NCCC-134
APPLIED COMMODITY PRICE ANALYSIS, FORECASTING AND MARKET RISK MANAGEMENT

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by

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Suggested citation format:

Cohen, L., and M. Gorham. 1985. "The Projected Impact of Cash-Settled Commodity Contracts on Cash/Futures Price Relationships." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL. [http://www.farmdoc.uiuc.edu/nccc134].

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Laurie Cohen and Michael Gorham*

Introduction

The primary economic function of any futures settlement mechanism is to promote convergence of the futures price and the cash price at the final settlement of the contract. A futures price which converges with the cash market price at final settlement makes futures markets valuable to those participants seeking to hedge against, or to speculate on, developments in the cash market. With physical delivery settlement, cash/futures arbitrage is relied upon to produce a convergence of the cash and futures prices. With cash settlement, the futures exchange sets the futures settlement price to be equal to some measure of the cash market price of the underlying commodity which should, by definition, create perfect convergence between the futures price and the chosen measure of the cash market price at contract expiration.

Most studies, to date, on cash settlement have dealt with the rationale, mechanics and precedents of cash-settled futures contracts (Garbade and Silber, Hobson, Jones, Martell and Salzman,Paul, Paul et al.). This paper will explore the differences which should be anticipated by both the hedger and

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the speculator when trading a contract that has been converted from physical delivery to cash settlement. Primary attention will focus on the expected price performance of the cash-settled contract at expiration and at selected time intervals prior to expiration. The first section of the paper discusses those factors which impart basis instability to a futures contract. The second section proceeds to review futures contracts which would be suitable candidates for cash settlement. The effects of trading a cash-settled contract are analyzed conceptually and explored empirically in the third section. Nonstorable commodity contracts are the focus, using the cash-settled Feeder Cattle contract proposal as the example. The last section provides a summary and conclusions.

The Origins of Basis Variability

A futures contract is only an effective risk transference vehicle if the maturity basis and the deferred basis of the contract can be predictably estimated. If the futures price does not track the cash price within a reasonably narrow range, the hedger may find the substitution of basis risk for cash market price risk to be an unattractive trade-off. Futures delivery costs in excess of cash market delivery costs introduce maturity basis variability. These incremental delivery costs along with variations in market expectations of the cash price at contract expiration lead to deferred basis instability in nonstorable commodities.(1)

(1) This paper discusses deferred basis variability in the context of nonstorable commodities, because it assumes that the deferred futures price is not a function of the current price plus costs of carry as in the case of grains and metals.

Maturity basis variability can be analyzed within the context of incremental futures delivery costs. If the futures physical delivery system does not duplicate the cash market delivery system, the costs of making or taking delivery in the futures market may exceed those experienced in the cash market. Differing costs will produce differing prices in the cash and futures markets.

Figure 1a illustrates the impact of incremental delivery costs on the range of the maturity basis. With zero incremental delivery costs, cash/futures arbitrage should tend to keep the futures and cash prices equal. When delivery costs unique to the futures delivery mechanism arise, the long and/or the short (depending upon the party confronting these costs) will adjust their/his valuation of the futures price. In Figure 1a, OA represents the sum of the incremental delivery costs incurred by the short.(1) The BO range represents the sum of the incremental delivery costs faced by the long. The AB range depicts the costs confronted by both parties to the contract and sets the boundaries within which the futures price can randomly wander. Within this basis range, no economic benefits will be derived from arbitraging

(1) We will assume that all shorts face identical delivery costs and that all longs face identical delivery costs. In fact, as this is generally not the case, the boundaries in Figure 1a could be construed as the costs faced by the most advantageously placed shorts and the most advantageously placed longs.

the futures and the cash markets. However, if the basis should exceed the upper boundary (B), a profitable buy futures/sell cash forward arbitrage exists which should quickly bring the basis back into the AB range. Alternatively, a decline in the basis below the lower boundary (A) signals a profitable buy cash/sell futures arbitrage. This arbitrage will force the basis back into the AB range.

In summation, the greater the incremental delivery costs, the greater the range of basis indeterminacy. Within this range, no profitable arbitrage opportunities arise. The basis, therefore, may stray haphazardly within the upper and lower boundaries of the basis range. With a wide range of basis indeterminacy, maturity basis risk becomes highly significant.

The incremental delivery costs associated with certain futures contracts illustrate the degree of maturity basis risk confronted by the trader. Currency contracts are low futures delivery cost contracts, because the futures physical delivery system does not differ significantly from a cash market delivery. Both delivery systems are basically free of transport costs and a futures delivery can be made by a simple bookkeeping entry. Hence, the futures price closely approximates the cash price at contract expiration thereby obviating maturity basis risk.

