Analysis of Two Hypothetical Long-Term Hog Marketing Agreements: Cost-Plus and Window Price, 1986-1996

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Summary and Implications

Two alternative long-term marketing contracts between producers and packers were compared over a 10-year period. Contracts offered in the industry differ greatly. The two contracts considered here represent a cost-plus contract and a $38-48 window price contract. They were compared using actual prices from 1986-1996 and at prices that were five percent lower than actual prices. Both contracts reduced the variabillity of prices and produced higher minimum prices than were offered in the cash market.

The appeal of the contract depends on the producers' outlook for price levels in the future. At prices equal to those of the previous 10 years, both contracts resulted in lower average prices. At 5% lower prices, the cost-plus contract was higher and the window price contract was lower than the cash price.

Introduction

Long-term marketing agreements have emerged between hog producers and pork packers in recent years. A recent University of Missouri study indicated that approximately 26% of hogs marketed in 1994 were sold on a formula pricing agreement. A much smaller, but growing percent involved some type of price risk sharing arrangement between the producer and packer. Two risk sharing arrangements that have been offered by packers are the cost-plus and window contracts. The cost-plus contract bases the price the producer receives for hogs on a standardized cost of production and the factors that influence costs (e.g., feed prices). The window contract sets an upper and lower price boundary and the producer receives the market price if it falls within these boundaries or window of prices. When prices are outside the window, the "pain or gain" is shared between the buyer and seller.

After the very low hog prices of late 1994 and the historically high grain prices of 1996, producers are increasingly interested in some method of managing price risk. Likewise, lenders are encouraging producers to develop management and marketing strategies that increase the probability that operations can service debt payments in a timely manner. Declining hog production in traditional Hog Belt states with excess packer capacity such as Iowa has prompted packers to look for ways to secure a supply of hogs. Long-term risk sharing contracts manage price risk—and possibly profit risk—for hog producers, increasing their ability to access capital and grow their operation. Such agreements also serve to secure a supply of hogs for a packer.

While risk-sharing contracts offer advantages to both buyers and sellers, questions remain as to how these marketing contracts perform relative to the cash market. Risk-sharing contracts are difficult to analyze. First, not all packers offer a contract, and contracts do differ between packers. Second, the contracts are typically confidential in nature and the details of specific contracts are not observable. This paper will model two hypothetical contracts based on reported features of contracts, a cost-plus contract and a window price contract. The analysis is not intended to represent a specific contract offered by a packer and all of its details, but rather reflect a general type of agreement that may be available to producers. The prices resulting from the contracts will be compared with the Iowa-Southern Minnesota cash market over a 10-year period under two different price scenarios.

Data

The cash market price used was the weekly average U.S. 1-2, 220-260 pound barrows and gilts in the Iowa-Southern Minnesota market reported by the USDA. Central Iowa weekly average corn prices paid to farmers were adjusted upward $0.20 per bushel to more closely reflect a river bid often used in cost-plus contracts. Decatur, Illinois, soybean meal prices (SBM) for Thursday were also used.

Materials and Methods

Cost-Plus Contract

The cost of production in cost-plus contracts is typically meant to represent above-average producers. The cost-plus contract in this analysis assumes a standard production budget based on an eight week rolling average corn and SBM price. The budget has a whole herd feed efficiency of 350 pounds of feed per hundredweight of hog produced and an 80% corn and 20% SBM diet. An additional $35 per ton of feed was included for vitamin and mineral premix and any feed additives. Nonfeed cost per hundredweight was set at $14 to cover other variable and overhead costs. Table 1 illustrates cost-plus prices at alternative corn and SBM prices. For, example the estimated cost of production per cwt. with $2.50/bu. river basis corn and $200/ton Decatur SBM is $39.63/cwt. At $4.50/bu. corn and $200/ton SBM, the cost increases to $49.63/cwt. Five dollars per cwt. was added to the estimated cost of production as the "plus" in the cost-plus contract.

Table 1. Estimated cost of hog production, per hundredweight.

