Chapter 3--Origins and Nature of the National Cheese Exchange

This chapter provides a brief history of the Exchange, describes salient features of its current organization, identifies the regulatory authorities with jurisdiction over the Exchange, reviews the potential problems of thinly traded markets, and examines certain unique characteristics of the Exchange, especially the small volume of cheese traded and the concentration of trading activity among a few traders.

A. History of NCE

The nation's first cheese factory was started by five Wisconsin farmers in 1841. In succeeding decades numerous cheese factories were established, especially in New York and Wisconsin. The Census Bureau reported that in 1870 there were 1,313 cheese factories in the United States. Only 54 (4.1 percent) of these were located in Wisconsin (Appendix Table 3.2). Fully 62 percent of all U.S. cheese plants were located in New York and another 15 percent in Ohio. The number of cheese factories grew in succeeding decades, reaching a peak around the turn of the century. In 1920 the Census Bureau reported 3,530 factories in the U.S. with 2,323 (64 percent) located in Wisconsin; these plants made 65 percent of all cheese in the U.S. In contrast, New York and Ohio had only 17 percent of all cheese plants and 19 percent of all cheese production. Thereafter the number of plants in the U.S. declined steadily until there were only 418 cheese companies in the nation by 1992, and only 216 companies had annual sales over $100,000 in 1987 (Appendix Table 3.1).

1 For the number of cheese factories and companies over time, see Appendix Tables 3.1 and 3.2.
Initially, cheese was bought directly from factories by dealers who assembled cheese from several factories. Subsequently, cheese factories established dairy boards that served as meeting places for factory representatives and cheese buyers. By 1879 there were seven dairy boards in Wisconsin.\(^2\) Dairy boards also operated in New York and other states.

To encourage competitive bidding among dealers a Call Board system developed whereby offers from cheese factories and bids from interested buyers were recorded on a blackboard, with sales going to the highest bidder. By 1890 there were 18 Call Boards in Wisconsin.\(^3\)

The Boards typically served quite small regions, often individual counties. In 1909 the Dairy Board located in Plymouth, Wisconsin, changed its rules to permit any factory in Wisconsin to sell on the board, an important step in making it the largest board in the state. In 1913 it was renamed the Plymouth Central Call Board of Trade. At the time there were six other call boards in the state. In 1918 the Central Call Board of Trade was reorganized to give full membership only to dealers and was incorporated as the Wisconsin Cheese Exchange.\(^4\)

In response to producer dissatisfaction with the Exchange, the Farmer's Call Board was established in Plymouth in 1921. Cheese factories and cheese producer associations could become members, but only dealers were given buying privileges. The Farmer's Call Board,

---


\(^3\) Ibid.

which met shortly after the weekly sessions of the Wisconsin Cheese Exchange, came under increasing criticism (see below) and discontinued operations in 1941. That left only the Wisconsin Cheese Exchange, which in 1956 was moved to Green Bay, Wisconsin, where it remains at present. In 1974 its name was changed to the National Cheese Exchange (NCE).

Periodic criticisms of the pricing practices of the dairy boards and their successors have resulted in a number of investigations by state and federal authorities. In 1911 dealers allegedly fixed prices and allocated customers among themselves at secret meetings held prior to call board sessions.\(^5\) Cheese producers responded to the situation in 1913 by organizing the Sheboygan County Cheese Producers' Federation. Farmers hoped that by cooperative action they could develop their own marketing system and ultimately eliminate the Board.\(^6\)

An investigation by the State of Wisconsin during 1931-32 concluded that the Farmers Call Board was a sham designed to placate farmers' dissatisfaction, but changed nothing. The Deputy Attorney General of Wisconsin, in summarizing evidence taken before the Wisconsin Commissioner of Agriculture, drew the following conclusion:

The dealers and not the farmers conceived the idea of the organization of the board in the first place, and certain farmers lent their names then and since. In fact, the Farmers Call Board was organized to meet the growing dissatisfaction by producers with prices fixed by the dealers between themselves in their own organization, the Plymouth Cheese Exchange, and to make it appear that the farmers have set up their own market to which the dealers had to go to get cheese. The fraud of the name of the board is aggravated by its pretended farmer operation and control and by the insistence of the dealers that it is in fact a farmers' organization, and the persistent representation and advertisement of it as such.\(^7\)


\(^6\) *Id.*, pp. 10-11.

