Table 5.4. Price Behavior on Days in Which at Least One of the Leading Traders in Each Group was Active, 1988-1993

Trader Active on NCE	Number of Days NCE Prices:				Trading Days		Loads Traded	
	Increased	Decreased	Remained Unchanged	Price Increase Stopped, Slowed, or Reversed[a]	Total Trading Days	Percent of Total Days	Loads Sold	Loads Bought
				BARRELS and/or BLOCKS[b]				
Seller-traders[c]	14	79	41	49	183[e]	58%	1806	35[h]
Percent	8%	43%	22%	27%	100%	--	--	--
Buyer-traders[d]	107	72	60	N/A	239	76%	89[g]	1947
Percent	45%	30%	25%	N/A	100%	--	--	--
Both Seller and Buyer Traders Active					164	52%		
Other Traders Active					10	3%	301	236
No Activity Days					45	14%	0	0
Total Days of Trading					313	100%[f]	2,196	2,196

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-1993.

[a]This refers to a day in which prices were increasing due to other trader activity until Kraft began selling activity, with the apparent effect of stopping, slowing or reversing an upward price trend.
[b]This reflects trading days in which the leading sellers or buyers were involved in either barrel and/or block trading on the NCE. The number of days price increased (decreased) includes days in which both barrel and block prices increased (decreased) or days in which barrel prices increased (decreased) while block prices were unchanged and vice versa. The number of days prices remained unchanged refers to the days in which both barrel and block prices remain unchanged. Finally, the price increase stopped, slowed or reversed refers to the days in which the leading sellers' activity stopped, slowed or reversed an upward price trend in barrel while block prices increased or remained unchanged, and vice versa.

On three trading days, barrel and block prices moved in opposite directions, thus not falling in any of the above categories. These days were classified as a price increase, decrease or unchanged, depending upon the net difference between barrel and block price changes. For leading seller-traders, two of these three days are included in the price increase-stopped-slowed-or-reversed category.

[c]Kraft, Borden and Alpine Lace
[d]Beatrice, Mid-Am, Schreiber, Land O' Lakes and AMPI
[e]Excludes four days when Kraft and/or Borden submitted bids for the apparent purpose of signalling their approval to buyer-traders of an upward price trend. See Section E, this chapter.
[f]Percents do not add to 100 because of the 164 days in which both seller and buyer traders were active.
[g]Includes 10 loads AMPI sold through a broker.
[h]Excludes 22 loads of blocks Kraft purchased for the apparent purpose of influencing the block-barrel price spread. See Section E, this chapter.

Hence, during 1989-1993, the three leading seller-traders were virtually always sellers.

The buyer-traders appear to be a less cohesive group than the seller-traders. Whereas the three largest buyer-traders *sold no* loads of barrels and very few loads of blocks, the sales of the fourth largest buyer-trader, Land O' Lakes, were 38 percent as great as its purchases. And the largest cheese manufacturing cooperative, AMPI, was a relatively inactive buyer-trader, buying less than any of the other leading buyer-traders. Moreover, on one occasion AMPI sold heavily while the two leading buyer-traders were purchasing.[14]

E. Trading to Signal Competitors and to Influence the Block-Barrel Spread

The most notable feature of Kraft's activity on the NCE during 1988-1993 is that it virtually always acted as a seller-trader: it bought no barrels and only 22 loads of blocks during these six years. Examination of these exceptions to Kraft's conduct as a seller-trader reveals that Kraft was not motivated by a desire to purchase cheese. Rather, it appears that the activity occurred to influence the *price spread* between blocks and barrels. On two other occasions Kraft apparently made bids for the purpose of *signaling* competitors that Kraft approved of a rising price trend.

Trading to Signal Competitors

Kraft bid to buy when NCE prices were rising during two of the six price cycles in 1988-1993. On July 21, 1989, Kraft made one bid to buy barrels, and on April 16, 1992, it made one bid to buy blocks. None of the bids was filled.

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[14] See Chapter 6, Section A.

A leading *buyer-trader* interpreted Kraft's barrel and block bids on April 16, 1992, as sending a "message" to other traders that Kraft did not object to an upward price trend then underway. An internal company memorandum summarizing activity stated in part:

> A significant event occurred today. When the block market was bid to $1.27, Kraft entered a bid for four cars of blocks at $1.27 and 5 cars of barrels at $1.24/pound...*Kraft's message to the industry was that they were not going to sell any blocks or barrels at this point in time.* (Emphasis added).[15]

This expectation was confirmed by subsequent events: Kraft did not offer to sell on the NCE for the next 16 weeks, during which prices continued to rise.

We have no industry commentary concerning Kraft's price bid of July 21, 1989, but this bid occurred under circumstances similar to those of April 16, 1992. Prices rose from May 5 through June 30, 1989, after which the price of barrels remained unchanged for two weeks. After prices began rising again on July 21, Kraft made one bid to buy barrels, which was not filled. Kraft's bid likely was interpreted by the buyer-traders as *signaling* Kraft's approval of further price increases. If so, their expectation was confirmed by subsequent events: Kraft made no offers to sell during the following 14 weeks, as prices continued to rise.

Another type of trading activity by Kraft was apparently interpreted by an official of a leading *buyer-trader* as signaling that Kraft approved of an "orderly" price rise. The trader also observed that Kraft was engaged in "selective selling" to "moderate" a rising market. This buyer-trader made the following observations, in internal company memoranda, concerning Kraft's trading activity during a period of rising prices:[16]

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[15] [[Source deleted in public report as not essential.]]

[16] For a discussion of this period see Chapter 6, Section C.

June 14, 1991 Trading Session
...Kraft seems to be taking the position that they will sell to prevent a panic market run up but will not stop an orderly market rise.[17]

June 28, 1991 Trading Session
It appears that Kraft is *continuing to over commit* for both blocks and barrels so that they are in a position to cover their commercial orders *as well as influence and trade at the Exchange.*[18]

July 19, 1991 Trading Session
The cheese available, especially barrels, continues light--with Kraft's selective selling moderating the rise in markets.[19]

September 19, 1991
Wayne [Hangartner, Kraft's purchasing director] believed that they will have more available in future weeks and that they don't want to carry more than they need for their own requirements[;] however, *he wanted to have some trading inventory.*[20]

October 8, 1991
Kraft selective selling continues to moderate the upward movement.[21]

Trading to Influence the Block-Barrel Price Spread

Because barrel trading often drives NCE price levels, some trading activity occurs to achieve what traders regard as the appropriate block-to-barrel price spread.[22] The size of the spread is important because it affects the relative profitability of manufacturing blocks and barrels. Kraft's *purchases* during four sessions in August-October 1990 apparently were motivated by this objective. During this period Kraft purchased 22 loads of blocks, its only

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17 [[Source deleted in public report as not essential.]]

18 Emphasis added. [[Source deleted in public report as not essential.]]

19 [[Source deleted in public report as not essential.]]

20 Emphasis added. [[Source deleted in public report as not essential.]]

21 [[Source deleted in public report as not essential.]]

22 See Chapter 4, text at notes 15 and 16.

purchases on the NCE during 1988-1993.[23] The evident purpose and effect of Kraft's conduct was to prevent what it believed was an inappropriate narrowing of the block-barrel spread. Kraft clearly did not buy because it needed more blocks. As explained below,[24] during this period Kraft appeared to be leading the market down so that it could dispose of a large surplus of blocks and barrels once NCE prices were driven below the support level.

F. Econometric Examination of Trader-Price Relationships

The preceding demonstrates that during 1988-1993 the conduct of leading traders was consistent with the motives hypothesized: Kraft, Borden, and Alpine Lace were primarily seller-traders that exerted a downward pressure on prices, whereas Beatrice, Schreiber, Mid-Am, Land O' Lakes, and AMPI were primarily buyer-traders that exerted an upward pressure on prices, although the relationship appears weaker than for the seller-traders.

Kraft appeared to lead the seller-traders, joined by others with common interests, especially Borden and Alpine Lace. Over a price cycle Kraft appeared to shape the pattern of the cycle by setting price tops, by participating in initiating and sustaining price declines, and by establishing and maintaining price bottoms. Between a price bottom and the succeeding price top, leading buyer-traders were active in raising prices. During the latter period Kraft appeared

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[23] On August 24, 1990, Kraft bought 7 loads of blocks. During the prior three weeks the spread between blocks and barrels had narrowed from 4.25 cents to 3.5 cents. When the spread continued to narrow to 1.25 cents on August 24, Kraft began bidding for blocks. The spread at the close of trading was 2.25 cents. When the spread continued to narrow the next week, August 31, 1990, Kraft again bought blocks. At the close the spread was 1.0 cent. At the opening of trading September 28, 1990, the spread was 2 cents. When the spread narrowed, Kraft began buying blocks; nonetheless, at the close the spread was 0.5 cents. The following trading session, October 5, 1990, trading was very active, with barrels dropping 9.25 cents on offers by Kraft and Borden. Kraft again bought blocks. At the close, the spread had widened to 1.5 cents.

[24] See Chapter 6, Section B.

to *signal* implicit approval of rising prices by not participating in trading, *signal* explicit approval of rising prices by submitting a bid, and *signal* explicit disapproval of rising prices by selling into a rising market, thereby moderating upward price trends.

Although Kraft was the dominant seller-trader, it was confronted by a small group of buyer-traders. In this setting, Kraft's view of the appropriate price apparently did not always go unchallenged. The buyer-traders appeared to challenge Kraft's conduct at price bottoms and, to a lesser degree, at price tops. When they persisted in bidding and/or covering Kraft offers, Kraft had to sell large amounts to prevent a price rise. If Kraft yielded to the buying pressure by not filling bids, prices rose immediately and often continuously for some weeks, often with few or no actual consummated transactions.

The apparently conflicting motives and conduct of these leading traders implied that NCE trading occurred within the context of bilateral oligopoly, where a small group of seller-traders confronted a small group of buyer-traders. This conclusion raises the question, what was the relative impact on prices of these countervailing traders? We have, therefore, performed an econometric test of the following hypotheses: (a) the trading activity of the leading seller-traders had a negative influence on NCE prices and (b) the trading activity of the leading buyer-traders had a positive influence on NCE prices.

The Economic Model

A simple competitive partial equilibrium model of the monthly pricing of cheese at the manufacturing level may be written as a function of dynamic adjustments, predetermined supply and demand shifters as follows:

$$P_t = f\ (p_t^{\ell},\ S_t,\ x_t) \qquad t = 1,2....T, \qquad (1)$$

where P_t denotes the monthly average price of cheese; vector $\underline{p}_t^t$ denotes lagged cheese prices; S_t denotes predetermined total supply (beginning stocks plus production); and $\underline{x}_t$ is a vector of exogenous variables that are important shifters of the demand for cheese (e.g., disposable income, population and seasonality). The subscript t indicates month t. Under the competitive model given by equation 1, lagged cheese prices are included to reflect the possibility that supply and demand conditions prior to any given month influence cheese prices for that month. Total supply in a given month is considered as predetermined because of short-run inelastic cheese supply response.

A quantitative analysis of cheese pricing would be relatively straightforward if the observed prices were determined in a purely competitive market. In reality, however, observed prices are affected by a complex interaction of market forces, government price support policies, and the conduct of leading traders on the NCE. The federal government directly influences cheese prices through the CCC purchases of cheese for school lunch and other purposes and, importantly, through price supports for milk used in manufacturing cheese. Under the price support program, the federal government buys cheese, butter, and dried skim milk to assure that the price paid to farmers does not fall below support levels. The government's offer to buy cheese in unlimited quantities at announced prices often tends to put a floor on the price received by manufacturers. Moreover, as explained in earlier sections of this chapter, the trading patterns of leading sellers and leading buyers on the NCE imply that these traders play an important part in setting the level of observed NCE cheese prices. Thus, a competitive econometric model of cheese pricing must be modified to account for both government intervention and the potential effect of leading NCE traders.

The next section presents two alternative econometric models that allow us to control for government intervention and to test the hypotheses that leading NCE sellers have a negative effect and leading NCE buyers a positive effect on monthly cheese prices.

The Econometric Model

Let P_t equal the price of cheese at time t. A dynamic econometric equation that draws on the competitive economic model given by equation 1 can be specified as a function of market forces, seasonality, and stochastic error at time t as follows:

$$P_t = \alpha_0 + \underline{\beta}_1' \underline{p}_t^{\ell} + \beta_2 S_t + \underline{\beta}_3' \underline{x}_t + e_t \qquad t = 1,2...T, \tag{2}$$

where $\underline{p}_t^{\ell}$ is a vector of lagged prices, S_t is the predetermined total cheese supply (beginning stocks plus production), and $\underline{x}_t$ is a vector of demand shifters (i.e. disposable income, population and seasonality) with $\underline{\beta}_1$, β_2 and $\underline{\beta}_3$ being the corresponding parameters at time t. The term α_0 denotes a constant term while e_t denotes disturbance at time t. It is assumed that $E(e_t) = 0$, $var(e_t) = \sigma$ and $cov(e_t, e_{t+1}) \neq 0$.

The lagged prices $\underline{p}_t^{\ell}$ are included to control for the dynamic adjustment process of monthly cheese prices. The full price effects of changes in $\underline{x}_t$ and S_t are felt not only in the same month during which these changes occur, but also over several months. Inserting lagged independent variables is a standard way of taking into account such changes that take place over time.

An econometric estimation of equation 2 would provide a consistent estimation of the parameters α_0, $\underline{\beta}_1$, β_2 and $\underline{\beta}_3$ if NCE prices were determined solely by the interaction of market forces without the influence on cheese prices of a) the behavior of leading NCE traders, as hypothesized above, and b) government purchases, particularly under its milk price support

program. The effect of leading NCE traders' conduct on the level of observed prices can be accounted for by incorporating in equation 2 variables representing leading sellers' and buyers' trading on the NCE. The estimation problem caused by government intervention in the cheese market, however, may be dealt with by two alternative methods as detailed below.

Government intervention through CCC purchase prices has at times played a dominant role in determining prices, since the CCC purchase price tends to set a lower bound on NCE prices. Thus when the NCE price drops to the CCC support level, market factors are relegated to a role of marginal importance. For example, an examination of monthly NCE and CCC prices for 40-pound block cheese reveals that during the period from 1988-1993, 17 percent of the monthly NCE prices were at or slightly below the CCC price support level. These observations pose a problem in specifying a model to explain cheese prices since NCE prices significantly below CCC price levels never occur. The role of government in cheese pricing suggests a need for modification of the econometric model given by equation 2.