Livestock contracts entail significant futures delivery costs. For example, the incremental delivery costs associated with a feeder cattle delivery (of as much as $1.00/cwt. for a short owning the cattle and $2.00-3.00/cwt for a short who must acquire the cattle) oftentimes allows the futures price to rise $2.00 to $3.00 above the

cash price(1). During the four-year period, 1980 to 1983, on average, the Feeder Cattle futures expired at a $2.00 premium to the Oklahoma City cash feeder price, however, there were contract months when the futures price was more than $4.00 above the cash price. The incremental futures delivery costs faced by the short include the futures commission, the grading fee, the sorting costs, and a premium for the uncertainty that the grader will reject a load that the seller believes is deliverable, resulting in resorting costs and a late penalty fee.

On the other hand, the uncertainty faced by the long when standing for delivery on the Feeder Cattle contract periodically allows the Feeder Cattle settlement price to fall to a $1.50 or greater discount to the Oklahoma City cash feeder price. Long uncertainty emerges in the Feeder Cattle contract because the short can choose delivery from a number of locations, grades and dates. The long standing for delivery in the Feeder Cattle contract must anticipate delivery at one of eleven delivery points stretching from Billings, Montana to Montgomery, Alabama. Hence, he will not be willing to buy the futures at a price above the cheapest delivery location cash market feeder price (after corrections for contract discounts). Since the short can include up to 13 head of No. 2's in a par delivery unit (roughly 20 percent of the delivery unit), the long must insure himself against being delivered a mixed load. Thus, the long will tend to discount the futures price to the value of a

(1) This represents 1.5 percent to 4.5 percent of the current feeder cattle price of $67/cwt.

sale load consisting of 20 percent No. 2's and 80 percent No. 1's. Time uncertainty arises for the long, because the actual date of delivery within the delivery period is set by the short. However, time uncertainty diminishes as the end of the delivery period approaches. Also, the uncertainties associated with the grading of livestock deliveries generates additional costs to the long as he cannot be certain that the actual quality of the animals received will reflect the grader's assessment of the delivery unit.

The incremental costs of making and taking delivery on the Feeder Cattle contract represent a range within which no forces will act to trigger a change in the futures price. An arbitrageur will only enter into a buy cash/sell futures (buy futures/sell cash) arbitrage when the futures price rises above (falls below) the cash price by more than the cost of making (taking) delivery on the contract. The delivery costs confronted by both the long and the short generate a widely fluctuating basis thereby imparting much basis risk to the users of the contract. The outer bounds of the basis might be, at times, expanded further by such extraneous factors as tax laws, e.g., a long might stand for a livestock delivery at a seemingly uneconomic price in order to qualify for long-term capital gains tax treatment.

The deferred basis risk, i.e, basis risk prior to contract expiration, of a nonstorable commodity should reflect any incremental futures delivery costs embodied in the maturity basis as well as differences in price expectations at contract expiration. Differences in price expectations result from differing interpretations of supply and demand indicators. The longer the

period to contract expiration, the greater should be the variability in price expectations, because forecasts tend to be more imperfect as one moves back in time. Therefore, the deferred basis risk is likely to widen the AB maturity basis range depicted in Figure 1a. In fact, differences in price expectations four weeks prior to expiration of the Feeder Cattle contract resulted in a deferred basis range of $7.17/cwt. (maximum basis minus minimum basis) at Oklahoma City or $1.71/cwt. greater than the maturity basis range of $5.46/cwt. during the five-year period, 1979 to 1983.

With costly physical delivery settlement mechanisms, maturity basis risk and deferred basis risk is substantial and highly detrimental to the viability of hedging. Delivery costs are reduced to zero with cash-settled contracts. Therefore, a perfectly performing cash-settled contract should eliminate maturity basis risk for any party buying or selling the commodity at the cash settlement price and deferred basis risk will simply be a function of differences in market expectations. In fact, maturity basis risk will never really be zero, since commodity cash settlement prices tend to be averages over space, time, weight and grade, and the hedger, at best, will be selling at a price which is only one component of this average. The hedger, therefore, will confront basis risk equal to the range of differences between this average price and the price he faces in the local cash market. Figure 1b conceptually illustrates the basis risk of a cash-settled contract. The range of the basis is much narrower and gradually diminishes toward zero as contract expiration approaches and differences of opinion regarding the final market price narrow.