The Deputy Attorney General went on to say that

Whether competition really exists in the buying on the board is better judged by the results than the assertions of interested parties. The prices follow quite faithfully the base price fixed between the dealers on their own exchange each week, just an hour earlier.\(^8\)

The fact that the Farmers Call Board followed "faithfully" the prices set by the Wisconsin Cheese Exchange was important because of the way in which Exchange prices were set at the time. The pricing process was explained as follows by Mr. J.L. Kraft, President of the Kraft-Phoenix Cheese Corporation:

For the past few years a fair price has been established on the Plymouth Call Board in Wisconsin, which, to a very large extent, has been the ruling price throughout the country, or, in other words, the basic price from which to figure. This price has not been established by agreement but rather by sort of a tacit or mutual understanding as to what a fair relationship or fair value for the product should be, based upon statistical information at hand and the law of supply and demand.\(^9\)

These comments reflect a mind set that believed "fair" prices could best be set by "a sort of tacit or mutual understanding" among industry leaders.

Based on its study of cheese pricing on the Wisconsin Cheese Exchange and Farmers' Call Board, the Federal Trade Commission concluded, in part:

...[T]he transactions on these boards are relatively small and seemingly without any real competition....[T]he real purpose of these boards appears to be to establish the price to be paid by dealers during the ensuing week, such action being taken under a prearranged program....[T]he absence of competition upon [the Wisconsin Cheese Exchange] has a significant influence upon the prices received by milk producers.\(^10\)

---

\(^8\) Id.

\(^9\) Id., pp. 98-99.

In 1939, Professor William H. Nicholls, the leading economic authority of that day on competitive conduct in agricultural markets, including the cheese market, observed:

The real point at hand is the fact that only the buyer of cheese—the large-scale distributor—is party to the decision as to what the "fair" price should be. The "law of supply and demand" is doubtless important in the decision of the large cheese distributors as to the "fair" price of cheese, but there seems to be prima facie reason to raise the question whether that famous economic law as interpreted by those distributors is the most desirable from the social viewpoint, either for the milk producer or the consumer.\(^\text{11}\)

Nicholls concluded as follows concerning the state of competition in cheese pricing as of 1939:

Bulk cheese prices continue to be established on the two Plymouth exchanges, in spite of repeated recognition of the obvious lack of competition on the boards....

The chief competition the cheese industry has to meet is not within the industry itself. This competition is with the butter and condensed milk industries for the use of the milk supply. This competition still leaves a significant range within which monopolistic elements in the cheese industry can work against the farmer who sells his milk to the cross-roads cheese factory.\(^\text{12}\)

Following its extensive investigations of cheese pricing during the 1930s, the Wisconsin Department of Agriculture brought these matters to the attention of the federal Antitrust Division and assisted it during 1940-1942 in the investigation and prosecution of alleged price fixing of cheese prices paid to producers.\(^\text{13}\) These cases charged price fixing of Swiss, American, and brick cheese.\(^\text{14}\) The actions culminated in a consent decree and $30,000 fine in the Swiss case


\(^\text{12}\) Nicholls, *op. cit.*, pp. 118-119.


and acquittal in the brick case.\textsuperscript{15} After long delays, the American indictment was dismissed in 1950.\textsuperscript{16}

On November 20, 1987, the Assembly of the State of Wisconsin enacted a Resolution requesting an investigation of recent price declines on the National Cheese Exchange and a prosecution if any violation of law were found to have occurred.\textsuperscript{17} In response to this resolution, the Wisconsin Attorney General initiated a "preliminary investigation to determine whether there was any evidence of price-fixing or collusion or other violations of law on the NCE."\textsuperscript{18} The "preliminary investigation," conducted by one attorney and one investigator over a four-month period, involved interviews with the president of the NCE, examination of NCE trading minutes of the board and other NCE documents, and interviews with personnel of 21 companies represented on the NCE, as well as interviews with other interested parties. No internal documents were subpoenaed.