One way to resolve the estimation problem created by the limited dependency of NCE prices on competitive factors is to employ a censor regression model (or Tobit Model).[25] Let P_t^g be the CCC purchase price for cheese in month t. In the Tobit Model a switching regression equation may be specified as follows:

$$P_t = \begin{cases} \alpha_0 + \underline{\beta}_1' \underline{p}_t^{\ell} + \beta_2 S_t^c + \underline{\beta}_3' \underline{x}_t + \beta_4 K_t + \beta_5 BF_t + u_t & \text{if } P_t > P_t^g \\ P_t^g & \text{otherwise,} \end{cases} \qquad t = 1,2....T \qquad (3)$$

[25] G.S. Maddala 1983. *Limited Dependent and Qualitative Variables in Econometrics.* Cambridge, England: Econometric Society Monograph.

As specified in equation 3 the Tobit Model allows for switching between two regimes, namely the market regime when $P_t > P_t^g$ and the government regime otherwise. The switching is conditional on the level of P_t relative to P_t^g. If the observed cheese price is greater than the CCC purchase price, observation P_t is treated as the market-determined price of cheese at time t; otherwise, it is equal to the CCC purchase price, P_t^g. Note that in equation 3, we have replaced total supply S_t with commercial supply S_t^c, which equals total supply minus net government purchases.[26] Moreover, to account for leading traders' conduct on the NCE, equation 3 includes two additional variables, namely K_t and BF_t, representing leading sellers' and buyers' participation indices with corresponding parameters β_4 and β_5, respectively. (A detailed description of these and other variables along with data sources is given in the next section.) We assume the residuals, u_t, are independently and normally distributed with mean zero and common variance σ^2. A maximum likelihood estimation of the Tobit model (equation 3) would render consistent estimates of the parameters α_0, $\underline{\beta}_1$, β_2, $\underline{\beta}_3$, β_4, and β_5.

Another way to overcome the estimation problem caused by government intervention is to control for CCC net removal of cheese in each month, since it is through purchasing of cheese at CCC prices that the federal government implements its price policy. Thus if we employ the commercial supply of cheese, S_t^c, for each month in the following equation, we have insulated cheese prices from the distortion caused by CCC purchase prices.

$$P_t = \alpha_0 + \underline{\beta}_1' \underline{p}_t^{\ell} + \beta_2 S_t^c + \underline{\beta}_3' \underline{x}_t + \beta_4 K_t + \beta_5 BF_t + e_t \qquad t = 1,2....T \quad (4)$$

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[26] This variable replacement allows for government intervention in cases where market price is above the CCC price, but where government cheese purchases under programs other than the price support program may still affect cheese prices.

A maximum likelihood estimation of equation 4 (referred to here as Full Sample Model) would allow us to use the full sample of observations without censoring any observations.

In the analysis that follows, we employ both the Tobit Model (equation 3) and the Full Sample Model (equation 4) to explain monthly NCE and WAP barrel and block prices during the period 1988-1993.

Variables, Data and Hypotheses

Dependent Variables

The following monthly real NCE and WAP prices of cheddar cheese are employed as alternative dependent variables in the estimation of both the Tobit Model and the Full Sample Model.

NCE Prices. Monthly NCE barrel and block prices are calculated as the simple averages of weekly NCE barrel and block prices as reported in *Dairy Market News*, USDA. The producer price index (PPI) for processed food and feed (1982=100) is used to deflate nominal monthly prices.

WAP Prices. Monthly Wisconsin Assembly Point (WAP) prices for barrels and blocks are the simple averages of the minimum and maximum WAP barrel and block prices as reported in *Dairy Market News* on Thursday of each week. The PPI for processed food and feed (1982=100) is used to deflate nominal monthly prices.

Independent Variables

The following independent variables are used in the above models to explain monthly NCE and WAP prices.

Lag Prices (Lag 1 and Lag 2). For each dependent variable, we use monthly prices lagged by one and two months, respectively, as independent variables. Lagged prices are

introduced to account for the lagged or dynamic adjustment mechanism of monthly cheese prices. The coefficients for these variables reflect the speed of adjustment or delayed effect of other independent variables on the current monthly price. In other words the effect of other independent variables is the sum of the short-run or simultaneous effect and the delayed effect. We also examined three and four month lagged prices and found no significant effect on current prices. We conclude that one and two month lags are the most appropriate lags for prices to adjust to the changes in independent factors.

Supply (S^c). Supply is measured by per capita monthly commercial supply of American cheese in pounds. Commercial supply is equal to total supply minus CCC purchases during the month. Total supply is defined as the monthly production of American style cheese, plus beginning-of-month commercial stocks, plus CCC sales for unrestricted use in commercial channels. The CCC sales in commercial channels are included because they affect market price by adding to the existing market supply. Monthly population estimates were used to arrive at the per capita commercial supply of cheese.

Per capita monthly commercial supply figures in each year were standardized into 12 equal periods to adjust for differences in the number of days in each calendar month. Such standardization controls for the spurious variation in monthly supply due to the difference in the length of a month rather than to production seasonality or other economic conditions.

We expect the per capita commercial supply of cheese to be negatively related to NCE and WAP prices.

Demand Shifter (D). Monthly real per capita disposable personal income in thousands of 1982 dollars, D, is employed to account for one source of shifts in demand. Nominal

disposable personal income (as reported in *Survey of Current Business*, Economic and Statistics Administration, Bureau of Economic Analysis, US Department of Commerce) was deflated using an implicit price deflator for personal consumption expenditure to arrive at real disposable income. Monthly population estimates were used to get per capita income figures. We expect D to be positively related to NCE and WAP prices.

Seasonality (M2,...M12): Eleven monthly dummies, one for each month from February (M2) to December (M12) are employed to control for the effect of demand seasonality on NCE and WAP prices. Demand seasonality results from changes in consumer demand and the building up and the drawing down of inventory. January is excluded for dummy variable purposes.

Trader Activity Categories. Leading traders on the NCE are classified as follows: K--Kraft; the K-Group, which identifies the leading seller-traders (Kraft, Borden and Alpine Lace) and the BF-Group, which identifies the leading buyer-traders (Beatrice, Mid-Am, Schreiber, Land O'Lakes, and AMPI). A group's degree of participation in trading activity during a month is measured by the percent of trading sessions each month in which at least one member of the group is active on the Exchange. Because the number of trading sessions in a month is either 4 or 5, this variable may take on the following values for each group: 0, 20%, 25%, 40%, 50%, 60%, 75%, 80%, or 100%.

K and the K-Group variable are expected to be negatively related to NCE and WAP prices, and the BF-Group variable is expected to be positively related to NCE and WAP prices.

Estimation and Results

NCE Prices

Appendix Tables 5.5 and 5.6 present the maximum likelihood estimates of monthly NCE barrel and block prices for the Tobit and Full Sample Models for 1988-1993. The two models yield very similar results, perhaps reflecting the fact that only 17 percent of the price observations were at or below the CCC support level.

Estimated coefficients for Lag1 and Lag2 are positive and negative, respectively, in each of the four equations; they are significant at the 1 percent level. Lagged prices allow for controlling the dynamic adjustments of monthly cheese prices. Overall, the significant coefficients for Lag1 and Lag2 suggest that it takes three months for NCE prices to adjust or to reflect fully changes in market conditions.

As expected, the coefficients for S^c (per capita commercial supply) and D (per capita disposable personal income) are negative and positive, respectively, in each of the estimated equations for both the Tobit and Full Sample Models. Both of these variables are statistically significant at the 1 percent level in all of the price equations.

The effect of seasonality as depicted by the coefficients for $M_2, M_3 ... M_{12}$ in the four equations implies that on average, prices bottom in February and peak during July, August and September. These estimated coefficients reflect the seasonality of prices as shown in Figure 2.11. Low prices in February seem to reflect low demand for commercial stocks in addition to low demand for consumption after the holiday season of December and January; high prices during July through September, in contrast, seem to reflect high demand for commercial inventories (Figures 2.5 and 2.7) and high demand for consumption with the start of school.

Table 5.5. Estimated Relationship Between Trader Activity Variables and NCE Prices

	Tobit Model			Full Sample Model		
	BARRELS					
Equation	1a	1b	1c	2a	2b	2c
K	-0.026[b] (2.17)	--	--	-0.025[b] (1.96)	--	--
K-Group	--	-0.026[b] (2.06)	-0.032[b] (2.13)	--	-0.028[b] (2.14)	-0.036[b] (2.40)
BF-Group	--	--	0.013 (0.73)	--	--	0.018 (1.08)
	BLOCKS					
Equation	3a	3b	3c	4a	4b	4c
K	-0.021[b] (2.03)	--		-0.026[b] (2.37)	--	--
K-Group	--	-0.029[a] (2.68)	-0.033[a] (2.54)	--	-0.031[a] (2.79)	-0.035[a] (2.54)
BF-Group	--	--	0.008 (0.51)	--	--	0.007 (0.46)

Source: The value of other variables used in these equations appear in Appendix Tables 5.5 and 5.6.

Note: A one-tail t-test is used to determine statistical significance. An *a* denotes 1% level of significance and a *b* denotes 5% level of significance.

To facilitate presentation, the coefficients and t-values of the trader activity variables as reported are summarized in Table 5.5. When the Kraft trader activity variable, K, is included in the Tobit Model, the estimated coefficients on K are -0.026 for barrels and -0.021 for blocks (Equations 1a and 3a, Table 5.5). In the Full Sample Model, these coefficients on K are -0.025 for barrels and -0.026 for blocks (Equations 2a and 4a, Table 5.5). All coefficients are statistically significant at the 5 percent level or higher.

When the K-Group trader activity variable is included in the Tobit Model, the coefficients are -0.026 for barrels and -0.029 for blocks (Equations 1b and 3b). In the Full Sample Model, the coefficients on the K-Group are -0.028 for barrels and -0.031 for blocks (Equations 2b and 4b, Table 5.5). All coefficients are statistically significant at the 5 percent level or higher. In the Tobit Model, the coefficients on both K and K-Group are -0.026 in the barrel equations 1a and 1b. In contrast, the coefficient on the K-Group is somewhat greater than that on K in the block equations 3a and 3b. In the Full Sample Model, the coefficient on the K-Group is slightly greater than on K for both barrels and blocks. All coefficients are statistically significant at the 5 percent level or higher.

These findings suggest that while Kraft was predominantly responsible for the size of the coefficient on K-group, the participation of the other two leading seller-traders contributed modestly to Kraft's impact on prices. But while K-Group has a slightly larger coefficient in three equations than does K alone, this does not necessarily imply that their trading activity was essential to the result. For had they not joined Kraft in selling, Kraft may have achieved this result by making these sales itself.

When both the K-Group and BF-Group are included in the equations, the estimated coefficients for the K-Group in the Tobit Model are -0.032 for barrels and -0.033 for blocks (Equations 1c and 2c). In the Full Sample Model, these coefficients are -0.036 for barrels and -0.035 for blocks (Equations 3c and 4c). All coefficients are statistically significant at the 5 percent level or higher.

Though positive as hypothesized, the estimated coefficients for the BF-Group (leading buyer-traders) are very small and are not statistically significant in any of the equations.

These findings support the hypothesis that the trading activity of the leading seller-traders, dominated by Kraft, had a statistically significant negative impact on NCE cheese prices. On the other hand, the group of leading buyers had no statistically significant impact on prices.

Holding other variables constant, the findings imply that when at least one of the leading seller-traders was active in each trading session during a month, NCE prices were lower by 3.2-3.6 cents per pound for barrel cheese and 3.3-3.5 cents per pound for block cheese, respectively, than when none of the leading sellers was active. These coefficients are expressed in 1982 dollars. Expressed in 1993 dollars, these values are 4.0- 4.5 cents for barrels and 4.1-4.3 cents for blocks.

WAP Prices:

The above analysis estimates the effect of various factors on monthly NCE prices. These prices, of course, originate in a central, organized auction market, the National Cheese Exchange. And, as we have noted, NCE prices are used as the basis for formula pricing bulk cheese purchased under committed supply agreements, which account for 90-95 percent of all cheese sales. These formulas typically include a premium over the relevant NCE price, with the

premiums varying somewhat according to changes in overall market conditions. Hence, NCE prices may not be identical to actual transaction prices paid under committed supply agreements.

To determine whether this potential shortcoming of NCE prices significantly affected the relevance of our results, we substituted WAP prices, which are those paid on spot sales at Wisconsin assembly points. WAP spot transactions occur directly between buyers and sellers at negotiated prices expressed as a premium (or discount) in relation to NCE prices. WAP prices are generally higher than NCE prices, but the premium may change weekly to reflect changing market conditions. Since WAP premiums over NCE vary more frequently and by larger amounts than do the premiums of committed supply agreements, the use of WAP prices in our equation may provide a conservative test of whether our models accurately reflect changes in actual transaction prices of committed supply agreements.

The results using WAP prices as dependent variables are reported in Appendix Tables 5.7 and 5.8. The estimated coefficients are quite similar to those reported when NCE prices are used. Given the very high correlation of NCE and WAP prices ($r = 0.993$ for block prices and 0.992 for barrel prices), the similarity of results is not surprising. However, the consistency of the results using the two different market prices provides some encouragement concerning the validity of our model in explaining prices paid for bulk cheese purchased under committed supply agreements as well as NCE prices.

Appendix 5.A.
Kraft's Trading Activity During 1986 and 1987

Kraft's former Director of Purchasing explained why Kraft became a seller-trader beginning in 1986 as follows:

> ...the major, very significant change that you're talking about between those two periods, until about '85, '86, versus beyond that is the government support program and the supply/demand positions in the industry....[T]his industry had a gross surplus of cheese...beginning in 1980 throughout, until 1987, and while I was not making the decisions as to whether we sell cheese...on the board [or] off the board at that point in time, I was involved in inventory management....[Y]ou did not have to carry the kind of safety stocks you do in a volatile...market because you knew that cheese was always out there. You could buy any cheese any time you wanted to at basically support prices that first half of the 1980s. The people that were responsible at that time knew that [if] they didn't have any inventories, they could buy cheese as needed. So, in that particular case, I suspect that we played our inventories a little bit different. If I knew today that there was going to be that kind of surplus situation...we would change our management philosophy on raw material cheese....[27]

Examination of market conditions and Kraft's trading activity on the NCE, as well as examination of Kraft's actual inventory experience, does not support Mr. Hangartner's explanation as to why Kraft became exclusively a seller-trader beginning in 1986. Appendix Figure 5.3 shows the pattern of Kraft's overall trading activity from July 1986 through June 1988.[28] In the months prior to August 1986, when there was an industry surplus and NCE prices were *below* support levels, Kraft bought 104 loads on the NCE. It made its last purchase July 3, 1986. By the end of July market conditions had tightened and prices rose above the support level.