Attractive Candidates for Cash Settlement

Table 1 summarizes the suitability of cash settlement on the basis of physical delivery costs for select categories of futures contracts. The relatively insignificant physical delivery costs experienced by currencies, negotiable debt instruments, agricultural commodities backed by warehouse receipts and metals would not seem to warrant a cash settlement. With low to insignificant delivery costs, the maturity basis should approach zero. The physical delivery mechanism of certain commodity contracts, however, generates high costs significantly different from cash market delivery costs. Basis instability is a continual risk to users of these contracts, e.g., livestock, petroleum and petroleum products, tropical products and lumber. Thus, these commodity contracts are attractive cash settlement candidates. Finally, there are a number of futures contracts in which cash settlement is essentially mandatory. Stock index contracts are the most obvious as physical delivery would entail assembling odd lots of the numerous stocks comprising the index. Eurodollar time deposits are basically non-negotiable debt instruments making physical delivery highly impractical. Certain economic indicators are either not meaningfully delivered or can be delivered only at a very high cost.

Cash settlement, however, is a viable alternative to physical delivery only if appropriate cash market prices are available to use in deriving the final settlement price. The cash market prices must be representative of the underlying product, widely available to the public, easily accessible in a timely fashion from an objective and skillful price reporting service, and most importantly,

comfortably immune from manipulation. Certain commodities which appear to be attractive cash settlement candidates based on costly physical delivery mechanisms would not actually be suitable. For example, reported crude oil or petroleum product prices are essentially the market opinion of a handful of cash market traders. It might be very easy for one or a few of these traders to engage in false price reporting. Cash settlement, therefore, would not be attractive.

The Impact of a Cash-Settled Contract on Trading

The trader's expectations regarding the performance of a cash-settled contract may differ significantly from previous expectations associated with a physical delivery settlement. There are both benefits and costs to be derived from trading a cash-settled contract. The following six factors indicate the advantages entailed in trading a cash-settled contract:

1. Cash settlement eliminates the risk of parties unexpectedly having to make or take delivery on the contract should they neglect to offset their position prior to the first notice day (for longs) or the last day of trading (for both longs and shorts).

2. The elimination of physical delivery will eliminate the uncertainties and disputes associated with the grading of certain commodity deliveries.

3. Cash settlement eliminates the costs incurred in making or taking delivery on the contract.

4. Cash settlement removes the risk that a contract specified discount or premium for non-par grades, weights or locations will be seriously out of line from cash market differentials prevailing at the time thereby either causing longs to pay "too much" for the delivered goods or causing the futures price to be discounted by below the value of the par cash commodity.

5. The elimination of physical delivery should remove periodic, spatial distortions in the cash market price caused by shorts when acquiring the commodity in preparation for delivery and/or by longs when disposing of unwanted stocks of the commodity received in the delivery process.

6. Cash settlement should promote a much tighter cash/futures price convergence at contract expiration. And while this is not an advantage,it will, also, generally alter the mean basis.

The disadvantages of cash settlement include the following:

1. There is the risk of distortion or manipulation of the cash settlement price as there is an incentive for futures market participants to influence cash market prices. The likelihood of price distortion can be greatly reduced by using a large number of cash market prices in calculating the final settlement price.

2. Cash settlement eliminates the use of the delivery option as basis insurance. Thus, longs or shorts will not be able to take or make delivery should the basis move against them. Note that this option is currently limited to those shorts with contract specification product near a delivery point and to longs able to incur the risk of receiving delivery at any one of several delivery points (or to parties able to efficiently acquire or dispose of contract specification product near a delivery point).

3. A cash-settled contract eliminates the use of futures deliveries as a merchandising mechanism for acquisition or disposal of the commodity.

The basis performance of the proposed Feeder Cattle cash settlement, currently pending before the Commodity Futures Trading Commission, can be compared with the basis performance of the actual Feeder Cattle contract to illustrate the anticipated changes in the mean maturity basis and the maturity basis variability. The alteration of the mean basis results from a difference in the pricing of a cash-settled futures contract and a physically delivered contract. For example, the ability to deliver any one of several

grades or varieties of the commodity traded at any one of several delivery points should force the physical delivery futures price to the level of the cheapest grade acceptable at the cheapest cash market delivery location (after adjustments for contract premiums and discounts) since longs anticipate that shorts will deliver the cheapest (after adjustments) item available. Under cash settlement, the prices of the various grades from the various cash market locations are averaged, so the futures price (based upon the same grades, weights, and locations of its physically delivered counterpart) should be higher and the mean basis lower (cash minus futures) than would be the case for a physically delivered contract. Note, however, that most transformations of physically delivered contracts into cash-settled contracts will likely be associated with an alteration in locations, grades, weights, various terms of sale, and locational, grade and weight discounts and premiums so the above point may not prove operationally valid.

The looser quality specifications and the inclusion of unadjusted prices for cheaper feeder trade areas, reflected in the cash-settled Feeder Cattle contract, should result in a significantly lower futures price and higher basis than exists with the current contract. In fact, during the last week of trading, the cash-settled Feeder Cattle futures price would have been roughly $4.01/cwt. lower than the actual Feeder Cattle futures price, on average, for the period, 1980 to 1984. Figure 2 indicates that the maximum difference (current CME Feeder Cattle minus cash-settled) between these two settlement prices, at expiration, would have been $7.67 in August, 1982 and the minimum difference would have been -$0.51 in March,

1981.