Non-feed cost per cwt.	$14.00
Whole herd feed efficiency	350
Diet percent corn	80%
Vitamins, minerals, and additives per ton of feed	$35.00

River	Decatur Soybean Meal						
Corn	$180	$200	$220	$240	$260	$280	$300
$2.50	38.93	39.63	40.33	41.03	41.73	42.43	43.13
$3.00	41.43	42.13	42.83	43.53	44.23	44.93	45.63
$3.50	43.93	44.63	45.33	46.03	46.73	47.43	48.13
$4.00	46.43	47.13	47.83	48.53	49.23	49.93	50.63
$4.50	48.93	49.63	50.33	51.03	51.73	52.43	53.13

Under a typical cost-plus contract, the producer receives the cost-plus price if the current market price is less than the contract price for that week. The difference over the market price that the producer receives is recorded in a revolving account. It is often required that this revolving account have a zero balance at the end of the contract period. If the ending balance is not zero, the party that is ahead must either the pay the balance to the party that is behind, or the contract is extended. This analysis assumes that, at prices below the cost-plus price, the producer receives the cost-plus price. At prices above the cost-plus level, the producer receives the cost-plus price and pays back the revolving account balance with the difference between the current price and the cost-plus price. Once the balance is paid off, the producer receives half of the difference between the current price and the cost-plus price with the other half going to the revolving account to establish a positive balance. Interest at 5% is charged (earned) on negative (positive) balances.

The analysis is based on 100 pounds of hogs sold every week. The residual amount accumulated at the end of the contract would be multiplied by the hundredweight that a producer markets on average each week to arrive at the total balance in the account.

Window Contract

The window contract examined had a $38/cwt. lower boundary and a $48/cwt. upper boundary, and the producer and packer equally share prices above and below the boundaries. If the current price is between $38 and $48, the producer receives that price. If the current price is below $38, the producer receives $38 minus half of the difference between $38 and the current price. For example, if the current price is $33, the producer receives $38 - (38-33)/2 = $35.50. If the current price is above $48, the producer receives $48 plus half of the difference between $48 and the current price. At a current price of $56, the producer receives $48 + (56-48)/2 = $52. Although window contracts offered by packers may not require that a residual account be kept, this analysis monitors the residual account to measure the accumulated difference between the contract and cash prices.

Results and Discussion

To the producer, the appeal of risk-sharing contracts will depend on the amount of downside risk he or she expects to face during the life of the contract. Although the past is not a perfect predictor of the future, past prices offer a method of comparing cost-plus and window contracts to cash prices. The contracts were examined using weekly prices from July 1, 1986, through June 30, 1996, under two scenarios: 1) hog prices at 100% of actual prices and 2) hog prices at 95% of actual prices. The second scenario addresses lower prices resulting from improved production efficiencies that increase the supply of hogs for any given feed price. Actual prices averaged $47.43 over the 10-year period and ranged from $27.69 to $66.06 (Table 2). Under the 95% scenario, prices averaged $45.06 and ranged from $26.31 to $62.76.

The cost-plus and window price contracts generated average returns that were identical to each other and $1.15/cwt lower than the cash market under the 100% price scenario (Table 2, Figure 1). At the 95% price level, cost-plus prices were higher and window prices were lower than cash prices (Figure 2). The cost-plus contract had a highest minimum price, thus providing more protection from downside price risk. It also produced higher high prices than did the window, but they were less than the high in the cash market.

At the 100% price level, producers under contract receive lower average prices and therefore the residual account has a positive ending balance (Table 3, Figures 3 and 4). If the contract calls for a zero ending balance, the packer would owe the producer the amount in the ending balance. At the lower price level, the cost-plus residual is negative, indicating that the producer owes the packer money at the end of the contract. Some of the contracts on the market require a zero ending balance or the party that is behind may choose to extend the contract. Other contracts simply end at the designated time without any

Table 2. Cash, cost-plus, and window price summary statistics, July 1986 - June 1996, $ per cwt.