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[27] Wayne Hangartner, Kraft's former Director of Cheese Procurement and Inventories, typed transcript of recorded interview, December 8-9, 1992, pp. 119-120.

[28] This figure shows Kraft's activity in barrel and blocks although the price line shown is for barrels for presentation purposes. Block and barrel prices generally move together with block prices somewhat above barrel prices. See text at note 1, this chapter, for a description of the method used to construct Appendix Figure 5.3.

Barrel prices continued rising until August 29, when they reached $1.245, six cents above the barrel price on July 27. At this point Kraft began offering barrels, leading to a 1 cent per pound drop in barrel prices. A similar rise in block prices was reversed on August 22, when Kraft began offering blocks. During the next two sessions, Kraft continued to exert downward pressure on prices. It also appears that Kraft participated in topping the block market during September and October 1986.

We do not know Kraft's inventory situation in 1986. However, Kraft's abrupt change from a buyer to a seller on the Exchange occurred when market conditions strengthened and prices rose *above* the support level. Kraft's abrupt change in trading conduct in August 1986 and its subsequent conduct are consistent with the hypothesis that it was motivated by a desire to influence prices.

Kraft remained exclusively a seller-trader after 1986. Insofar as Kraft had a surplus in 1987, this does not in itself explain why it became the largest seller on the Exchange in that year. Examination of trading patterns suggests that Kraft's NCE sales were designed to maintain NCE prices at or below the CCC support level by what it believed to be an appropriate margin. During August 7 through September 9, 1987, Kraft offered to sell barrels whenever the price rose above the support level, with the result that prices at the close of each trading session were the same as at the opening. Kraft also appeared to play the leading role in the November and December 1987 market decline to below the support level in the weeks preceding the reduction in the level of support prices effective January 1, 1988.

Kraft apparently did not make these large sales on the NCE in order to maximize return in disposing of the surplus, since it would have fared better selling to the CCC rather than on the

NCE. During 1987, Kraft lost an average of 1.9 cents per pound on NCE sales, whereas its losses on CCC sales averaged only 0.6 cents per pound (Appendix Table 4.3).

Finally, recall that Mr. Hangartner said that the reason Kraft became a seller-trader after the mid-1980s was related to a change in inventory policy, implying that when CCC stocks were no longer available, Kraft had to carry larger inventories. Consider these facts. During 1988-1992, when NCE prices were primarily market driven, Kraft's raw material cheese inventories were below the average for 1981-1987, when NCE prices were largely determined by price support levels. Indeed, during 1988-1989, the first two years that NCE prices were market driven, Kraft's inventories were lower than Kraft's inventories in each year 1981-1987.[29]

In sum, the facts do not support Mr. Hangartner's rationale for Kraft's becoming a seller-trader in 1986. Rather, they are consistent with the hypothesis that Kraft began selling on the NCE in August 1986 to exert an influence on the level of NCE prices.

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[29] Appendix Table 6.1 and Kraft General Foods, Inc., *Cheese Procurement Strategy*, Operations, December 6, 1989, KGF 2948, 2982, 2983. During 1981-1987, Kraft's raw material cheese inventories averaged [...] million pounds per year, ranging from [...] million pounds to [...] million pounds. During 1988-1992, when cheese prices were predominantly above price support levels, Kraft's actual average inventories were less than [...] million pounds (1981-1987 average) in all years but 1990.

During 1981-1989, Kraft decreased its inventories expressed as average day's supply from [...] days to [...] days. Importantly, the decline continued during the first two years that price supports were not operative, 1988 and 1989. Kraft's planned average day's supply was [...] days in 1990 and in 1986, although that was higher than in 1988 or 1989. *Id.* 2983. 1990 was the only year during 1988-1993 in which Kraft's inventories exceeded the 1981-1987 average. However, Kraft's larger inventory in 1990 was unplanned. Its *planned* inventory for 1990 was well below its *actual* inventory. *Id.*, KGF 2982. Information has been redacted from the report at this time. See statement in Appendix Table 6.1.

Appendix Table 5.1a. Types of Trading Activity by Leading Traders of Barrel Cheese on the NCE, 1988-1993

Type of Trader Activity	Leading Traders										
	Kraft	Borden	Alpine	DS[1]	Beatrice	Mid-Am	Schreiber	LOL	AMPI	All Others[2]	TOTAL
Seller Activity of Traders											
Offers and Reduced Offers											
Number	546	250	50	198	0	0	0	33	0	61	1138
%	48	22	4	17				3		5	100
Sale: Offer Covered											
Carloads	436	45	13	34	0	0	0	2	0	29	559
%	78	8	2	6				*		5	100
Sale: Filled Bid											
Carloads	813	14	1	6	0	0	0	59	0	47	940
%	86	1	*	1				6		5	100
TOTAL SALES											
Carloads	1249	59	14	40	0	0	0	61	0	76	1499
%	83	4	1	3				4		5	100
Buyer Activity of Traders											
Bids and Increased Bids											
Number	2	29	4	114	498	184	352	220	188	231	1822
%	*	2	*	6	27	10	19	12	10	13	100
Purchase: Bid Filled											
Carloads	0	32	0	24	317	83	195	103	101	85	940
%		3		3	34	9	21	11	11	9	100
Purchase: Covered Offer											
Carloads	0	0	1	0	253	48	121	83	31	22	559
%			*		45	9	22	15	6	4	100
TOTAL PURCHASES											
Carloads	0	32	1	24	570	131	316	186	132	107	1499
%		2	*	2	38	9	21	12	9	7	100

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-93.

Note: Total percentage figure may not add, due to rounding.

*Less than 1 percent.

[1]Dairystate Brands, Inc.

[2]These are Bongards (sold 71 carloads); Edelweiss (bought 19 carloads); Hermke Cheese (bought 13 carloads); Masters Gallery (bought 37 carloads); Northern (bought 31 carloads); Northwood (bought 2 carloads); Schurman (sold 5 and bought 5 carloads). Alto, Fromageries and Frigo Cheese made offers and bids but no sales or purchases.

Appendix Table 5.1b. Types of Trading Activity by Leading Traders of Block Cheese on the NCE, 1988-1993

Type of Trader Activity	Leading Traders										
	Kraft	Borden	Alpine	DS[1]	Beatrice	Mid-Am	Schreiber	LOL	AMPI	All Others[2]	TOTAL
						Seller Activity of Traders					
Offers and Reduced Offers											
Number	333	0	435	303	0	0	26	26	3	328	1454
%	23		30	21			2	2	*	23	100
Sale: Offer Covered											
Carloads	197	0	105	76	0	0	4	0	0	72	454
%	43		23	17			1			16	100
Sale: Filled Bid											
Carloads	171	0	11	13	0	4	3	11	0	30	243
%	70		5	5		2	1	5		12	100
TOTAL SALES											
Carloads	368	0	116	89	0	4	7	11	0	102	697
%	53		17	13		1	1	2		15	100
						Buyer Activity of Traders					
Bids and Increased Bids											
Number	1	0	11	46	470	389	5	0	8	419	1349
%	*		1	3	35	29	*		1	31	100
Purchase: Bid Filled											
Carloads	0	0	1	5	74	122	2	0	4	35	243
%			*	2	30	50	1		2	14	100
Purchase: Covered Offer											
Carloads	22	0	1	0	129	238	4	3	36	21	454
%	5		*		28	52	1	1	8	5	100
TOTAL PURCHASES											
Carloads	22	0	2	5	203	360	6	3	40	56	697
%	3		*	1	29	52	1	*	6	9	100

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-93.

Note: Total percentage figure may not add, due to rounding.

*Less than 1 percent.

[1]Dairystate Brands, Inc.

[2]These are Alto (bought 6 carloads): Bongards (sold 4 carloads); Dairygold (sold 14 carloads); Empire Cheese (bought 5 carloads); Golden Cheese (sold 10 carloads); Marathon (sold 35 loads); Marketing Association (sold 6 carloads); Masters Gallery (sold 7 loads and bought 25); Northern (sold 18 loads and bought 2); Northwood (sold 6 and bought 3 carloads); Schurman (sold 2 and bought 15 carloads). Edelweiss, Green Bay Cheese, and Fromageries (made offers and bids but no sales or purchases).

Appendix Table 5.2. Price Behavior on Days in Which at Least One of the Leading Traders in Each Group was Active, 1988-1993

Trader Active on NCE	Number of Days NCE Prices:				Total Days Active
	Increased	Decreased	Remained Unchanged	Price Increase Stopped, Slowed, or Reversed[a]	
			BARRELS		
Seller-traders[b]	12	62	49	41	164[c]
Percent	7%	38%	30%	25%	100%
Buyer-traders[d]	96	41	67	N/A	204
Percent	47%	20%	33%	N/A	100%
			BLOCKS		
Seller-traders[b]	10	53	31	22	116[e]
Percent	9%	46%	27%	19%	100%
Buyer-traders[d]	67	51	47	N/A	165
Percent	41%	31%	28%	N/A	100%

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-1993.

[a]This refers to a day in which prices were increasing as a result of other trader activity until Kraft began selling activity with the apparent effect of stopping, slowing or reversing a price increase.

[b]Kraft, Borden and Alpine Lace

[c]Excludes 4 days when Kraft and/or Borden submitted bids for the apparent purpose of signalling their approval to buyer-traders of an upward price trend. See Section E, this chapter.

[d]Beatrice, Mid-Am, Schreiber, Land O' Lakes and AMPI

[e]Excludes one day when Kraft submitted bids for the apparent purpose of signaling its approval of an upward price trend to buyer-traders. See Section E, this chapter.

Appendix Table 5.3. Price Behavior in Days Kraft, Borden and Alpine Lace Were Active in NCE Trading, 1988-1993

Trader	Carloads Traded		Number of Days NCE Prices:				Total Days Active
	Sold	Bought	Increased	Decreased	Remained Unchanged	Price Increase Stopped, Slowed or Reversed	
BARRELS							
Kraft	1249	0	7[a]	48	37	41	133
Borden	59	32	10[c]	24	19	0	53
Alpine Lace	14	1	0	5	4	0	9
Total (Net)[b]	1322	33	10	62	50	41	163
Percent			6%	38%	31%	25%	100%
BLOCKS							
Kraft	368	22[d]	6[e]	42	24	22	94
Borden	0	0	0	0	0	0	0
Alpine Lace	116	2	11	33	11	0	55
Total (Net)[b]	484	24	11	53	31	22	115
Percent			9%	46%	27%	19%	100%

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-1993.

[a]Excludes two days when Kraft submitted bids for the apparent purpose of signalling that it approved of an upward price trend. See Section E, this chapter.

[b]This is the number of days in which at least one of the traders was active.

[c]Excludes four days when Borden submitted bids for the apparent purpose of signalling its approval of a rising price trend. See Section E, this chapter.

[d]Kraft purchased 22 loads of block apparently for the purpose of influencing the block-barrel price spread. See Section E, this chapter.

[e]Excludes two days when Kraft submitted bids for the apparent purpose of signalling its approval of a rising price trend. See Section E, this chapter.

Appendix Table 5.4. Price Behavior in Days Beatrice, Mid-Am, Schreiber and AMPI were Active in NCE Trading, 1988-1993

Trader	Carloads Traded		Number of Days NCE Prices:			Total Days Active
	Sold (1)	Bought (2)	Increased (3)	Decreased (4)	Remained Unchanged (5)	(6)
BARRELS						
Beatrice	0	570	51	19	35	105
Mid-Am	0	131	27	4	8	39
Schreiber	0	316	52	14	23	89
Land O' Lakes	61	186	28	14	19	61
AMPI	10[b]	132	23	4	19	46
Total (Net)[a]	71	1325	96	41	67	204
Percent			47%	20%	33%	100%
BLOCKS						
Beatrice	0	203	46	22	21	89
Mid-Am	4	360	43	42	29	114
Schreiber	7	6	4	4	1	9
Land O' Lakes	11	3	4	4	5	13
AMPI	0	40	4	11	6	21
Total (Net)[a]	22	612	67	51	47	165
Percent			41%	21%	28%	100%

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1988-1993.
[a]This is the number of days in which at least one of the traders was active.
[b]These are sales AMPI made through a broker, Dairystate.

Appendix Table 5.5. Estimates of Factors Affecting Monthly NCE Barrel Prices, 1988-1993
n=72

	Tobit Equations			Full Sample Equations		
	1a	1b	1c	2a	2b	2c
Variables	Coefficients					
Constant	-63.355[b]	-57.499[c]	-56.661[c]	-19.410	-17.682	-12.054
	(2.15)	(1.95)	(1.91)	(0.76)	(0.75)	(0.51)
Lag1	0.942[a]	0.942[a]	0.930[a]	0.985[a]	1.024[a]	1.031[a]
	(8.77)	(8.77)	(8.57)	(8.91)	(9.59)	(9.76)
Lag2	-0.385[a]	-0.392[a]	-0.376[a]	-0.416[a]	-0.440[a]	-0.433[a]
	(3.86)	(3.95)	(3.71)	(4.04)	(4.43)	(4.34)
S^c	-25.816[a]	-26.124[a]	-25.761[a]	-22.243[a]	-21.654[a]	-20.345[a]
	(5.50)	(5.60)	(5.44)	(4.44)	(4.61)	(4.36)
D	13.630[a]	13.366[a]	13.169[a]	9.241[a]	8.968[a]	8.092[a]
	(4.38)	(4.28)	(4.15)	(3.29)	(3.40)	(3.05)
M2	-2.058	-2.769	-3.124	-1.092	-1.363	-1.583
	(0.99)	(1.37)	(1.50)	(0.55)	(0.67)	(0.76)
M3	4.435[b]	3.190	2.673	3.514[c]	2.798	2.404
	(2.09)	(1.55)	(1.23)	(1.74)	(1.40)	(1.18)
M4	8.781[a]	7.491[a]	7.053[a]	6.823[a]	5.961[a]	5.578[b]
	(4.15)	(3.57)	(3.22)	(3.34)	(2.92)	(2.69)
M5	6.319[a]	5.127[b]	4.497[c]	4.503[b]	3.393	2.552
	(2.80)	(2.29)	(1.87)	(2.03)	(1.54)	(1.11)
M6	9.007[a]	7.831[a]	7.249[a]	6.983[a]	5.908[b]	5.005[b]
	(4.05)	(3.47)	(3.03)	(3.12)	(2.65)	(2.14)
M7	11.243[a]	10.042[a]	9.367[a]	9.110[a]	8.105[a]	7.120[a]
	(5.21)	(4.75)	(4.11)	(4.08)	(3.69)	(3.05)
M8	10.986[a]	10.161[a]	9.638[a]	8.939[a]	8.301[a]	7.493[a]
	(5.10)	(4.87)	(4.39)	(4.00)	(3.79)	(3.29)
M9	11.656[a]	10.559[a]	9.987[a]	9.677[a]	8.769[a]	7.902[a]
	(5.49)	(5.17)	(4.59)	(4.40)	(4.09)	(3.51)
M10	5.545[b]	4.173[b]	3.863[c]	3.834[c]	2.599	2.119
	(2.65)	(2.08)	(1.89)	(1.76)	(1.23)	(0.99)
M11	5.934[a]	4.650[b]	4.263[b]	4.761[b]	3.829[c]	3.391[c]
	(3.02)	(2.47)	(2.19)	(2.37)	(1.94)	(1.69)
M12	2.267	0.993	0.962	1.403	0.434	0.537
	(1.15)	(0.53)	(0.51)	(0.69)	(0.21)	(0.26)
K	-0.026[b]	–	–	-0.025[b]	–	–
	(2.17)			(1.96)		
K-group	–	-0.026[b]	-0.032[b]	–	-0.028[b]	-0.036[b]
		(2.06)	(2.13)		(2.14)	(2.40)
BF-group	–	–	0.013	–	–	0.018
			(0.73)			(1.08)
R^2	0.924	0.924	0.924	0.907	0.907	0.908

Note: Maximum Likelihood methods are used to estimate both the Tobit and Full Sample models. A one tail test is applied to determine statistical significance on S^c, D, K, K-group and BF-group coefficients while a two tail test is applied for the rest of the coefficients. T-statistics are in parentheses: a/ denotes 1% level of significance; b/ denotes 5% level of significance; and c/ denotes 10% level of significance. R^2 statistics are the squares of correlation coefficients between actual and predicted values.