The investigation yielded no evidence of price fixing. A number of parties interviewed indicated that the price declines in 1987 reflected general conditions of supply and demand. The attorney-investigator concluded:

---


\textsuperscript{15} \textit{United States v. Wisconsin Cheese Exchange}, reported in The Federal Anti-trust Laws with Summary of Cases Instituted by the United States No. 694 (CCH-1947).

\textsuperscript{16} Geffen, \textit{op. cit.}, p. 681


\textsuperscript{18} Matthew J. Frank, Assistant Attorney General to Kevin J. O'Connor, Assistant Attorney General, Unit Head, Consumer Protection and Antitrust Unit, Office of the Attorney General, April 11, 1988.
In the absence of evidence of price-fixing agreements, and in the presence of reasonable explanations for the price declines because of general market conditions in the industry, the Department of Justice can take no further action at this time.\footnote{Ibid.}

**B. Current Organization of NCE**

The National Cheese Exchange articles of incorporation state that the purpose of the Exchange

...shall be to provide and maintain an exchange for the purchase and sale of cheese by its members and generally to do any lawful act which may be incident to the promotion of said purpose.

The affairs of the Exchange are managed by a Board of Directors, consisting of six members elected by NCE members, and the President, who is appointed by the Board.\footnote{This and the following are based on the National Cheese Exchange, Inc., Articles of Incorporation, By-Laws, and Rules Regulating Trading, April 6, 1990.}

The By-Laws of the NCE provide that anyone may become a member by satisfying "the members that he or it is suitable to assume responsibilities and privileges of membership." In recent years, there have been 35-40 members, all of whom were cheese manufacturers, converters, marketers, brokers or customers. Members represent about 90 percent of the cheese industry. Each member may designate up to five persons as traders who can negotiate on the Exchange. The Board may suspend a member from the privilege of trading on the Exchange for up to six months for any conduct considered detrimental to the interests or welfare of the Exchange.\footnote{See Chapter 4, text at notes 96-109, for an example of suspension for alleged misconduct in trading.}
The NCE typically trades each Friday from 10:00 a.m. to 10:30 a.m., but the trading time may be extended if the presiding officer (the president or his designee) observes a continuing interest in trading. Only cheddar cheese in 40-pound blocks and 500-pound barrels in 38,000-42,000 pound carlots was traded until 1994, when 640-pound blocks were added for trade. All bids and offers for these types of cheese are subject to price adjustments for moisture content as provided by the rules. Unless a bid or offer specifies otherwise, the styles traded shall not be less than four days or more than one month of age on the date of sale. Traders may specify older cheese by stating the actual age in terms of months.

Barrel cheese shall meet the requirements of Wisconsin State Brand or USDA Extra Grade or better, and 40-pound block cheese shall meet the requirements of Wisconsin State Brand, USDA Grade A or better, except that moisture content shall be no less than 36.5 percent. Barrel cheese shall be white and block cheese shall be colored. Block style cheese shall be wrapped in a sealed film and packed in corrugated or solid fiberboard containers. Barrels shall be in airtight, 55-gallon steel containers or barrels which meet specifications.

No bids or offers shall disclose the state of origin, but the identity of trades making bids and offers is known. Parties represented by brokers are not disclosed. Bids and offers are stated in multiples of one-fourth of a cent per pound. When a member has an offer on the board, he cannot bid for the same kind of cheese at the same price; while he has an unsatisfied bid on board, he cannot offer the same kind of cheese at the same price.