	100% of Actual Prices		
	Cash	Cost-Plus Price	$38-48 Window Price
Average	47.43	46.28	46.28
Minimum	27.69	40.75	32.85
Maximum	66.06	59.31	57.03
	95% of Actual Prices		
	Cash	Cost-Plus Price	$38-48 Window Price
Average	45.06	45.52	44.47
Minimum	26.31	39.75	32.15
Maximum	62.76	56.93	55.38

settling up. The residual in this analysis is calculated on 100 pounds per week. For example, the total amount of the residual account that the packer owes a producer selling a semi load a week (50,000 pounds) is $504,265 for the cost-plus and $430,070 for the window under the 100% price level scenario.

The distribution of prices under the 100% price scenario also indicates that the cost-plus contract provides more downside price protection than does the window price contract or cash market (Figures 5 and 6). The distribution of cash and window contract prices was nearly identical except for the extremes and the $47-51 range. The window had fewer extreme prices and a higher percentage—nearly a third—in the $47-51 range. Seventy percent of the cost-plus contract prices were between $40.75 (minimum) and $46.99. At the lower price level, approximately 28% of cash prices were below $43, but only 20% of the cost-plus prices were below $43 and the minimum was $39.75. Over half of cost-plus prices were in the $43 to 46.99 range. Half of the window prices were less than $47. This figure is equal to that of the cash market, but there were fewer prices in the less-than $35 range.

Table 3. Residual account summary statistics by marketing contract and price level.

	100% of Actual Prices		95% of Actual Prices	
	Cost-Plus	$38-48 Window	Cost-Plus	$38-48 Window
Ending Value	1,008.53	860.14	-68.53	464.05
Minimum	0.00	0.00	-68.53	0.00
Maximum	1,231.60	860.14	619.01	477.82

Figure 1. Cash price, cost-plus, and window contract, actual prices, July 1986-June 1996.