Appendix Table 5.6. Estimates of Factors Affecting Monthly NCE Block Prices, 1988-1993

n=72

	Tobit Equations			Full Sample Equations		
	1a	1b	1c	2a	2b	2c
Variables	Coefficients					
Constant	-41.298[c] (1.76)	-38.403[c] (1.68)	-39.053[c] (1.68)	-18.797 (0.84)	-17.496 (0.82)	-15.526 (0.73)
Lag1	1.036[a] (9.46)	1.007[a] (9.49)	0.997[a] (9.23)	1.048[a] (9.88)	1.054[a] (10.23)	1.056[a] (10.10)
Lag2	-0.447[a] (4.41)	-0.421[a] (4.33)	-0.408[a] (4.07)	-0.426[a] (4.38)	-0.424[a] (4.48)	-0.420[a] (4.29)
S^c	-23.981[a] (5.80)	-23.585[a] (5.95)	-23.421[a] (5.83)	-19.948[a] (4.48)	-19.632[a] (4.65)	-19.117[a] (4.48)
D	11.261[a] (4.38)	11.096[a] (4.46)	11.081[a] (4.38)	8.353[a] (3.43)	8.229[a] (3.54)	7.904[a] (3.32)
M2	-0.912 (0.52)	-1.369 (0.81)	-1.530 (0.88)	0.525 (0.31)	0.223 (0.13)	0.136 (0.08)
M3	4.543[b] (2.54)	3.561[b] (2.08)	3.322[c] (1.86)	4.817[a] (2.75)	3.929[b] (2.27)	3.776[b] (2.11)
M4	8.448[a] (4.87)	7.389[a] (4.36)	7.222[a] (4.15)	7.625[a] (4.54)	6.713[a] (3.86)	6.570[a] (3.70)
M5	5.025[b] (2.66)	4.080[b] (2.23)	3.811[c] (2.00)	4.755[b] (2.50)	8.746[b] (1.99)	3.431[c] (1.74)
M6	8.523[a] (4.68)	7.486[a] (4.14)	7.235[a] (3.85)	7.718[a] (4.04)	6.725[a] (3.54)	6.383[a] (3.17)
M7	9.847[a] (5.57	8.987[a] (5.29)	8.709[a] (4.87)	9.126[a] (4.74)	8.232[a] (4.39)	7.860[a] (3.91)
M8	10.766[a] (6.14)	10.357[a] (6.19)	10.145[a] (4.87)	10.136[a] (5.30)	9.694[a] (5.22)	9.391[a] (4.83)
M9	9.960[a] (5.64)	9.330[a] (5.59)	9.100[a] (5.26)	9.422[a] (4.92)	8.672[a] (4.70)	8.345[a] (4.29)
M10	4.354[b] (2.55)	3.403[b] (2.11)	3.305[b] (2.03)	4.006[b] (2.15)	2.902 (1.62)	2.719 (1.49)
M11	5.229[a] (3.19)	4.358[a] (2.83)	4.204[b] (2.68)	5.471[a] (3.17)	4.507[b] (2.68)	4.338[b] (2.50)
M12	2.337 (1.43)	1.422 (0.92)	1.463 (0.95)	2.525 (1.46)	1.540 (0.91)	1.571 (0.91)
K	-0.021[b] (2.03)	–	–	-0.026[b] (2.37)	–	–
K-group	–	-0.029[a] (2.68)	-0.033[a] (2.54)	–	-0.031[a] (2.79)	-0.035[a] (2.54)
BF-group	–	–	0.008 (0.51)	–	–	0.007 (0.46)
R^2	0.941	0.943	0.943	0.93	0.943	0.933

Note: Maximum Likelihood methods are used to estimate both the Tobit and Full Sample models. A one tail test is applied to determine statistical significance on S^c, D, K, K-group and BF-group coefficients while a two tail test is applied for the rest of the coefficients. T-statistics are in parentheses: a/ denotes 1% level of significance; b/ denotes 5% level of significance; and c/ denotes 10% level of significance. R^2 statistics are the squares of correlation coefficients between actual and predicted values.

Appendix Table 5.7. Estimates of Factors Affecting Monthly WAP Barrel Prices, 1988-1993

n=72

	Tobit Equations			Full Sample Equations		
	1a	1b	1c	2a	2b	2c
Variables	Coefficients					
Constant	-59.790[b]	-53.318[b]	-52.010[b]	-26.956	-25.551	-20.374
	(2.29)	(2.09)	(2.02)	(1.02)	(1.05)	(0.86)
Lag1	1.153[a]	1.135[a]	1.124[a]	1.102[a]	1.123[a]	1.129[a]
	(11.98)	(11.84)	(11.70)	(10.55)	(11.02)	(11.24)
Lag2	-0.511[a]	-0.498[a]	-0.482[a]	-0.480[a]	-0.488[a]	-0.481[a]
	(5.63)	(5.57)	(5.32)	(4.87)	(5.07)	(5.01)
S^c	-22.922[a]	-22.833[a]	-22.286[a]	-21.188[a]	-20.640[a]	-19.352[a]
	(5.64)	(5.77)	(5.54)	(4.32)	(4.52)	(4.30)
D	12.124[a]	11.737[a]	11.446[a]	9.280[a]	9.057[a]	8.230[a]
	(4.48)	(4.43)	(4.24)	(3.26)	(3.43)	(3.14)
M2	-1.592	-2.275	-2.670	-0.704	-0.971	-1.171
	(0.85)	(1.26)	(1.46)	(0.43)	(0.58)	(0.68)
M3	4.753[b]	3.497[c]	2.922	3.617[c]	2.846	2.475
	(2.51)	(1.93)	(1.54)	(1.97)	(1.58)	(1.35)
M4	8.938[a]	7.625[a]	7.125[a]	7.125[a]	6.282[a]	5.920[a]
	(4.71)	(4.11)	(3.72)	(3.82)	(3.41)	(3.19)
M5	5.902[a]	4.725[b]	3.958[c]	4.885[b]	3.860[c]	3.058
	(2.85)	(2.37)	(1.87)	(2.39)	(1.93)	(1.47)
M6	7.937[a]	6.730[a]	6.038[a]	6.749[a]	5.714[a]	4.852[b]
	(3.86)	(3.34)	(2.87)	(3.22)	(2.79)	(2.28)
M7	9.752[a]	8.601[a]	7.828[a]	8.515[a]	7.570[a]	6.630[a]
	(4.91)	(4.56)	(3.89)	(4.09)	(3.77)	(3.13)
M8	10.028[a]	9.301[a]	8.665[a]	8.896[a]	8.373[a]	7.611[a]
	(5.12)	(5.03)	(4.49)	(4.34)	(4.22)	(3.71)
M9	10.275[a]	9.285[a]	8.596[a]	9.226[a]	8.415[a]	7.595[a]
	(5.29)	(5.12)	(4.50)	(4.57)	(4.35)	(3.76)
M10	5.625[a]	4.355[b]	3.986[b]	4.829[b]	3.682[c]	3.229[c]
	(2.95)	(2.46)	(2.22)	(2.43)	(1.94)	(1.69)
M11	4.879[b]	3.691[b]	3.267[c]	4.156[b]	3.184[c]	2.764
	(2.68)	(2.20)	(1.91)	(2.27)	(1.80)	(1.54)
M12	1.744	0.566	0.563	1.559	0.580	0.649
	(0.96)	(0.33)	(0.33)	(0.91)	(0.34)	(0.37)
K	-0.024[b]	–	–	-0.025[b]	–	–
	(2.15)			(2.06)		
K-group	–	-0.028[b]	-0.036[a]	–	-0.029[b]	-0.039[a]
		(2.40)	(2.60)		(2.33)	(2.60)
BF-group	–	–	0.016	–	–	0.018
			(1.02)			(1.11)
R^2	0.949	0.951	0.951	0.939	0.941	0.943

Note: Maximum Likelihood methods are used to estimate both the Tobit and Full Sample models. A one tail test is applied to determine statistical significance on S^e, D, K, K-group and BF-group coefficients while a two tail test is applied for the rest of the coefficients. T-statistics are in parentheses: a/ denotes 1% level of significance; b/ denotes 5% level of significance; and c/ denotes 10% level of significance.
R^2 statistics are the squares of correlation coefficients between actual and predicted values.

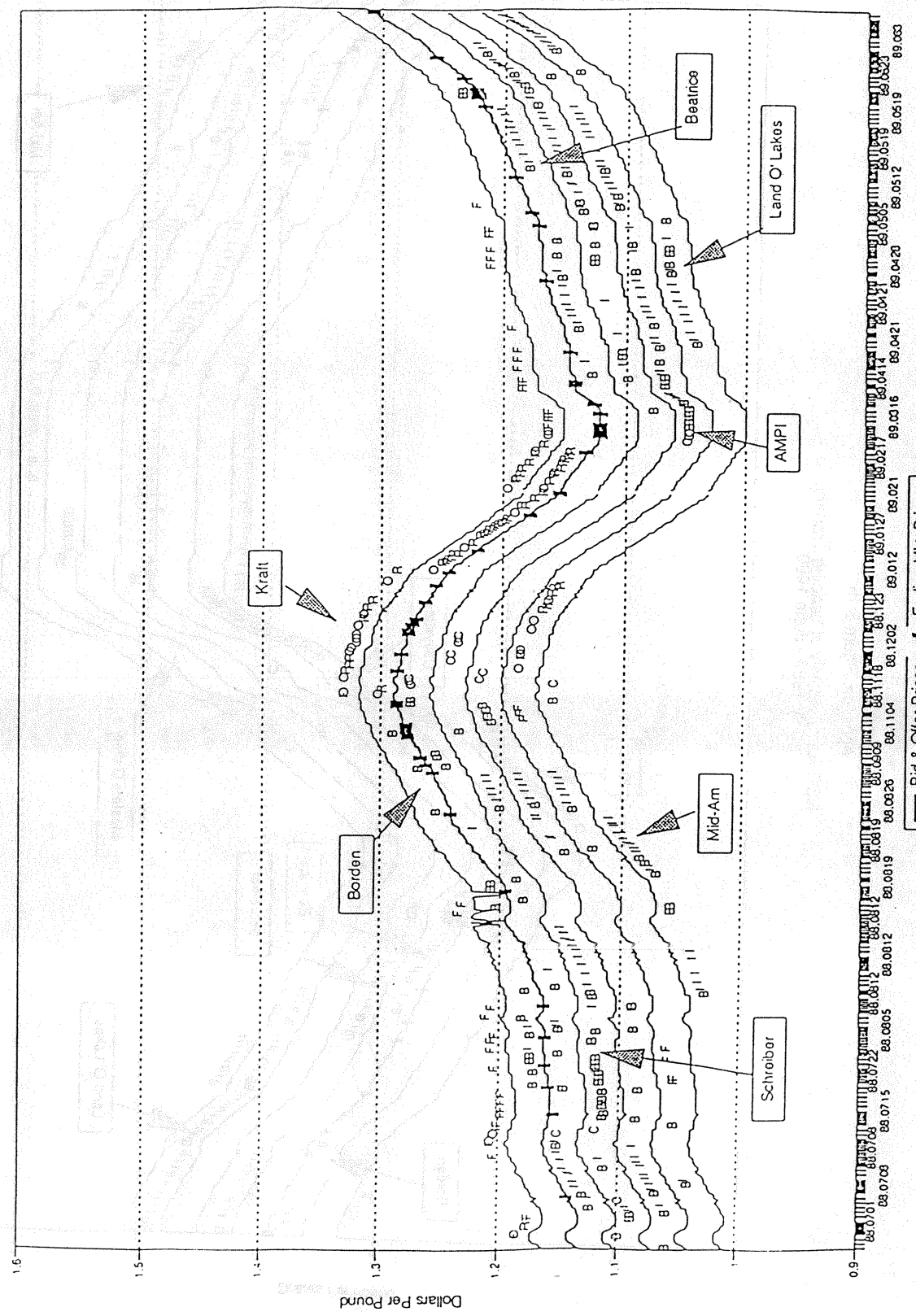
Appendix Table 5.8. Estimates of Factors Affecting Monthly WAP Block Prices, 1988-1993