Transactions on the NCE are FOB Green Bay, but no freight charge is made on cheese within 200 miles of Green Bay. Cheese that is located more than 200 miles from Green Bay has the freight cost to Green Bay (as specified by Exchange rules) deducted from the selling price.
Thus, all cheese is priced as though it is physically shipped to Green Bay. In reality, cheese sold on the NCE can be shipped anywhere within the continental U.S. On those transactions in which the actual freight from seller to buyer is less than the freight from seller’s dock to Green Bay, buyers on the Exchange can benefit from the phantom freight charged to sellers.

C. Regulation of the NCE

Several government agencies have authority over trading activity on the National Cheese Exchange. The United States Department of Justice enforces the Sherman Act, which prohibits price fixing agreements and monopolizing conduct. The Federal Trade Commission, which enforces the Federal Trade Commission Act, can act in cases dealing with unfair methods of competition, which include price fixing agreements and monopolizing conduct. The Wisconsin Department of Justice can challenge price fixing agreements and monopolizing conduct under state or federal laws. The Wisconsin Department of Agriculture, Trade and Consumer Protection has jurisdiction over unfair competition and trade practices. Private parties may also initiate actions under the Sherman Act. The law allows a party injured by a violation of the Sherman Act to sue in Federal Court and recover treble damages plus the costs of the suit, including reasonable attorney’s fees.

The NCE also became subject to the regulatory authority of the Commodity Futures Trading Commission (CFTC) in 1994 when the Commission designated the Coffee, Sugar, and Cocoa Exchange as a contract market for futures trading on cheddar cheese. The Commodity Exchange Act (CEA) gives the CFTC jurisdiction over commodity futures and options transactions. The CEA also gives the CFTC jurisdiction over the cash markets with futures contract markets. Section 6(c) of the CEA authorizes the CFTC to bring administrative action
against persons believed to be manipulating or attempting to manipulate the price of any commodity or for future delivery. Section 8 of the CEA gives the CFTC broad power to investigate the cash market in implementing and enforcing its authority. In *The Matter of Hunt et al*\(^{22}\) the CFTC charged persons with manipulating cash prices in addition to futures prices.

**D. The NCE is a Thin Market**

The term *thin market* as used herein, refers to a market with a small volume of trading relative to the total transactions that are priced off the market.\(^{23}\) As such, the term is purely descriptive, implying nothing regarding a market's pricing or operational efficiency.

Economic examination of thin markets raises two questions: (1) Why is the market thin? and (2) How well does the market perform? Causes of thin trading are easier to identify than the results. Thin centralized cash markets in many food industries have common economic roots: Industry members bypass centralized cash markets because trading there is more costly than trading directly via either spot purchases or long-term contractual arrangements. This situation has been true in cheese procurement for over 100 years. The "dairy boards" set up in the 1870s provided places for buyers and sellers to meet. But apparently after sellers and buyers had met


\(^{23}\) This is the definition used by Raikes: "A market is thin if the reservation supply and demand values of only a small proportion of all traders are represented in the market." Ronald Raikes, "Thin Markets: Some Causes, Consequences, and Remedies," in Marvin L. Hayenga (ed.), *Pricing Problems in the Food Industry (With Emphasis on Thin Markets).* NC Project 117, Monograph 7, Research Division, College of Agriculture and Life Sciences, University of Wisconsin, February 1979, p. 132. Dunn also uses this definition. Read J. Dunn, Jr., "Pricing Problems in the Food Industry: Research Needs," in Hayenga, *op. cit.*, p. 149. Others have defined a thin market as a market "with few transactions negotiated per time period." Hayenga, et. al., in Hayenga, (ed.), *op. cit.*, p. 11.
and developed mutually agreeable arrangements, both parties often preferred trading directly with one another using longer-term formal or informal arrangements. From the outset very little cheese was actually traded on any of the various centralized exchanges that predated the NCE.