The lower cash-settled price would have yielded a higher mean maturity basis at cash market feeder locations. Table 2 indicates that the cash-settled mean basis would have been, on average, $4.01/cwt. higher than the mean basis of its physical delivery counterpart during the five-year period, 1980 to 1984, and $4.19/cwt. higher during the four-year period, 1980 to 1983. For example, a hedger at Oklahoma City, who previously found a cash price lower than futures by $1.85, on average, at contract expiration should anticipate a $2.35 premium in his cash price at contract expiration under the cash-settled futures contract.

With a cash-settled futures price, the trader may also have to alter seasonal basis expectations. Table 3 compares the seasonal basis (each of the eight Feeder Cattle delivery months) of the current Feeder Cattle contract with the cash-settled contract during the five-year period, 1980 to 1984, at Amarillo, TX, Dodge City, KN, Greeley, CO, and Oklahoma City, OK. On the basis of historical price relationships, the trader should anticipate an increase in the mean basis (cash minus futures) in January of $4.40, in March of $3.02, in April of $3.85, in May of $2.99, in August of $4.71, in September of $3.54, in October of $4.66, and in November of $4.93. In general, when converting to cash settlement, a decrease in the futures price and an increase in the basis tends to be largest in August, October, November and January and smallest in March, April, May and September.

The reduction in the maturity basis risk of a cash-settled Feeder Cattle contract becomes readily apparent when the standard

deviation of its basis at contract expiration (measured by the difference between the cash settlement price and selected cash prices during the last week of trading in the actual futures) is compared with the standard deviation of the basis of the actual physical delivery contract. Maturity basis variability is reduced at each of the 38 cash market locations included in Table 2 from a minimum of $0.20 (Dodge City, Kansas) to a maximum of $1.27 (Florida). The trader can expect a $0.77/cwt. reduction in basis variability at Oklahoma City, OK and a $0.86/cwt. reduction in basis variability at Amarillo, TX. Hence, the range in which the mean maturity basis might fall would be reduced from $3.38 (under physical delivery) to $1.84 (under cash settlement) at Oklahoma City and from $4.14 to $2.42 at Amarillo, TX 67 percent of the time (assuming a normally distributed feeder cattle basis).

With a reduction in maturity basis variability, one would expect the deferred basis risk of a cash-settled contract also to decline. As the time to contract expiration increases, however, differences in market opinion should be greater thereby generating greater deferred basis risk as one moves back in time. The deferred basis variability of a cash-settled Feeder Cattle contract cannot be realistically estimated, because the Cattle-Fax U.S. feeder steer price is based on cash market feeder transactions of the current week. Thus, it can only be used to represent the futures price at contract expiration. Prior to contract expiration, the cash-settled futures price would differ from the Cattle-Fax U.S. feeder steer price of the given week. However, we might turn to other markets to find a currently traded cash-settled contract which can be compared with a

similar contract settled by physical delivery to assess the impact of cash settlement on deferred basis variability.

Short-term interest rate futures are the only contracts traded which employ cash settlement in some contracts and physical delivery in others. The three-month Eurodollar time deposit contract traded at the Chicago Mercantile Exchange is cash settled on the basis of the London Interbank Offer Rate (LIBOR)(1). The remaining two short-term interest rate contracts, CME Treasury bills and CME Certificates of Deposit, utilize physical delivery mechanisms.

Table 4 presents the standard deviation of the basis on the day of contract expiration, during the week prior, during the month prior, during the second month prior, and during the third month prior to contract expiration for the three short-term interest rate futures for the period, 1982 to 1984. These results indicate that the more distant the period to contract expiration, the greater the basis instability. For example, the standard deviation of the Eurodollar basis increases from six basis points at contract expiration to 36 basis points during the third month prior to contract expiration. The more relevant issue, whether the maturity basis advantage achieved through cash settlement is maintained throughout the life of the contract, cannot be resolved on the basis of these results, because the cash-settled Eurodollar contract does not enjoy a maturity basis advantage. Maturity basis variability is very low and essentially equal for all three contracts. These

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(1) The 90-day Treasury bill contract traded at the Mid-America Commodity Exchange is cash-settled, but simply on the basis of the 90-day CME Treasury bill futures price.

results are not terribly surprising as the costs associated with making and taking delivery of these interest rate futures are minimal, thus, the reduction in maturity basis variability yielded by a cash-settled contract should not be terribly significant. Hence, the lack of a maturity basis advantage for the cash-settled contract, does not allow us to assess the impact of cash settlement on deferred basis variability.