n=72

	Tobit Equations			Full Sample Equations		
	1a	1b	1c	2a	2b	2c
Variables	Coefficients					
Constant	-56.036[b] (2.03)	-52.966[c] (1.97)	-53.460[c] (1.95)	-25.155 (0.97)	-23.110 (0.94)	-18.389 (0.76)
Lag1	1.101[a] (8.98)	1.066[a] (8.81)	1.052[a] (8.58)	1.051[a] (9.63)	1.058[a] (9.98)	1.068[a] (10.13)
Lag2	-0.480[a] (4.17)	-0.447[a] (3.98)	-0.428[a] (3.70)	0.414[a] (4.08)	-0.413[a] (4.18)	-0.410[a] (4.10)
S^c	-25.326[a] (5.46)	-24.879[a] (5.57)	-24.451[a] (5.36)	-20.611[a] (4.11)	-20.240[a] (4.29)	-19.026[a] (4.05)
D	12.567[a] (4.28)	12.381[a] (4.34)	12.260[a] (4.20)	8.971[a] (3.17)	8.789[a] (3.28)	8.019[a] (2.96)
M2	-1.805 (0.87)	-2.265 (1.13)	-2.525 (1.24)	0.247 (0.12)	-0.110 (0.05)	-0.282 (0.13)
M3	4.819[b] (2.31)	3.752[c] (1.84)	3.351 (1.58)	4.818[b] (2.30)	3.765[c] (1.83)	3.474 (1.64)
M4	8.308[a] (4.04)	7.205[a] (3.55)	6.910[a] (3.31)	7.630[a] (3.63)	6.546[a] (3.14)	6.241[a] (2.94)
M5	5.808[b] (2.61)	4.851[b] (2.26)	4.372[c] (1.94)	5.622[b] (2.51)	4.420[c] (2.00)	3.728 (1.61)
M6	8.547[a] (3.92)	7.519[a] (3.49)	7.076[a] (3.16)	7.968[a] (3.50)	6.786[a] (3.02)	6.040[b] (2.55)
M7	9.710[a] (4.60)	8.859[a] (4.39)	8.360[a] (3.92)	9.162[a] (4.01)	8.095[a] (3.65)	7.280[a] (3.07)
M8	10.935[a] (5.28)	10.550[a] (5.33)	10.156[a] (4.95)	10.509[a] (4.67)	9.983[a] (4.57)	9.315[a] (4.07)
M9	11.116[a] (5.31)	10.503[a] (5.33)	10.080[a] (4.91)	10.918[a] (4.85)	10.026[a] (4.62)	9.308[a] (4.07)
M10	3.793[c] (1.81)	2.875 (1.47)	2.704 (1.37)	3.910[c] (1.74)	2.591 (1.21)	2.172 (0.99)
M11	5.368[b] (2.66)	4.536[b] (2.41)	4.281[b] (2.24)	6.485[a] (3.15)	5.341[b] (2.66)	4.986[b] (2.42)
M12	1.795 (0.92)	0.872 (0.47)	0.954 (0.52)	2.322 (1.11)	1.163 (0.56)	1.246 (0.59)
K	-0.023[b] (1.75)	–	–	-0.031[b] (2.37)	–	–
K-group	–	-0.032[b] (2.31)	-0.038[b] (2.37)	–	-0.038[a] (2.79)	-0.045[a] (2.78)
BF-group	–	–	0.013 (0.75)	–	–	0.015 (0.82)
R^2	0.933	0.935	0.935	0.92	0.922	0.923

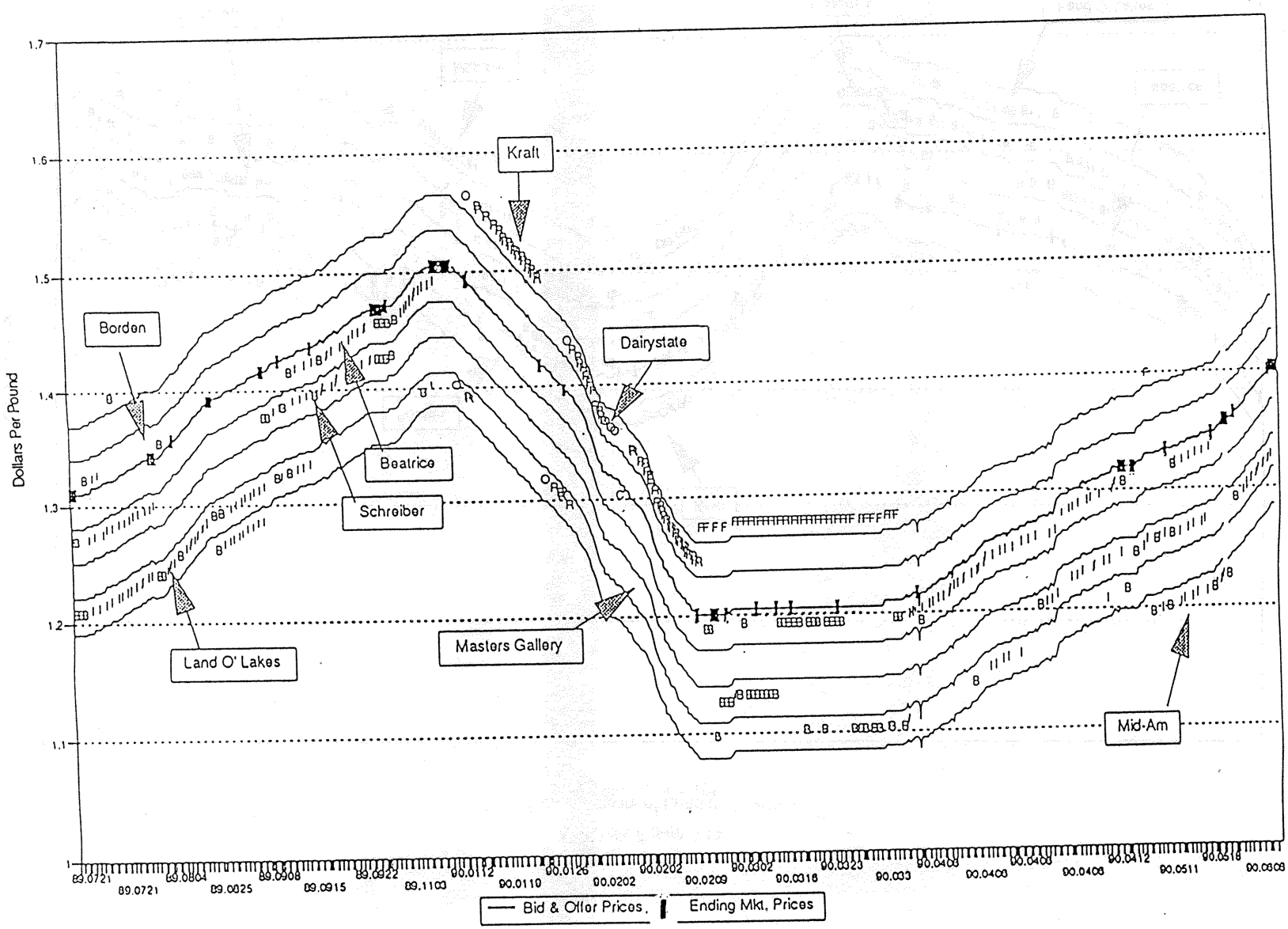
Note: Maximum Likelihood methods are used to estimate both the Tobit and Full Sample models. A one tail test is applied to determine statistical significance on S^c, D, K, K-group and BF-group coefficients while a two tail test is applied for the rest of the coefficients. T-statistics are in parentheses: a/ denotes 1% level of significance; b/ denotes 5% level of significance; and c/ denotes 10% level of significance. R^2 statistics are the squares of correlation coefficients between actual and predicted values.

Appendix Figure 5.1a
NCE Barrel Activity of Leading Traders,
July 1988 - June 1989