Based on industry interviews, we believe that in recent years 90-95 percent of all bulk cheese transactions involve direct procurement using written or verbal committed supply arrangements, often one year in duration; another 5-10 percent involve direct spot transactions; and less than 0.5 percent of all transactions take place on the NCE. But despite the minuscule volume traded on the NCE, virtually all "committed" or contract transactions of bulk cheese use formula agreements that tie the price directly to prices developed on the NCE. Spot transactions also use the NCE as a reference price but have much greater flexibility to change the differential. For example, when NCE prices are declining, buyers may be unwilling to pay any premium over the NCE. Indeed, a negative differential does occasionally occur. The opposite is true when NCE prices are rising.

*Formula pricing* is heavily used in the cheese subsector, as it is in many other agricultural commodities. Formula pricing is trading on someone else's price; the price for a transaction is determined by an agreed upon formula tied to one or more indicators of value. Formula pricing arrangements that use a thin market price as the indicator of value are of particular interest since the combination gives enormous leverage to the thin market. In the case of cheese, if a firm can influence the price in a market (i.e., the NCE) that operates 30 minutes per week and trades less than one-half of 1 percent of all cheese, that firm has influenced the price of nearly all bulk cheese sold in the U.S. the following week.
Formula pricing and thin markets often go together. As firms adopt formula pricing to reduce transaction costs and price risks, the residual spot market declines in volume. Schrader and colleagues note the consequences:\(^{24}\)

The market, thinned by formula-priced transactions that are not immediately responsive to spot market prices, may be less likely to arrive at a price that approximates a competitive equilibrium. Furthermore, firms with formula-priced contracts based on a thin market price may have an incentive to attempt manipulation of the reference price quotation.\(^{25}\)

The combination of a thin market and very few participants on one side of the market may accent price volatility and inequity.\(^{26}\)

Whenever so much business is transacted with reference to prices established by so few, questions persist concerning the quality of the price discovery process. Economists have identified various dimensions of performance deserving attention in examining thin markets, including the following:

(1) the possible manipulation of thinly-traded markets by dominant firms or concentrated oligopolies, resulting in short or long term monopoly profits and discovered prices that do not accurately reflect industry supply and demand.

(2) possible nonrepresentative or biased price signals, not because of intentional manipulation by participants, but because the buyer demand and seller supply represented in thinly-traded markets does not accurately reflect industry supply and demand. The results are prices that provide inaccurate resource allocation signals to the vertically linked markets in an industry or subsector.

(3) the possible perception of increased risk due to more volatile prices, illiquid markets, and less secure input supply and output markets. Thinly traded markets may be less

---


\(^{25}\) Id., p. 74.

\(^{26}\) Id., p. 101.
predictable and may be less able to deal with unexpected shifts in supply or demand than "fat" markets.\textsuperscript{27}

Thinly traded markets are thought to be particularly vulnerable to the third problem when most of the supply in the industry moves between firms via contracts or committed arrangements. The logic here is that buyers and sellers are locked into committed supply arrangements in which quantities and prices are largely specified. Shifts in supply or demand, therefore, have an inordinate impact on the residual market. Thinly traded markets are often part of the residual market, which is the case in the cheese industry. The uncommitted supply represents 5-10 percent of total cheese produced; the NCE represents less than one-tenth of that residual market.

Thin trading volume does not necessarily imply poor performance if there is sufficient volume "waiting in the wings" and if no firm is large enough to influence or manipulate price to the firm's advantage.\textsuperscript{28} As some analysts have observed, a "thin" market need not perform poorly:

There may be sufficient volume "waiting in the wings" that could be quickly triggered into the price determination process, suppressing price gyrations or price inequities that otherwise might be "too large." Or, no firm may be large enough in absolute size that relatively small shifts in its inventory or its buy and sell policy could strongly influence or "manipulate" negotiated price levels and the returns from related formula price contracts to the firm's advantage.\textsuperscript{29}

\textsuperscript{27} Marvin L. Hayenga, "Summary" in Hayenga (ed.) \textit{op. cit.}, p. 12.

\textsuperscript{28} \textit{Id.}, pp. 11-12.