Summary and Conclusions

In assessing the impact of cash settlement mechanisms on cash/futures price relationships, the basis performance of a cash-settled Feeder Cattle contract was compared with its physical delivery counterpart. Given the significant incremental futures delivery costs entailed in the current Feeder Cattle contract, cash/futures arbitrage opportunities only arise when the futures price falls below (rises above) the cash price by more than the cost of taking (making) delivery on the contract. Within the range of basis indeterminacy, i.e., the sum of the incremental costs of making and taking delivery, no profitable cash/futures arbitrage opportunities emerge to trigger a change in the futures price. Hence, the degree of convergence of the futures price with the cash price is likely to be only as tight as the cash price plus (minus) the costs of making (taking) delivery on the contract. Users of the contract, therefore, confront significant basis risk.

Based on the results of the empirical research in this study, the implementation of a cash settlement mechanism for a nonstorable commodity contract should alter basis performance in the following

ways:

1. The cash-settled futures price will be an average of cash market transactions over time, space and quality whereas the physical delivery futures price will reflect the minimum cash market price over time, space and quality. Thus, the cash-settled futures price should be higher than the physical delivery futures price, if the contract's commodity specifications and terms of sale are not altered. In fact, the proposed cash-settled feeder cattle futures price is likely to be about $4/cwt lower due to the inclusion of lower grades and cheaper trade areas with no price adjustment.

2. The maturity basis range of the physical delivery contract will be equal to the sum of the incremental costs of making and taking delivery whereas the maturity basis range of the cash-settled contract should be limited to the range of the differences between the local cash market price and the average cash-settled price. If futures delivery costs differ significantly from cash market delivery costs, a cash-settled contract should significantly reduce maturity basis risk. Maturity basis risk in feeder cattle during 1980-1983 would have been reduced by 15% to 58% at 14 selected auctions, had cash settlement been used.

3. If a commodity contract experiences incremental futures delivery costs, the maturity basis risk advantage achieved with a cash settlement mechanism should be reflected in the deferred basis, because one of the two risk components comprising the deferred basis, i.e., delivery costs, has been eliminated. On the other hand, in the absence of incremental futures delivery costs, a cash settlement mechanism is unlikely to reduce either maturity basis risk or deferred basis risk. This paper was unable to marshal empirical evidence to support the hypothesis that the maturity basis advantage conferred by cash settlement is maintained throughout the life of the contract.

