those starting conditions, the likelihood of payment does not change. What does change is the likelihood of receiving an LDP. The resulting policy lesson is that when considering the "risk reducing" effects of MPCI products, it is important to establish the appropriate revenue measure.

Average insurance payments under the two price scenarios are reported in the lower half of Table 2. Average payments increase as coverage levels increase and as the starting expected price increases. As one moves to a higher starting price, the value of what is being insured increases, leading to increased insurance payments, on average.

For comparison, average CC payment levels are presented in Table 3. For corn in this county, at the starting price of $1.80, the average CC payment of $22.71 per acre is greater than the average insurance payment of each MPCI products at this starting price. When the starting price is $2.60, the average corn CC payment of $3.64 per acre is well below average MPCI payments at high coverage levels.

The correlation between CC payments and revenue is low when the starting price is low, increases as the price increases, then eventually drops at high initial prices. At low starting prices, the CC payment level is almost always at its maximum level, and thus there is very little correlation between the CC payment level and revenue (market revenue plus LDP). At higher starting prices, changes in the CC payment cause increased correlation. But this correlation goes down again after the starting point reaches a point where the likelihood of receiving a CC payment is small. The CC program can be thought of as a type of put option that is given to the producer. During times of low starting prices, the option value of the CC program can be quite high.

Table 3. Correlations and Averages of Counter-Cyclical Payments

Price		Correlation with Market Revenue + LDP		Average Payment per Acre	
Corn	Beans	Corn	Beans	Corn	Beans
$1.80	$4.64	-0.01	-0.11	$22.71	$7.29
$2.00	$5.33	-0.12	-0.23	$16.92	$4.33
$2.20	$6.03	-0.2	-0.26	$11.28	$2.12
$2.40	$6.72	-0.25	-0.25	$6.74	$0.92
$2.60	$7.42	-0.25	-0.19	$3.64	$0.30

In Summary

Because CC payments are not based on current production, they are often thought of as having an "insurance effect," where an indemnity is triggered by the season average price. In sum, this analysis suggests that (1) CC payments and MPCI payments are not highly correlated, and thus the CC program should not be viewed as an important substitute for crop insurance, (2) negative correlations between MPCI payments and revenue (market revenue plus loan deficiency payment) under high coverage levels are relatively high when compared to the correlations between CC payments and revenue, (3) when considering the "risk reducing" effects of MPCI products, it is important to establish the appropriate revenue measure, and (4) average or expected MPCI payments change in response to changes in the starting, new-crop price in March; however, these changes in expected MPCI payments are small compared to the changes in expected CC payment.

The type of risk reduced by the MPCI products is fundamentally different than that reduced by the CC program. MPCI products reduce risks within the year, but do not help maintain income at a particular level across years. The CC program helps maintain income across years, to the extent that price reflects income.❖

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Credit Programs and Agricultural Policy

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Credit institutions contribute significantly to risk management and risk bearing in agricultural and rural finance. They do so by pooling and spreading credit risk, risk rating and credit scoring of agricultural borrowers, monitoring farmers' loan performance, providing liquidity, limiting excessive use of debt, and encouraging farmers' use of risk management practices. Most farm borrowers prefer lenders who have specialized knowledge about agriculture and who value lender-borrower relationships through good and bad economic times. The rub in this case, however, is that specialized, dedicated agricultural lenders may need some form of back-up support to offset the risks of concentrated lending programs. The goal in this article is to consider the role of Government-Sponsored Enterprises (GSEs) in risk bearing for agriculture and the related policy implications.

GSEs and Rural Finance

Government-Sponsored Enterprises are federally chartered, privately-owned financial institutions that have a dedicated mission of providing reliable credit and related services to targeted sectors of the economy. Those involved in rural finance are the Farm Credit System, Farmer Mac, and the Federal Home Loan Bank System. Others include Fannie Mae and Freddie Mac both of which have achieved extraordinarily large size by providing secondary market services for the residential housing market. Sallie Mae provides a similar function for University student loans. The GSEs fulfill their mission through direct and guaranteed financing programs and by increasing competitiveness in the financial marketplace.

The Farm Credit System currently holds about $88 billion of loans to farmers, their cooperatives, and other agribusinesses. Lending is by retail, farmer-owned lending associations that obtain their loan funds from wholesale farm credit banks which turn sell FCS securities to financial market investors.

Farmer Mac buys farm real estate loans from commercial banks, life insurance companies, and other lenders, and has provided "standby" purchase commitments on farm real estate loans made by several Farm Credit System institutions. The 12 Federal Home Loan Banks provide lines of credit to eligible community banks and other types of financial institutions, many of which are significantly involved in farm lending.