\textsuperscript{29} Hayenga, et. al., \textit{op. cit.}, pp. 11-12.
The critical factual question is whether there exists a sufficient supply of potential traders "waiting in the wings" that will be "triggered into the price determination process" to prevent price departures from competitive levels. As Raikes explains,

[T]here may be no reason to expect that, in general, the reservation values on the demand and supply sides in the central market will be representative of aggregate market demand and supply schedules, or to expect that the price distribution from the residual central market would be the same as the price distribution that would result if suppliers and demanders participated in price determination.  

The central market may not be representative of aggregate market conditions for various reasons. Few firms trade in the central market, but virtually all firms use the prices generated there in formula pricing their spot or contract transactions. Even if a non-trading user believes that the central market price is inaccurate, he may continue to use it because the existing alternatives are more costly. As Raikes explains, "Firms legitimately pursue their self interest...by using prices made by other firms to reduce spot transaction costs."  

Another reason central markets may not yield competitive results is that some traders enjoy strategic advantages over other traders. For example, if the largest trader(s) is perceived to have superior knowledge of overall supply and demand conditions, other traders and non-traders may be disinclined to challenge its judgment. If these advantages apply to potential as well as actual traders, they prevent the potential traders from contesting price decisions made in the central market.

---

30 Raikes, op. cit., p. 132.

31 Id.

The above conditions imply that there are differences in the competitive market structure of a thin central market and the aggregate market of a product. These differences have special relevance for the NCE where trading is far more concentrated than in other markets or stages of the cheese industry.

The preceding explains why prices in a thin market like the NCE may not accurately reflect aggregate market conditions. A related question is whether the price established on the NCE is constrained by the alternative uses for the milk used in making cheese, especially non-fat dry milk and butter. If the milk supply curve facing the bulk cheese manufacturing industry were perfectly elastic and bulk cheese manufacturing were perfectly competitive, the prices for milk and bulk cheese, including the NCE price, would equal competitive levels. In fact, however, bulk cheese producers compete with the manufacturers of butter and non-fat dry milk powder. The upward sloping supply curve for farm-level milk plus the downward sloping derived demand for milk for products other than cheese imply an upward sloping market-equilibrium supply curve for milk to the bulk cheese industry. This, in turn, may provide the opportunity for the exercise of market power in the purchase of bulk cheese. As a result there is a range within which market power may be exercised in setting NCE prices.33

33 In his study of cheese pricing, William H. Nicholls concluded that cheese prices could depart from competitive levels:

The chief competition the cheese industry has to meet is not within the industry itself. This competition is with the butter and condensed milk industries for the use of the milk supply. This competition still leaves a significant range within which monopolistic elements in the cheese industry can work against the farmer who sells his milk to the cross-roads cheese factory.

Those holding a sanguine view of thin markets believe they do not pose significant manipulation problems. Most economists, however, seem to agree with Caves who urges caution in summarily dismissing the likelihood of market manipulation. Market regulators agree. They are interested in thin cash and futures markets "because they are believed to be easily manipulated and susceptible to abusive treatment of customers."34 Therefore, the Commodity Futures Trading Commission (CFTC) has been assigned authority to prevent manipulation in the cash markets of the commodities which have futures markets regulated by the CFTC.35

Although those studying thin markets hold various opinions regarding the quality of their performance, all agree it is not possible to judge performance of particular markets based on economic theory alone. Such a determination requires detailed analysis of the organization and conduct of particular thin markets.36

Previous Empirical Studies of Thin Markets

While the consequences of thin markets is largely an empirical question, there are few studies that provide useful insights, partly because of the difficulty of evaluating thin markets. Determining whether price discovery is efficient, whether prices have been manipulated or whether prices are unnecessarily volatile is very difficult. In addition, thin markets often are also concentrated markets in which one or a few buyers or sellers account for most of the trades.