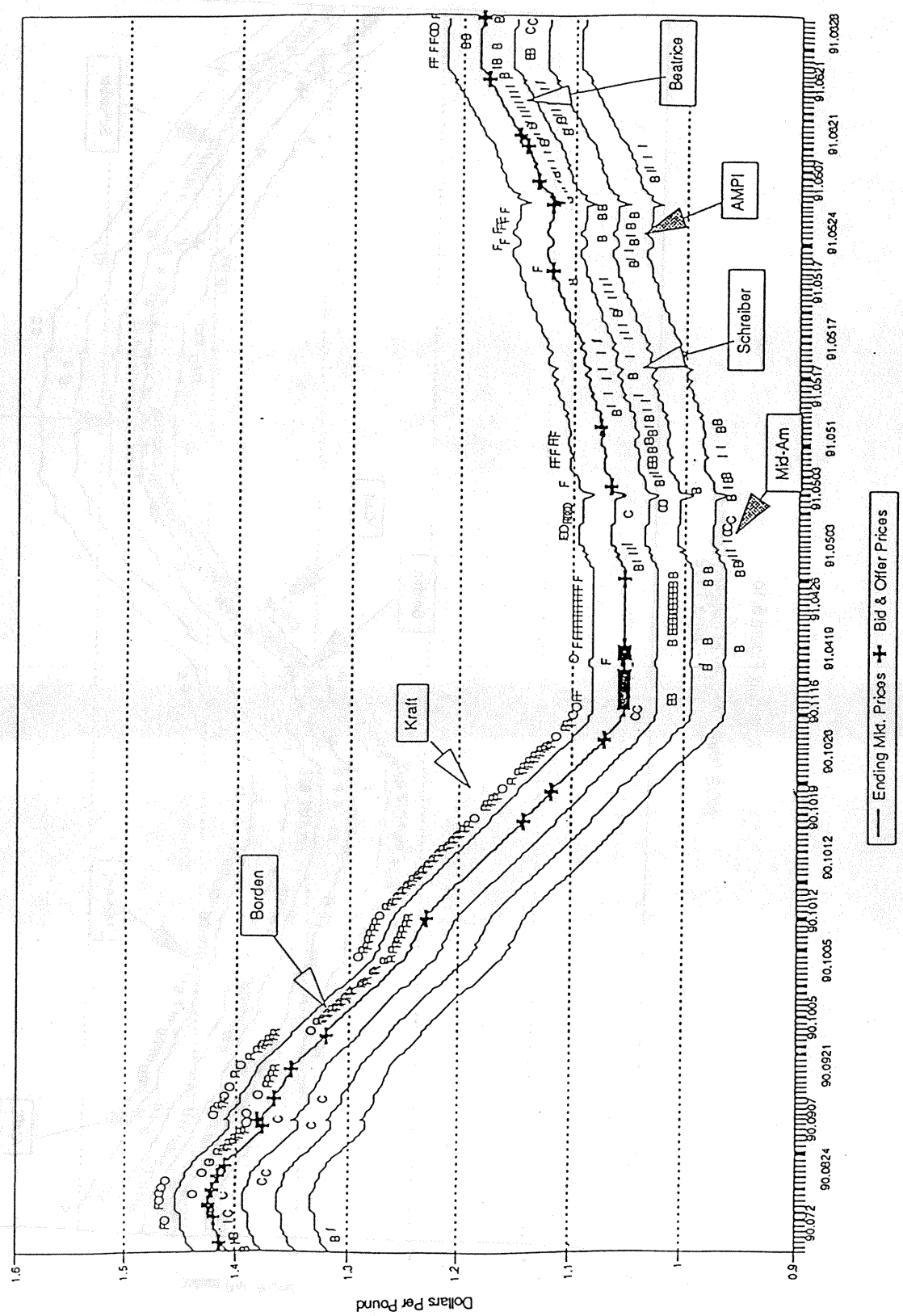
Appendix Figure 5.1b

NCE Barrel Activity of Leading Traders,
July 1989 - June 1990



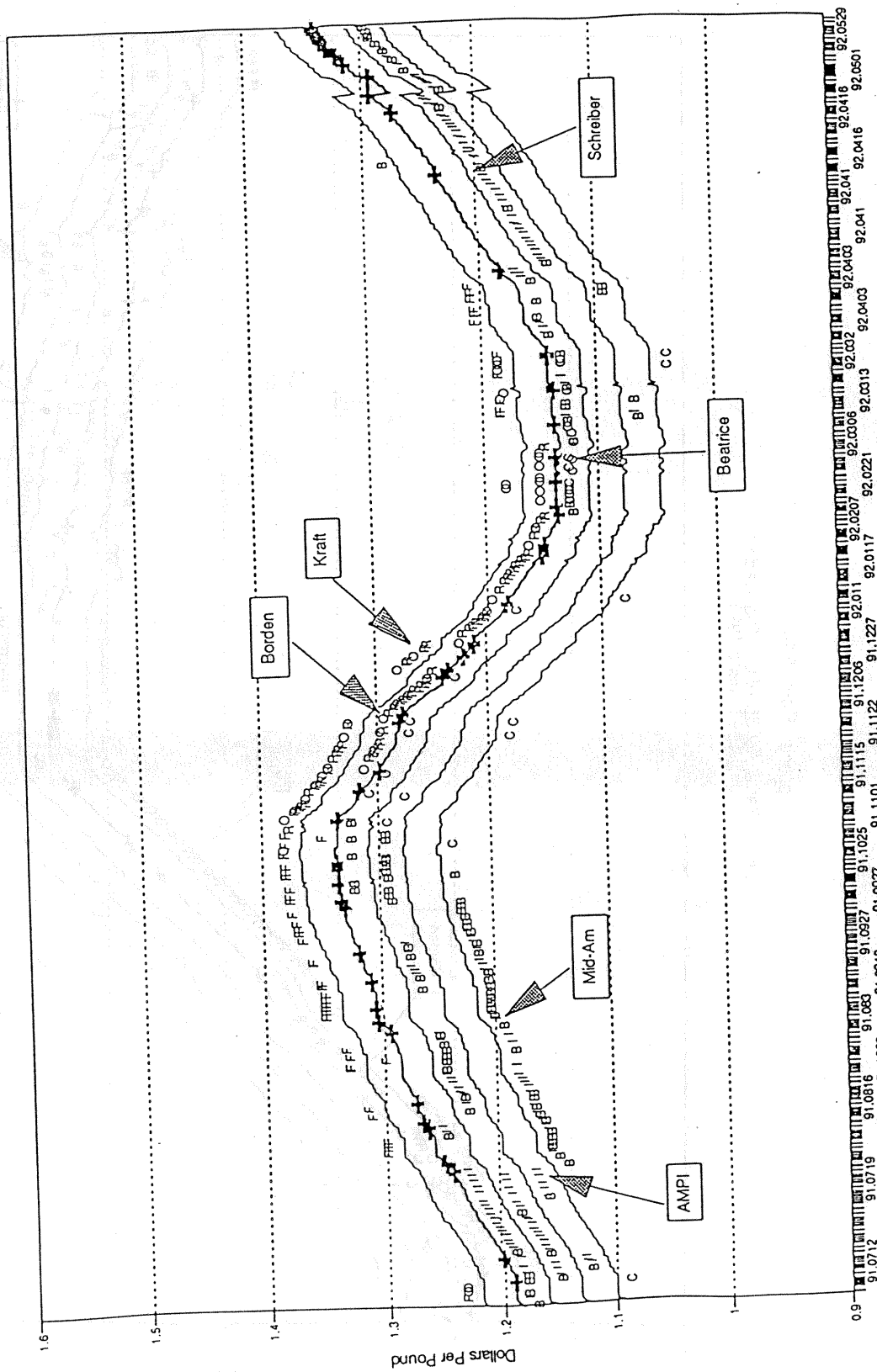
Appendix Figure 5.1c

NCE Barrel Activity of Leading Traders,
July 1990 - June 1991



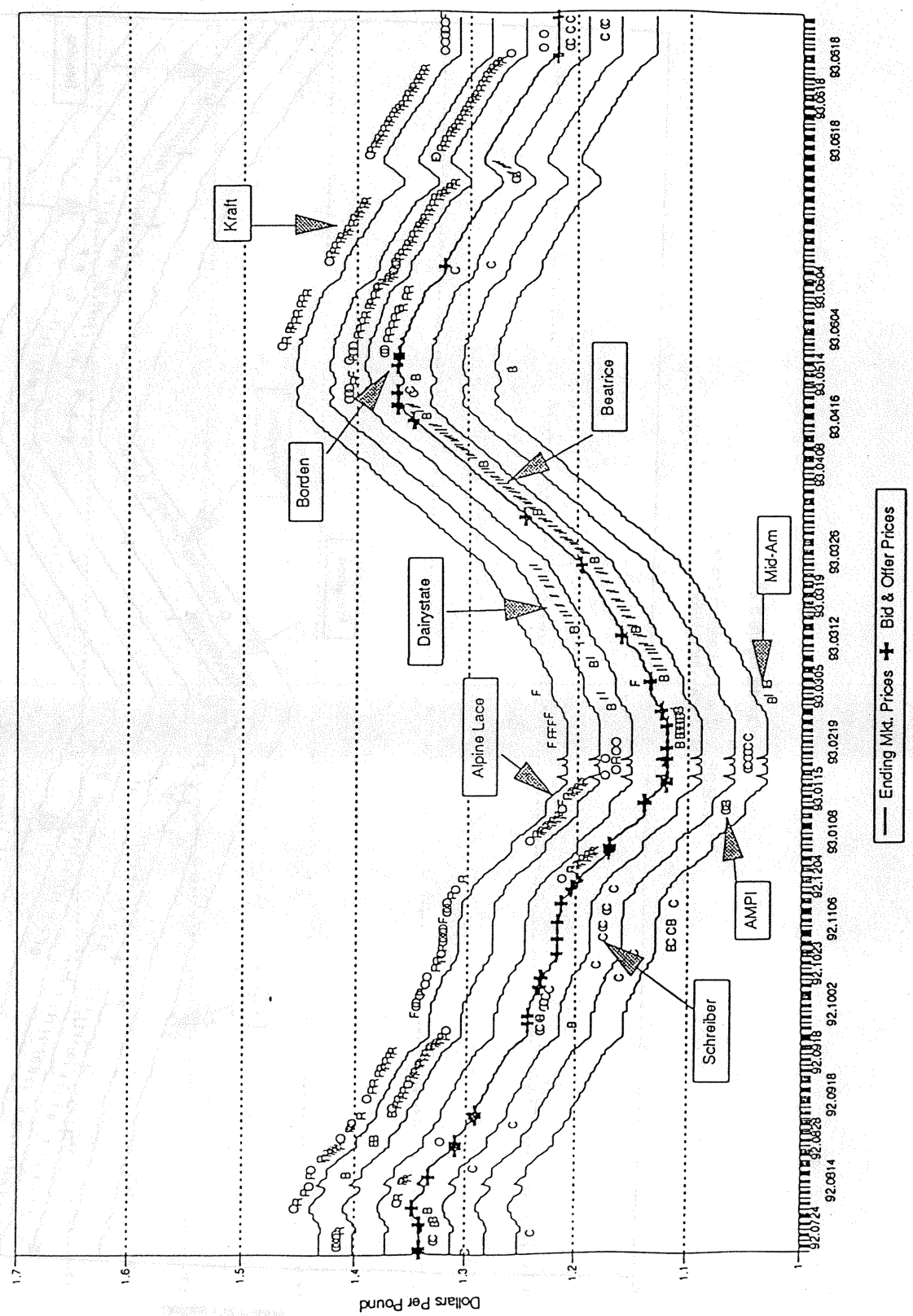
Appendix Figure 5.1d

NCE Barrel Activity of Leading Traders,
July 1991 - June 1992



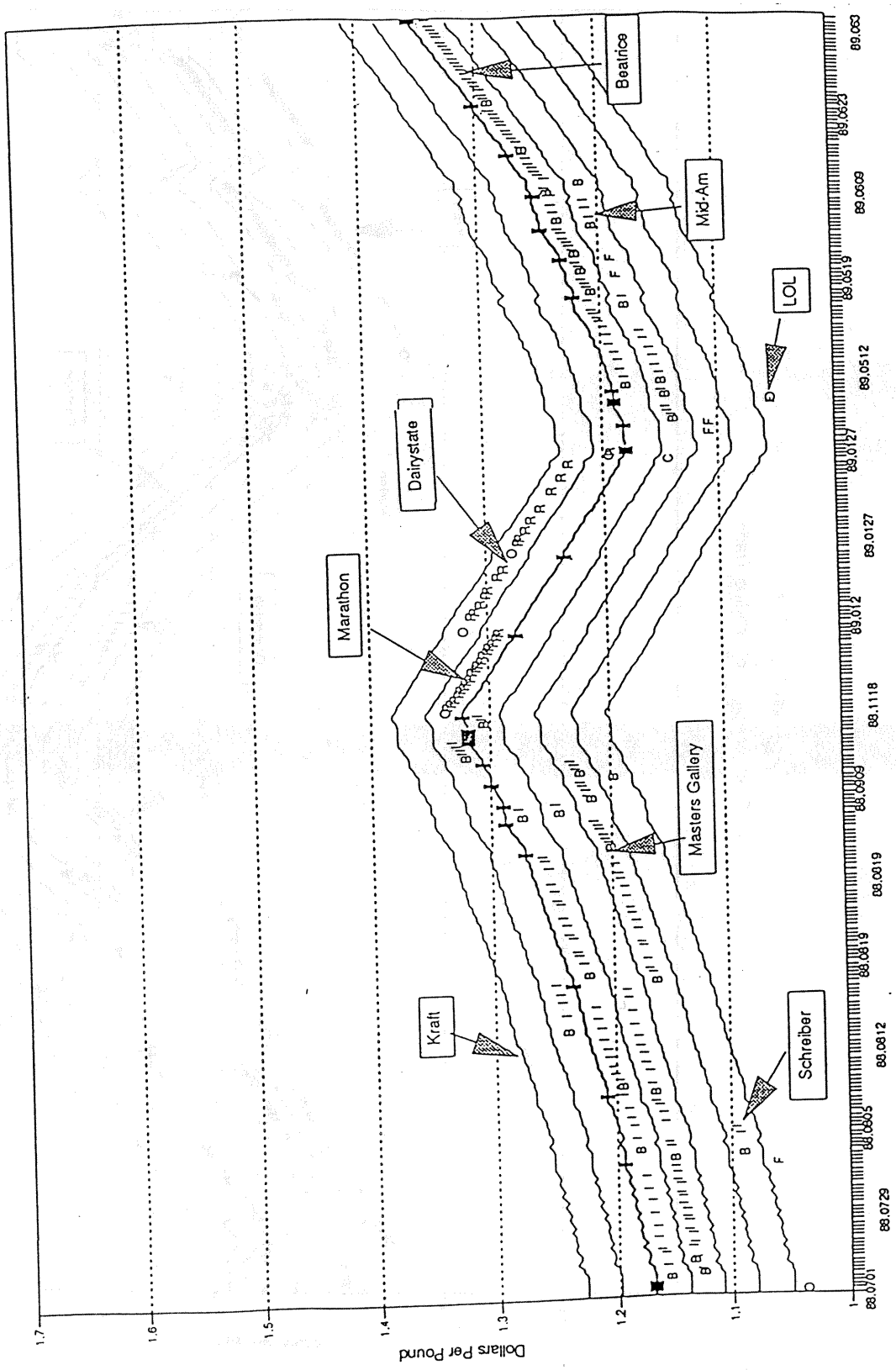
Appendix Figure 5.1e

NCE Barrel Activity of Leading Traders,
July 1992 - June 1993



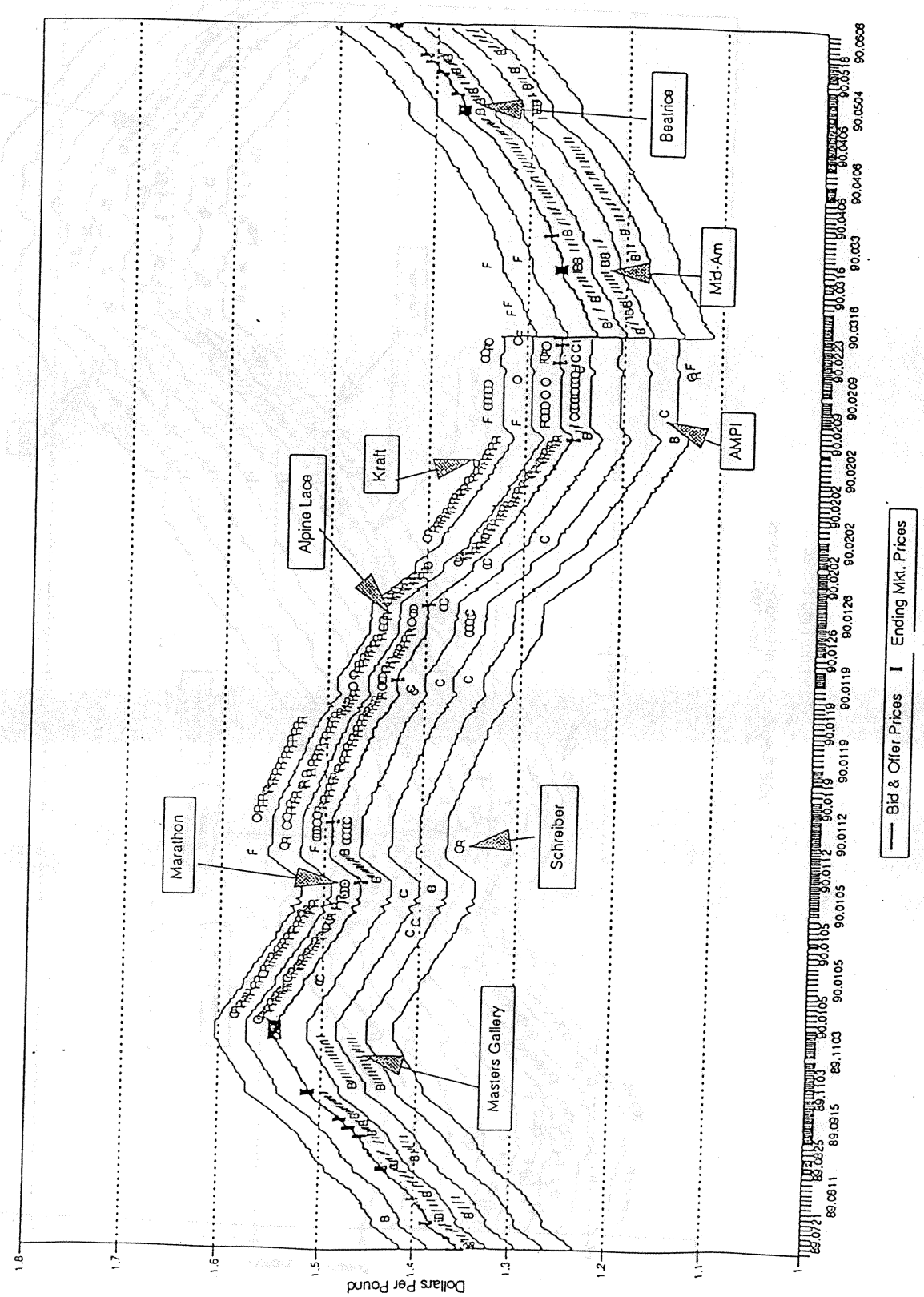
Appendix Figure 5.2a

NCE Block Activity of Leading Traders,
July 1988 - June 1989



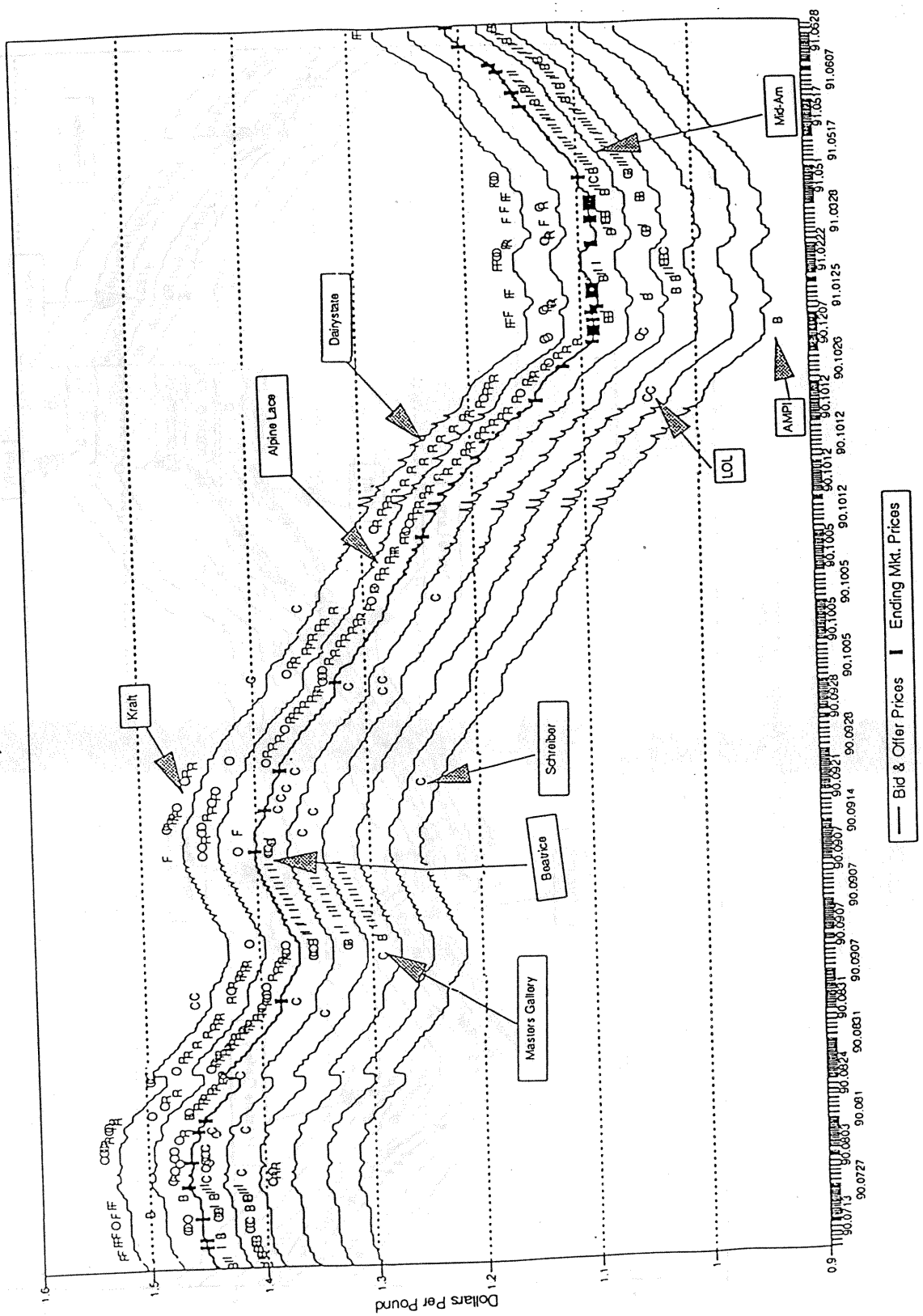
Appendix Figure 5.2b

NCE Block Activity of Leading Traders,
July 1989 - June 1990



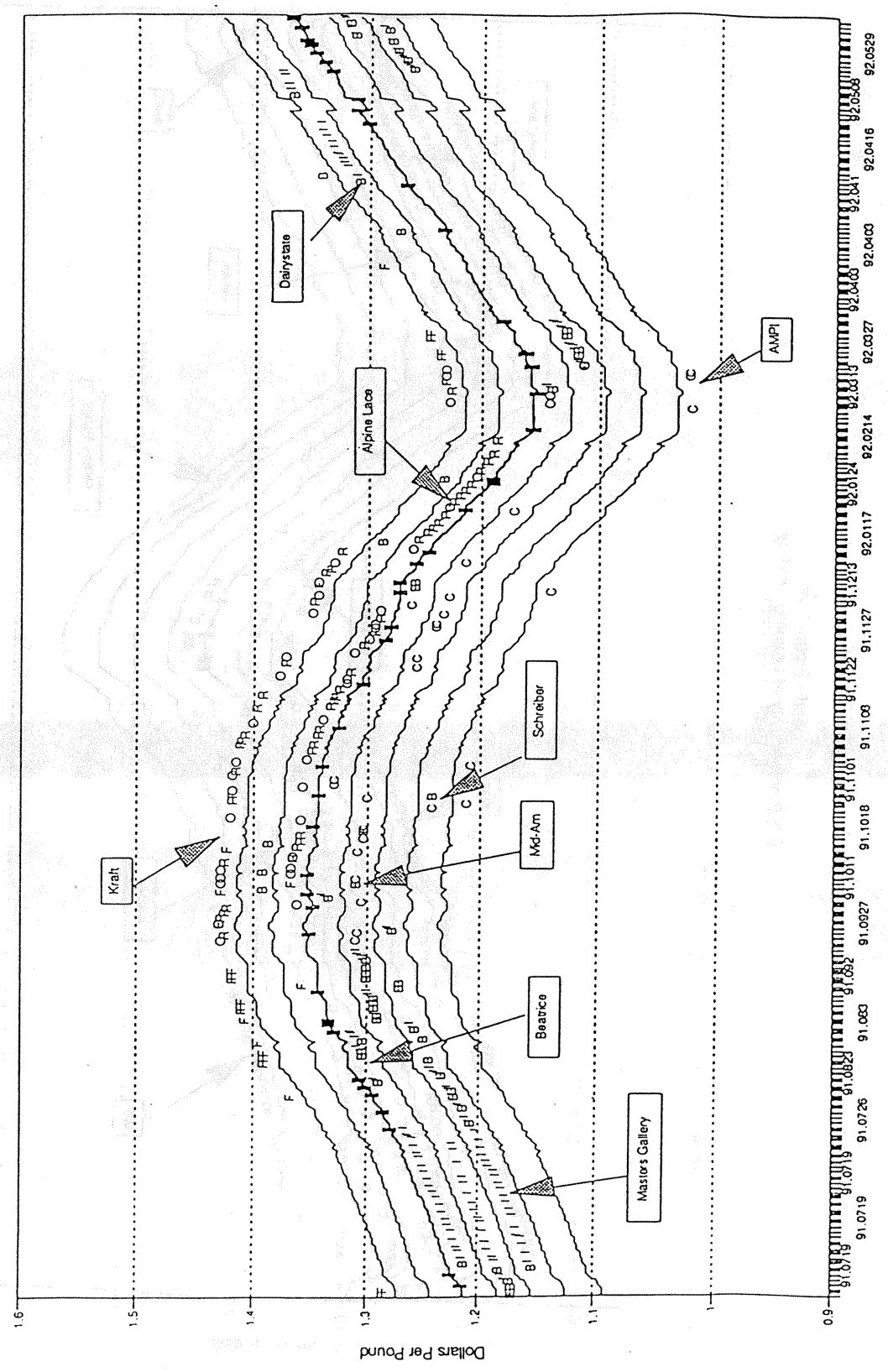
Appendix Figure 5.2c

NCE Block Activity of Leading Traders,
July 1990 - June 1991

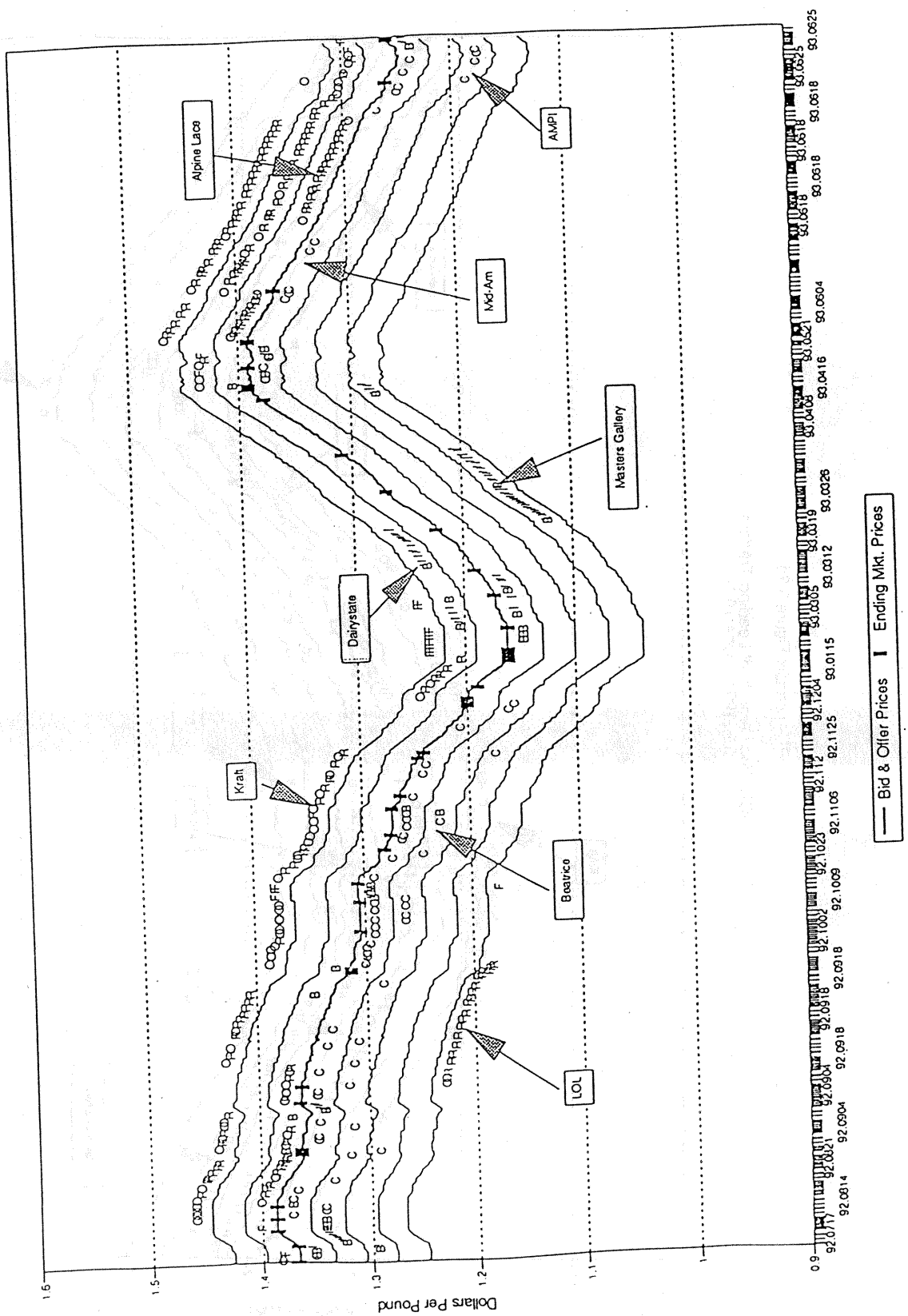


Appendix Figure 5.2d

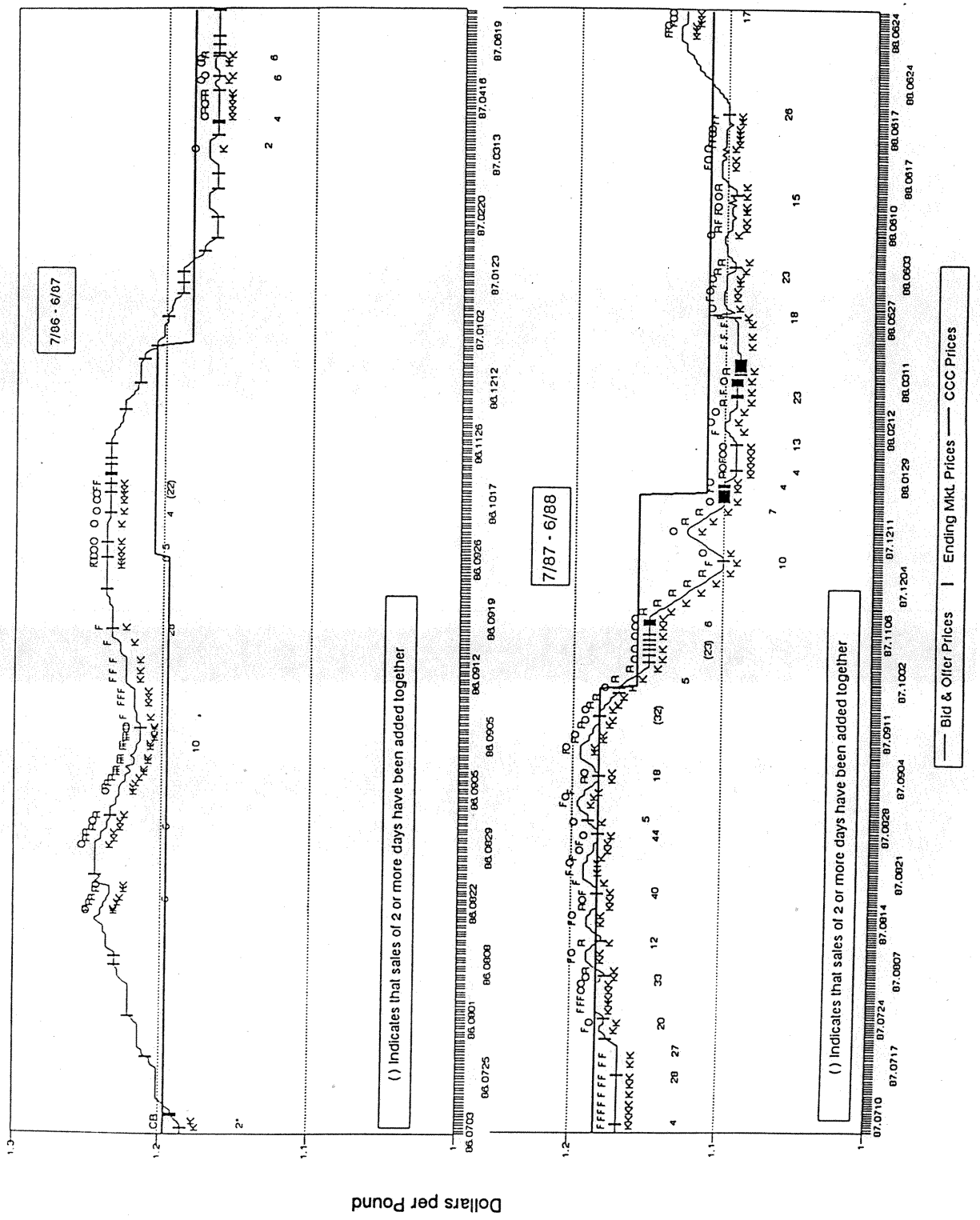
NCE Block Activity of Leading Traders,
July 1991 - June 1992



Appendix Figure 5.2e
NCE Block Activity of Leading Traders,
July 1992 - June 1993



Appendix Figure 5.3: Kraft Activity on NCE



Chapter 6--Kraft Trading Activity During 1990-1992

The preceding chapter examines the overall trading activity of leading seller-traders and buyer-traders during 1988-1993. Since Kraft was the preeminent trader on the NCE during 1988-1993, this chapter examines in more detail its trading activity from January 1990 through December 1992. We chose this period because we have the most documentary evidence for it, in addition to the trading activity reports for the NCE.[1] We focus on the nature and apparent impact on NCE prices of Kraft's trading during each price cycle, including the price decline, bottom, rise, and top. We also examine the roles played by other leading traders during these periods. Finally, we examine the relationship between NCE prices and Kraft's wholesale prices during 1990-1992.

To facilitate following the events discussed herein, readers should refer to Figure 5.1 and Appendix Figures 5.1-5.2, which display the weekly NCE trading activity of leading traders during this period. See also Figure 6.1.

A. Price Decline and Price Bottom, January-March 1990

In 1989 a reduction in herd numbers and milk production caused a large rise in cheese prices. NCE prices peaked in November 1989 and remained unchanged during the last eight weeks of the year. The industry anticipated that the return of flush milk supplies in 1990 would cause cheese prices to decline. After one company "polled" nine "major" cheese companies regarding expected price and other market conditions for the year, a November 17, 1989, internal memorandum reported, in part, that the lowest projected price for block was $1.28, with

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[1] The Department of Agriculture, Trade and Consumer Protection Demand for Production of Documents was served to companies in early 1992. A limited amount of information was obtained for periods before or after this date.