GSEs in general have come under periodic yet growing public scrutiny due to the contingent liability they bring to the to federal government, the size and recipients of the subsidies they provide, their political power, and the claim that other providers of credit services can successfully and equitably fulfill the GSE mission. The contingent liability arises from the perception in financial markets that the federal government would step in to back GSE security investors if major losses were imminent. The subsidy arises primarily from the funding cost advantages of agency securities and the mandated availability of credit to eligible borrowers through good and bad economic times. Estimated subsidies for Fannie Mae, Freddie Mac, and the FHLBs for example, fall in the $13-$16 billion range with about half of the subsidy going to mortgage borrowers and the other half to the institutions and their owners. It is unclear why such institutional investors should profit from federal subsidies.

Political power arises in some cases from the GSEs market dominance due to subsidy advantages and resulting political clout that serves to maintain the status quo. Political clout can also be influenced by different congressional committees charged with GSE oversight. The Farm Credit System and Farmer Mac are overseen by the Senate and House Agricultural Committees, while other committees oversee the other GSEs.

The alleged datedness of GSE missions arises from the claims by commercial banks and others that the financing needs of targeted GSE borrowers can be adequately met by other lenders.

The Farm Credit System

Unique to the Farm Credit System is its cooperative structure in which farmers and other eligible borrowers are both owners and patrons of their own financial institutions. Farm borrowers individually and through their participation in input supply and marketing cooperatives largely have unallocated equity capital claims on the respective FCS institutions. These equity capital investments serve to backstop safety and soundness of loan portfolios and to provide for future growth opportunities. The farmer members also elect boards of directors to hire and oversee management, and determine operating and strategic policies.

FCS equity is accumulated through retained earnings and borrowers' stock investments, with any year-end surpluses returnable to owner/patrons through allocated patronage refunds. These equity capital investments in the FCS institutions, thus, become a farmer-owned reserve for backstopping credit risk in agriculture and merit inclusion in determining the value of the full set of policy instruments utilized for agricultural risk management (government payments, federal crop insurance, federal and state government credit programs). At year end 2001, for example, the FCS reserves totaled $19.75 billion. These reserves were comprised of $15.86 billion of equity capital; $1.72 billion of assets in the FCS Insurance Corporation funded through premiums paid by FCS institutions who passed the premium cost along to farm borrowers; and $2.08 billion in allowances for loan losses. In addition, FCS borrowers ultimately pay the cost of operating the Farm Credit Administration (assessments of $36.7 million in 2002) including its regulatory responsibilities for safety and soundness of the FCS Institutions.

Future Risk Bearing Dimensions

In the future, the economic capital positions of FCS institutions likely will be calibrated more closely to their levels of credit, operating, and market risks. The proposed New Basel Accord, which sets global capital guidelines for individual country's financial institutions, is clearly on a path toward greater refinement in risk-based capital requirements. The Farm Credit Administration has already established a risk-based capital test for Farmer Mac and will consider similar approaches for the FCS.

Farmer Mac has recently achieved accelerating growth in its business activity to reach total on and off balance sheet holdings of $5.2 billion on September 30, 2002. About 44% of this total is comprised of stand-by loan purchase agreements for farm real estate loans with several FCS institutions, thus linking in part

the loan origination, secondary market, and risk bearing activities of these two GSEs. Economic capital needed for the two GSEs, thus, depends on their respective risk allocations. A common regulator (FCA) and common oversight by the Congressional agricultural committees allow for joint monitoring of their capital positions. Similarly, the public credit programs of the Farm Services Agency and individual state credit programs have the potential to divert credit risk away from the GSEs, and thus are part of overall agricultural policy.

The Federal Home Loan Bank System recently received expanded authorities to provide credit services to community banks and other eligible financial institutions. This expanded capacity provides the potential for direct access by rural banks to non-local agency market sources of funds to aid in managing liquidity and interest rate risk positions. Such GSE access has been a long-term goal of the banking community, and FHLB loan volumes have grown accordingly. The FHLB system, thus, is linked to risk bearing in agriculture through their financing of rural banks with agricultural loans.

In Summary

GSEs and public credit programs are specialized, dedicated financial institutions that provide interconnected risk bearing and credit services to the agricultural sector. They are instruments of overall agricultural policy and, in the case of the Farm Credit System, hold sizable capital reserves contributed by farmers and other rural entities to backstop their own credit risk positions. The value of these risk-bearing services needs consideration in policy deliberations about support for agriculture and about the role of publicly-authorized credit programs for farmers.❖

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