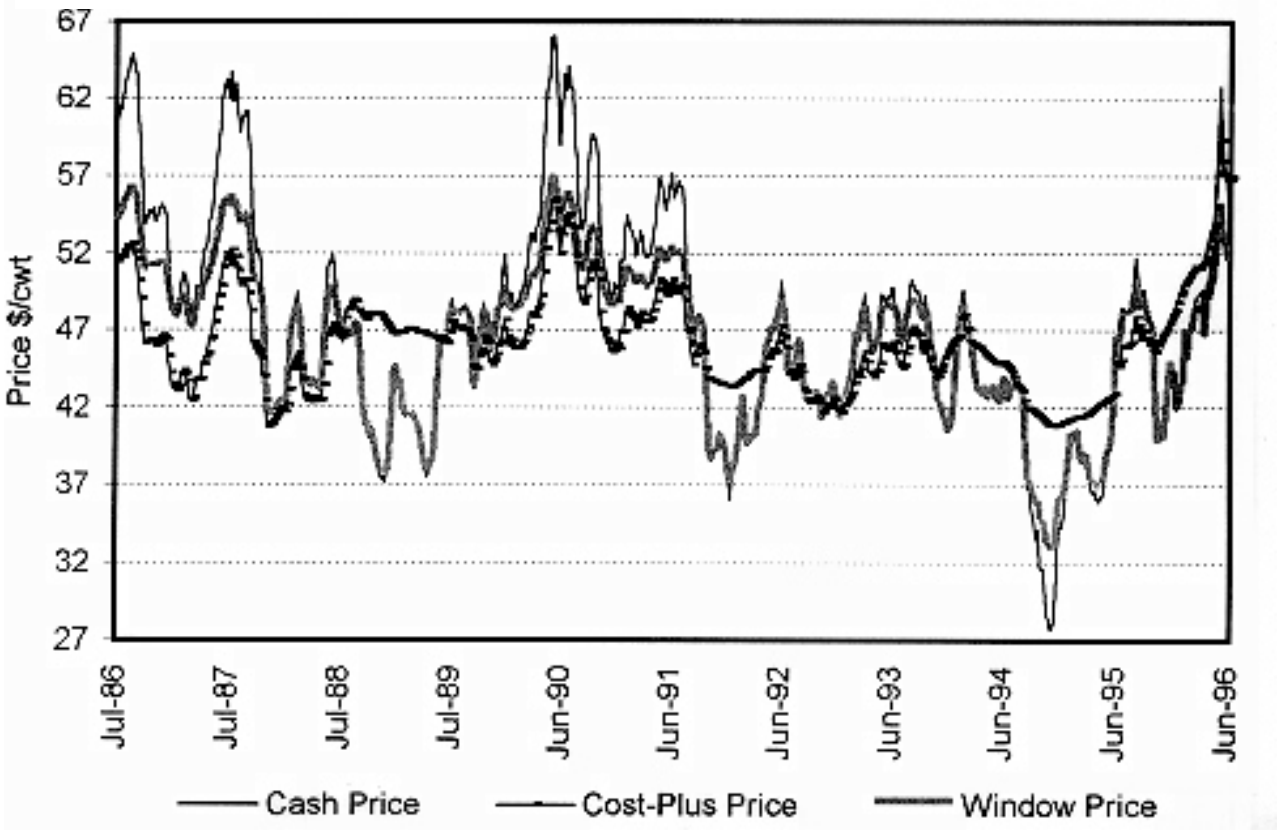

Figure 2. Cash price, cost-plus, and window contract, prices at 95% of July 1986-June 1996.

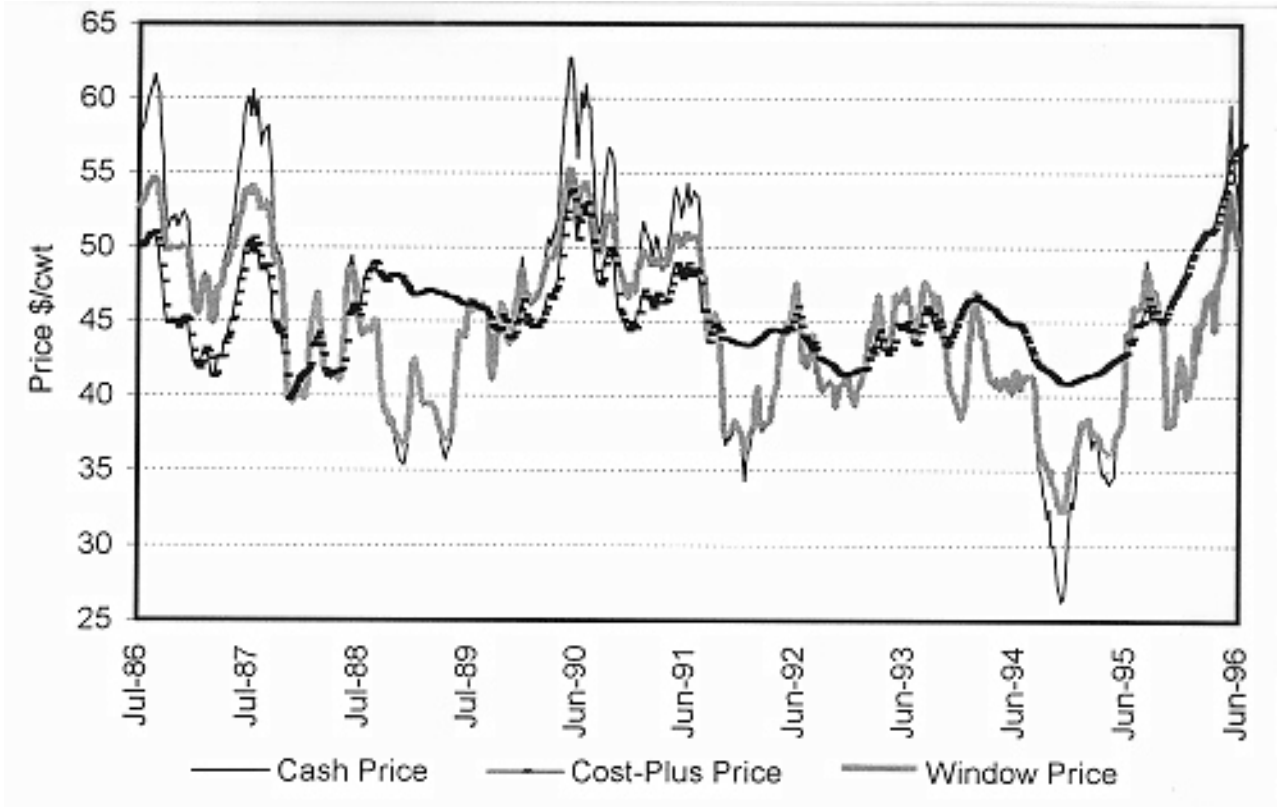

Figure 3. Residual account at 100% of actual prices.