Figure 1A

Maturity Basis Variability of a
Futures Contract Settled by Physical Delivery

BASIS = CASH PRICE - FUTURES PRICE

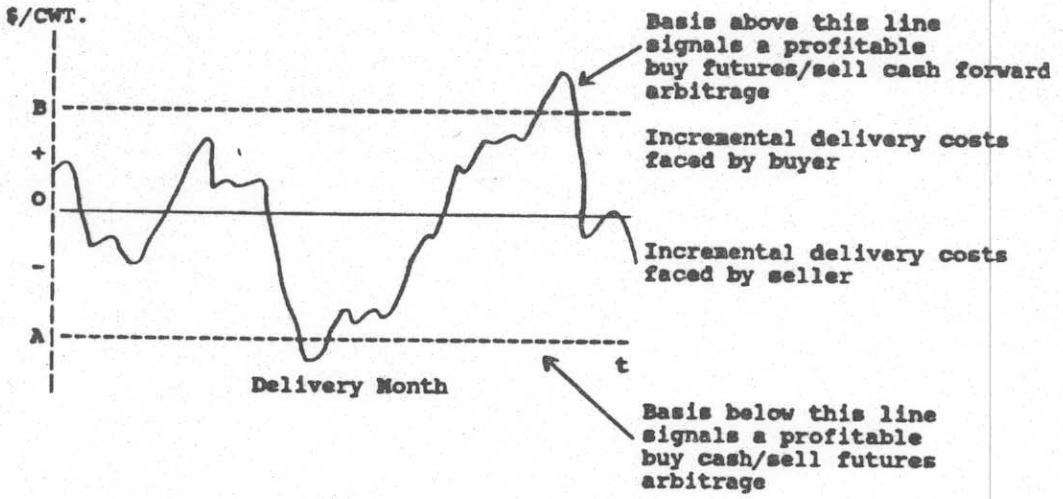

Figure 1B

Deferred and Maturity
Basis Variability of a Cash-Settled Contract

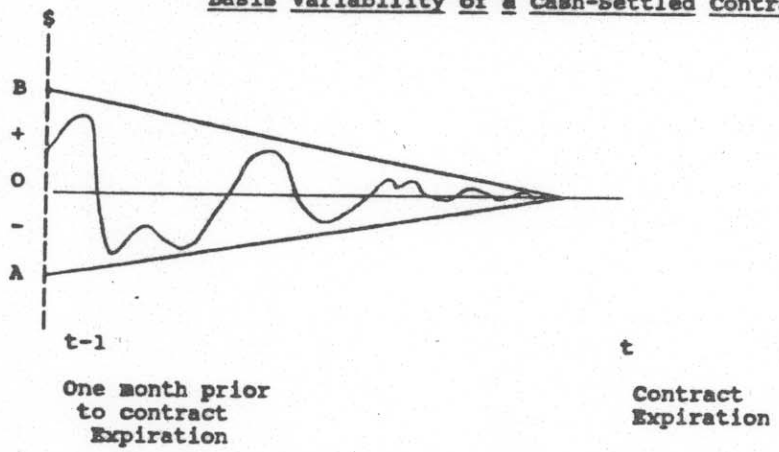

Figure 2

Feeder Cattle
Settlement Price at Contract Expiration
□ Cash-Settled Price Vs. + CME Feeder Cattle Futures
1980-1984