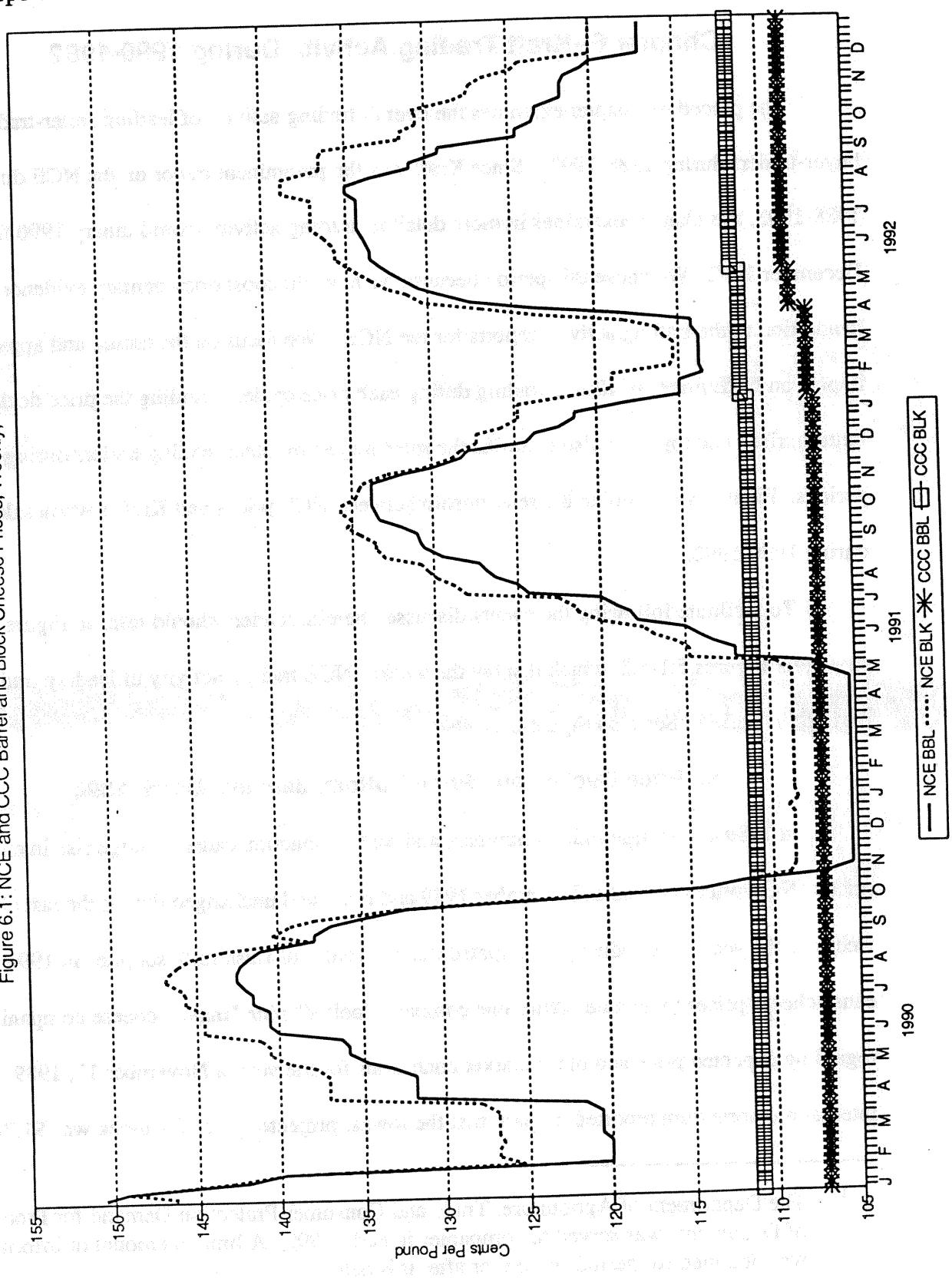

Figure 6.1: NCE and CCC Barrel and Block Cheese Prices, Weekly, 1990-1992

most company estimates in the range of $1.30-$1.32. At the time this document was written, block prices were $1.545.[2] Based on the poll, the company prepared two Industry Forecasts (showing expected monthly prices) that projected block prices would bottom at $1.28-$1.32 and barrel prices at $1.24-$1.28, with the expected low to occur in April-May.[3]

The Price Decline

There was an industry consensus that cheese prices would fall substantially in 1990. The main questions were how much prices would fall, when the price decline would begin, and who would lead the market down. One leading competitor apparently expected Kraft to lead off the price decline, since "One source reported that Kraft might try to work on the barrel market today [January 5]."[4] In fact, neither Kraft nor anyone else sold barrels on January 5. Two other traders, Alpine Lace and Marathon, sold 9 loads of blocks, causing block prices to fall 8.25 cents per pound while barrel prices remained unchanged. This development caused block prices to be 4.25 cents per pound *below* barrel prices, creating an atypical relationship since blocks usually

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[2] All of the major companies polled were suppliers or customers of the company. [[Source deleted in public report as not essential.]]

When questioned about the November 17, 1989, memorandum, a purchasing official of the company explained how he generally developed such information: "Getting an understanding of what others are thinking, for some companies, the way I would determine what their thinking was, I would give Mid Am a call and say, How is your milk supply at this point? How do the solids look? What do you expect for the next three or six months and what do you expect to happen in the markets? and see what they say. So there would be typically companies like Mid-Am or AMPI that we are doing business with on a committed supply basis. [[Source deleted in public report as not essential.]]

[3] [[Source deleted in public report as not essential]]

[4] Schreiber Foods, Inc., Purchasing Director-Western Region, to Vice-President-Purchasing, "Pre-Market Update," E-mail transmission, January 5, 1990, 8:27 a.m., Bates 5059.

sell at 2 cents to 4 cents per pound *above* barrels.[5] This relationship was corrected the following week when block prices rose while barrel prices fell.

(All references below to trading volume and prices on the NCE are based on the trading activity reports prepared weekly by the Agricultural Marketing Service (AMS), USDA, unless another source is cited.)

During the next three weeks--January 12, January 19, and January 26--NCE barrel prices dropped a total of 10.75 cents. Most of the decline occurred January 19, when Kraft led the trading in barrels; it made 30 offers and reduced offers to sell barrels, causing prices to drop 7.25 cents for the day, but no sales were consummated. No other trader offered barrels during the session. Kraft, joined by Alpine Lace and Marathon, also led off the decline in block prices on January 19. Block prices dropped until Beatrice began buying near the end of the session.

Dairystate, a broker, was the only trader to offer barrels on the NCE on February 2, 1990.[6] It opened trading for the day by offering 5 loads of barrels at $1.3975, the previous week's close. During the first 18 minutes of trading, Dairystate reduced its offer 24 times, dropping the price 7.25 cents. Between 10:18 a.m. and 10:31 a.m., Beatrice Foods and Masters Gallery covered all offers, purchasing 10 loads. Although 10:30 a.m. is the customary closing time of the NCE, trading rules provide that activity continues until one minute elapses after the last action. On this day, trading in barrels continued to 10:53 a.m., by which time Dairystate had

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5 One industry source observed: "This is only the second time in recollectable history that the cost of Barrels is greater than Blocks...." Schreiber Foods, Inc., Director of Copack Services to Senior Vice-President and General Manager-Retail Division, "Schreiber Report-Rough Draft No. 4," E-mail transmission, January 10, 1990, Bates 2298.

6 Dairystate is generally viewed by industry participants as a broker on the NCE, although it describes itself as a cheese trader or reseller. It sometimes takes title to the cheese it sells, although it typically sells the cheese of others for a fixed fee and does not take the price risk of an owner. Typed transcript of recorded interview of Dennis Wyssbrod, Dairystate Brands, August 11, 1993, pp. 2 and 24.

reduced its offer 50 more times without any takers, and NCE barrel prices had dropped a total of 19.75 cents. One minute later, block trading also ceased (see below).

Dairystate was offering cheese for AMPI, which apparently did not wish to sell in its own name.[7] Two weeks before February 2, 1990, AMPI had offered another cheese company cheddar barrels to sell on the NCE. An internal document of that company dated January 19, 1990, stated:

> AMPI has offered barrels to us in steel based on today's market down to $1.2500. In other words, if we want to offer barrels they would provide the cheese and absorb any risk of market decline.[8]

An internal memorandum of this company written before the opening of trading the morning of February 2, 1990, stated:

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[7] Immediately after Black Friday, an industry trade paper stated that Dairystate was a broker that represented, "among other firms,...Associated Milk Producers Inc.," *The Milkweed*, "`Black Friday' at Green Bay," December 1989, p. 4. (The February 1990 issue of *The Milkweed* was dated December 1989.) This source did not specifically state that Dairystate had sold for AMPI on February 2. During the course of this study we learned that it is common industry knowledge that Dairystate had been selling for AMPI. We were not able to determine whether any companies, in addition to the one cited below, knew on February 2, 1990, that Dairystate was selling for AMPI.

We have found no evidence that AMPI has sold on the NCE on any other occasion between February 2, 1990, and the end of 1993. AMPI *purchased* 172 carlots on the NCE during 1988-1993 (Table 5.1).

An executive of a leading cheese company said that "...after the market on February 2, Beatrice field men were out telling farmers that AMPI was responsible for the market drop in areas where they compete for milk." [[Source deleted in public report as not essential.]]

[8] Schreiber Foods, Inc., Purchasing Director-Western Region, to Vice-President-Purchasing, "Pre-Market Update," E-mail transmission, January 19, 1990, 8:10:56, Bates 5055. When the vice president-purchasing was asked why Schreiber did not accept the AMPI proposition, he replied: "...we simply don't participate in that kind of thing." Typed transcript of recorded interview, May 26, 1993, *Id.*, p. 16.

> AMPI, North Central, are still offering us 10 loads of barrels to go to the exchange with and they would absorb market decline. They are very perturbed at Mid-Am's activity on the exchange.[9]

While this company declined the AMPI proposition, Dairystate did offer barrels on the NCE for AMPI. We have been unable to determine how much cheese Dairystate was prepared to sell, but after it had sold 10 loads, it offered five more, none of which was covered; by the close of trading it had reduced the offer to one load.

Although Kraft did not offer barrels during the February 2 price decline, it did participate in NCE block trading. As its only trade for the day, Alpine Lace first offered two loads of blocks, an offer that Beatrice covered after the price of barrels had dropped by 4.5 cents per pound. At that time, Marathon and Kraft began offering blocks and continued until the price had declined another 10 cents, although only one of these loads was sold. In total, Beatrice bought two loads and Mid-America one load of blocks. Clearly, Beatrice Foods, Mid-Am and Masters Gallery, the only buyers on February 2, held a different view of the appropriate price than did the other traders.

AMPI's motive for taking down the barrel market price remains unclear,[10] but in light of the memorandum cited above it appears that AMPI expected its actions to drop the market. Nor

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[9] Schreiber Foods, Inc., Purchasing Director-Western Region to Vice-President-Purchasing, "Pre-Market Update," Interoffice Memorandum, February 2, 1990, Bates 5052. The reference to being "very perturbed at Mid-Am's activity on the exchange" may have referred to Mid-Am's participation in bidding activity during the long run-up in NCE prices in 1989 (Appendix Figures 5.2a-5.2b). AMPI made no bids after May 1989, whereas Mid-Am bid through November 3, 1989, at which time prices peaked for the year.

[10] During the course of an interview of AMPI officials, an official stated that it was not AMPI's purpose to lower the price on the NCE February 2, 1990. Mark Firth, North Central Regional Manager, typed transcript of recorded interview of AMPI officials, July 29, 1993, p. 41.

is it plausible that AMPI was selling on the NCE merely to reduce excess inventory. The Exchange clearly is not a viable outlet for surpluses of the size Dairystate was prepared to sell on February 2, particularly during a period of declining prices. Indeed, most companies, both large and small, look to better means for solving excess inventory problems (See Section D, Chapter 4). AMPI's motives for selling on February 2 are puzzling, especially considering subsequent events. First, on the following Friday it led off bidding for both barrels and blocks and ended up purchasing two loads of barrels and one load of blocks. Second, AMPI made no further bids for blocks or barrels during the rest of 1990 although it did buy in the spot market.[11] Finally, as discussed below in the internal memoranda of other companies, in the weeks following February 2 many companies, apparently including AMPI, had no extra cheese available for spot buyers.[12]

The Price Bottom

Once the market hit bottom on February 2, 1990, barrel prices remained at a low of $1.20-$1.205 for the next seven weeks as Kraft filled all but one bid for barrels. When Kraft failed to fill one bid immediately on March 2, 1990, the bid was increased twice, resulting in a 0.50 cent price increase, whereupon Kraft filled that bid and all others for the day. During February-March 1990, Kraft sold a total of 100 loads of barrels. Dairystate was the only other trader selling barrels during the period.

Kraft also was active in block trading during the February-March price bottom, selling 18 loads in all. Closing block prices ranged between $1.2525 and $1.2675.

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[11] On March 12, 1990, AMPI purchased three loads of barrels in the spot market from Dairystate, which was selling for Borden. Records of Dairystate Brands, Inc.

[12] See notes 16-17.

When Kraft stopped filling barrel bids at 10:23 a.m. on March 30, buyer-traders immediately began bidding up prices, which went up 1.5 cents per pound for the day. Block prices also rose 1 cent for the day.

Summary of Kraft Conduct at Price Bottom

Although Kraft's role in the market decline before and on February 2 is ambiguous, Kraft appears to have played a less ambiguous role in keeping prices virtually unchanged over the next seven weeks. Kraft's persistent and largely solitary selling over this period raises the question, did its trading keep prices below those warranted by competitive supply and demand conditions? Below is summarized evidence relevant in answering this question.

1. During January-March 1990, industry commercial stocks and CCC stocks were lower than in any other like months during 1980-1993.[13].

2. Kraft did not have a surplus at the end of 1989. On the contrary, Kraft's 1990 procurement plan, prepared in November 1989, projected a 35 million pound shortage for 1990.[14] Nor did Kraft believe it had an inventory problem in early 1990.[15]

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[13] Figure 6.2, Appendix Table 6.3.

[14] Kraft-General Foods, Inc., *1990 Cheese Inventory and Procurement Strategy*, Operations, December 12, 1989, KGF 3002, 3005.

[15] On February 28, 1990, Kraft's director of cheese procurement and inventories stated that, although usage and receipts were not on Plan, in his view this did not pose a problem. As he saw it:

> This over Plan condition is a result of usage being under Plan by 11 million pounds and receipts over by 3 million during the November-January period. *Based on our latest forecast for the balance of 1990, this 14 million pounds will be required to cover heavy Fall demand.* Kraft General Foods, Inc., Wayne Hangartner, Director of Cheese Procurement and Inventories to Don Butte, Vice-President and Director-Refrigerated Operations, "Letter of Comment-February 1990," February 28, 1990, KGF 3168-3169, emphasis added.