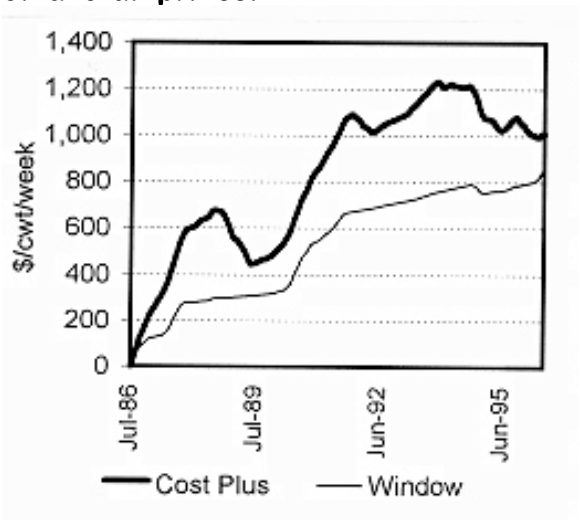

Figure 4. Residual account at 95% of actual prices.

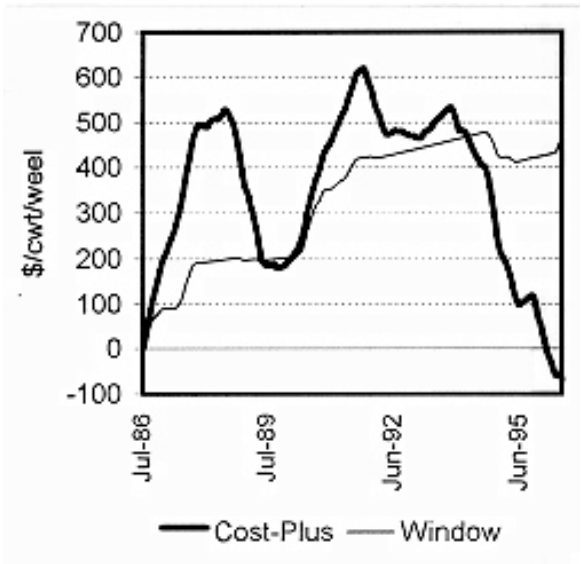

Figure 5. Price distribution by marketing agreement, 100% July 1986-June 1996 prices.

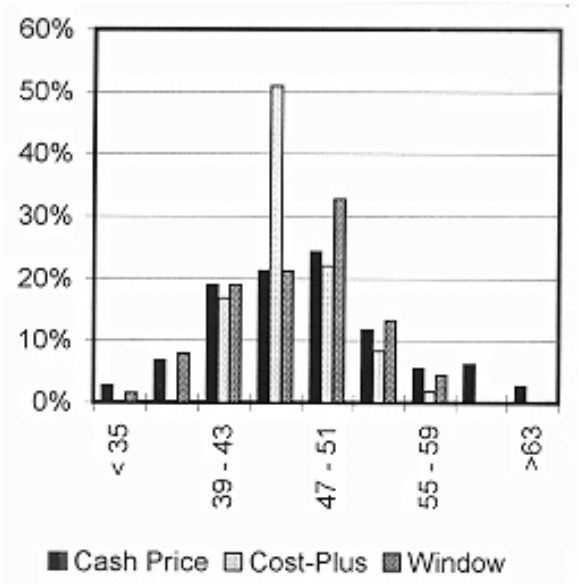

Figure 6. Price distribution by marketing agreement, 95% July 1986-June 1996 prices.