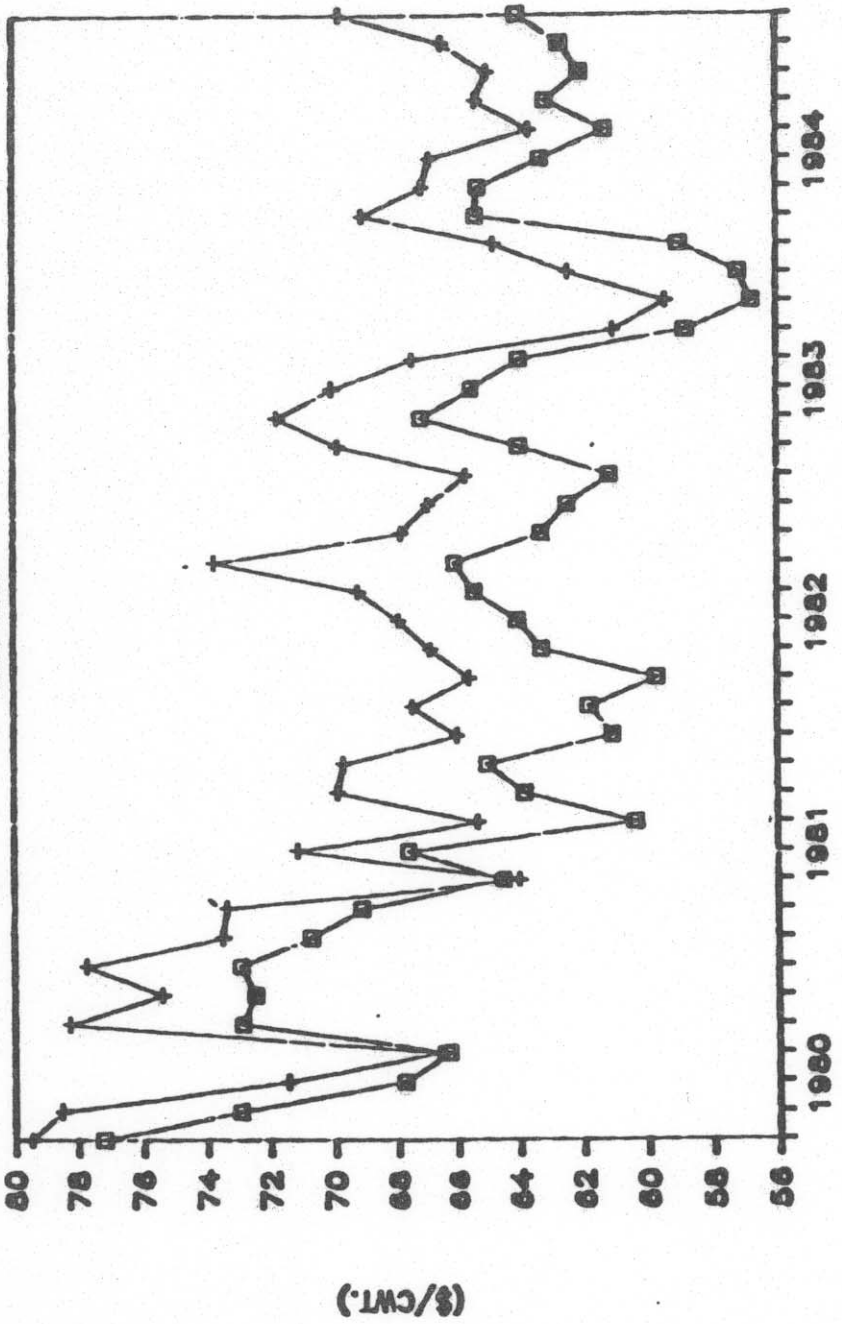

Table 1

Cash Settlement Candidates Based

on Futures Physical Delivery Costs

Futures Delivery Costs	Attractiveness of Cash Settlement	Examples of Contracts
Relatively Insignificant	Uninteresting (Cash Settlement is unnecessary)	- Currencies (free of foreign exchange controls) - Interest Rates (debt instruments must be negotiable) - Agricultureal Commodities Backed by Warehouse Receipts (e.g., grains, pork bellies) - Metals (free of trade restrictions)
Significant	Attractive (Candidates for cash settlement)	- Livestock (live basis) - Petroleum and products - Lumber - Tropicals - Coal
Very high to Infinite	Mandatory (Infeasible unless cash-settled)	- Non-negotiable debt instruments (Eurodollars) - Broadly-based stock indexes (S&P 500) - Economic Indicators (CPI, Housing Starts) - Ocean Freight Rates

Table 2
FEEDER CATTLE
BASIS VARIABILITY AT CONTRACT EXPIRATION*

	Mean of the Basis		Std. Deviation of the Basis	
	Physical CME Feeder Futures ($/CWT.)	Cash Settled Cattle-Fax U.S. Index ($/CWT.)	Physical CME Feeder Futures ($/CWT.)	Cash Settled Cattle-Fax U.S. Index ($/CWT.)
Individual Auctions (1980-83)				
Montgomery, AL	-9.11	-6.92	2.30	1.42
Amarillo, TX	-2.51	1.68	2.07	1.21
Greeley, CO	-1.99	2.19	1.99	0.84
Dodge City, KN	-2.26	1.92	1.40	1.19
Kansas City, MO	-1.28	2.91	2.04	1.06
Louisville, KY	-4.29	-0.11	2.37	1.53
Oklahoma City, OK	-1.85	2.33	1.69	0.92
Omaha, NE	-0.53	3.65	2.96	2.21
Shasta, CA	-3.27	0.91	2.72	1.77
Sioux City, IA	-1.13	3.05	2.51	1.66
Billings, MT	-4.29	-0.11	2.37	1.53
Sioux Falls, SD	-1.85	2.33	1.69	0.92
West Fargo, ND	-0.53	3.65	2.96	2.21
Clovis, NM	-3.27	0.91	2.72	1.77
Western Region (1980-84)				
Arizona	-4.70	-0.69	1.93	1.37
California	-4.80	-0.80	2.10	1.25
Colorado	-2.65	1.35	1.49	0.56
Nevada	-4.83	-0.82	2.14	1.46
New Mexico	-3.96	0.05	1.77	1.25
Utah	-4.62	-0.61	2.00	1.06
Northwestern Region (1980-84)				
Idaho	-3.50	0.51	2.24	1.14
Montana	-3.42	0.58	1.94	0.80
N Dak/S Dak	-2.39	1.62	1.64	0.71
Oregon	-3.78	0.23	2.20	1.13
Washington	-4.62	-0.61	2.00	1.06
Wyoming	-3.50	0.51	2.24	1.14
Plains Region (1980-84)				
Iowa	-3.42	0.58	1.94	0.80
Kansas	-2.39	1.62	1.64	0.71
Missouri	-3.78	0.23	2.20	1.13
Nebraska	-1.79	2.22	1.61	0.80
Oklahoma	-2.75	1.26	1.51	0.56
Texas	-3.52	0.49	1.55	0.84
Southeast Region (1980-84)				
Alabama	-7.49	-3.48	2.01	0.83
Arkansas	-5.85	-1.84	1.81	0.83
Florida	-8.52	-4.51	2.20	0.93
Georgia	-7.97	-3.97	2.06	0.98
LA/Miss	-7.54	-3.53	2.15	0.91
KY/Tenn	-6.08	-2.07	2.03	0.96

*Basis = Cash Price - Futures Price

Cash prices are weekly USDA 600 to 700 lb. Choice Feeder steer auction prices and weekly state Cattle-Fax 600 to 800 lb. Choice Feeder steer prices for the week in which futures expire. The physical delivery futures price is the average of the CME Feeder Cattle settlement prices for the same week. The cash-settled futures price is the weekly average Cattle-Fax U.S. Feeder steer price for the same week.

Table 3
SEASONAL MEAN BASIS*
AT CONTRACT EXPIRATION
1980-1984

CME Feeder Cattle Futures versus Cattle-Fax Cash-Settled Index

LOCATIONS	JANUARY		MARCH		APRIL		MAY	
	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index
Amarillo, TX	-1.89	2.52	-0.35	2.67	-2.67	1.18	-2.35	0.64
Dodge City, KN	-2.41	1.99	-0.99	2.03	-2.10	1.75	-1.09	1.90
Greeley, CO	-1.85	2.55	-1.15	1.87	-1.98	1.87	-0.22	3.22
Oklahoma City, OK	-1.33	3.08	-0.62	2.40	-2.09	1.76	-1.06	1.93

LOCATIONS	AUGUST		SEPTEMBER		OCTOBER		NOVEMBER	
	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index	CME FC Futures	Cattle-Fax Cash-Settled Index
Amarillo, TX	-3.01	1.70	-2.38	1.16	-3.56	1.10	-2.58	2.34
Dodge City, KN	-3.06	1.65	-1.81	1.73	-2.60	2.06	-2.79	2.14
Greeley, CO	-3.14	1.57	-1.61	1.94	-2.72	1.93	-2.60	2.33
Oklahoma City, OK	-2.55	2.16	-1.49	2.06	-2.90	1.76	-2.10	2.83

*BASIS = CASH PRICE-FUTURES PRICE

Cash Price: Weekly USDA 600 to 700 lb. Choice Feeder steer auction prices.
Futures Prices: Average of the CME Feeder Cattle settlement prices for the week in which the futures expire and the weekly average Cattle-Fax U.S. Feeder steer price for the same week.

Table 4
Interest Rate Futures Basis
Performance at Selected Time Intervals Prior to Contract Expiration[a]
1982 - 1984

Third Month Prior to Contract Expiration			
BASIS	3 - Month Eurodollars	90-Day Certificates of Deposit	90-Day Treasury Bills
MEAN	-0.27	-0.39	-0.34
ST DEV	0.36	0.38	0.41
MIN	-1.72	-1.60	-2.02
MAX	0.79	0.46	0.28

Second Month Prior to Contract Expiration			
BASIS	3 - Month Eurodollars	90-Day Certificates of Deposit	90-Day Treasury Bills
MEAN	-0.20	-0.20	-0.17
ST DEV	0.33	0.30	0.38
MIN	-1.49	-1.39	-1.70
MAX	0.65	0.46	0.62

First Month Prior to Contract Expiration			
BASIS	3 - Month Eurodollars	90-Day Certificates of Deposit	90-Day Treasury Bills
MEAN	-0.04	-0.00	-0.07
ST DEV	0.26	0.12	0.23
MIN	-1.49	-0.71	-1.29
MAX	1.02	0.49	0.26

One Week Prior to Contract Expiration			
BASIS	3 - Month Eurodollars	90-Day Certificates of Deposit	90-Day Treasury Bills
MEAN	0.01	0.03	0.02
ST DEV	0.09	0.08	0.06
MIN	-0.20	-0.02	-0.11
MAX	0.29	0.18	0.20

Day of Contract Expiration			
BASIS	3 - Month Eurodollars	90-Day Certificates of Deposit	90-Day Treasury Bills
MEAN	0.02	0.05	0.01
ST DEV	0.06	0.08	0.05
MIN	-0.12	-0.09	-0.07
MAX	0.11	0.17	0.11

BASIS = CASH PRICE - FUTURES PRICE
Cash prices used in calculating the basis consist of the 3-month Eurodollar offer rate (synonomous with the London Interbank Offer Rate), the prevailing secondary market offerings of 3-month Treasury Bills, and the 90-day secondary certificates of deposit rate. One hundred minus the daily futures closing price of each of the three futures contract represents the futures prices.

References

Garbade, Kenneth D. and William L. Silber. "Cash Settlement of Futures Contracts: An Economic Analysis." Journal of Futures Markets. Vol 3, No. 4 (1983): 451-472.

Hobson, Ronald B. "Cash Settlement of Futures Contracts: Concepts and Experience." CFTC Education Quarterly. Vol. 1, No. 2 (1982): 1-4

Jones, Frank J. "The Economics of Futures and Options Contracts Based on Cash Settlement." Journal of Futures Markets. Vol. 2, No. 1 (1982): 63-82.

Martell, Terrence F. and Jerrold E. Salzman. "Cash Settlement for Futures Contracts Based on Common Stock Indices: An Economic and Legal Perspective." Journal of Futures Markets. Vol. 1, No. 3 (1981): 291-303.

Paul, Allen B. "Should Futures Contracts Be Settled by Cash Payment." Contributed Paper, American Association of Agricultural Economists annual meeting, Urbana, Illinois (1980).

Paul, Allen B. "The Role of Cash Settlement in Futures Contract Specification." AEI Occasional Paper on the Economics and Regulation of Futures Markets, American Enterprise Institute (1984).

Paul, Allen B., Kandice H. Kahl, and William G. Tomek. Performance of Futures Markets: The Case of Potatoes. Technical Bulletin No. 1636, U.S. Department of Agriculture (1981).