In this situation, it is difficult to separate the effect of market thinness from the effect of market concentration.\textsuperscript{37}

Tomek’s study of the Denver terminal market for fed cattle is one of the best known studies of thin markets. Tomek found that Denver price movements were increasingly disassociated with price movements in other terminal markets (Omaha and Sioux City) as the volume of cattle on the Denver market declined in the late 1960s.\textsuperscript{38} By 1967-68, Denver prices relative to Omaha prices had declined by about 50 cents per cwt. Unfortunately, Tomek never examined whether market power had increased in the Denver market. But, by 1967, only 27,000 head of steers were sold at the Denver market (vs. 165,000 in 1964). The Omaha terminal sold 700,000 head in 1967. As volume declines, the number of buyers also tends to fall. We suspect that the Denver example involved both market thinness (small volume) and buyer market power. The decline in steer prices was likely a consequence of both factors.

Many U.S. agricultural commodities have thin spot or negotiated markets, or have thinly reported markets. This is particularly true in commodities in which formula pricing and/or contracting is widespread. Organized markets, like the NCE, have tended to decline in importance as contracting/formula pricing has increased. Indeed, the NCE is unique as a centralized cash auction market of a manufactured food product. The only similar market with


which we are familiar is the cash butter market located at the Chicago Mercantile Exchange. This market has even less trading than the NCE.\footnote{See Chapter 4, note 63.}

Centralized markets have the virtue of providing low-cost price and quantity information that others can use to reduce their transaction costs. Developing accurate price information from decentralized direct transactions is more costly but may be less vulnerable to the price discovery and manipulation problems of thin central markets. The presence of an effective futures market may improve the price discovery process in thinly traded commodity markets.

The remainder of this chapter examines two features of the NCE that give rise to its characterization as a thin market: the volume of trading and the number and relative size of traders.

**Trading Volume on NCE**

In all years during 1974-1993, less than 1 percent of total cheese production was sold on the Exchange (Table 3.1). During 1988-1993, cheese traded on the Exchange never exceeded 0.4 percent and averaged 0.2 percent of total cheese manufactured in the U.S. The NCE played an especially important role in cheese pricing during the latter period because government price support programs had less influence on NCE price levels than in many earlier years.

Figure 3.1 depicts barrel prices and total barrel and block sales on the NCE over the course of each year during 1989-1993.\footnote{For clarity of presentation no price line is shown for blocks, which generally move in unison with barrels at a few cents above barrels.} Each bar identifies the price at the end of a trading day. When trades occur the number of loads traded are shown near a bar. The wider solid bars
## Table 3.1. Volume of Cheese Traded on the NCE, 1974-1993

<table>
<thead>
<tr>
<th>Year</th>
<th>Carloads Sold on NCE(^1)</th>
<th>American(^3) Cheese</th>
<th>All(^4) Cheese</th>
<th>American Cheese</th>
<th>All Cheese</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>43</td>
<td>46,558</td>
<td>73,434</td>
<td>0.09%</td>
<td>0.06%</td>
</tr>
<tr>
<td>1975</td>
<td>167</td>
<td>41,499</td>
<td>70,285</td>
<td>0.40</td>
<td>0.24</td>
</tr>
<tr>
<td>1976</td>
<td>490</td>
<td>51,345</td>
<td>83,006</td>
<td>0.95</td>
<td>0.59</td>
</tr>
<tr>
<td>1977</td>
<td>553</td>
<td>51,179</td>
<td>83,963</td>
<td>1.08</td>
<td>0.66</td>
</tr>
<tr>
<td>1978</td>
<td>325</td>
<td>51,977</td>
<td>87,992</td>
<td>0.63</td>
<td>0.37</td>
</tr>
<tr>
<td>1979</td>
<td>440</td>
<td>54,857</td>
<td>92,931</td>
<td>0.80</td>
<td>0.47</td>
</tr>
<tr>
<td>1980</td>
<td>264</td>
<td>59,528</td>
<td>99,607</td>
<td>0.44</td>
<td>0.27</td>
</tr>
<tr>
<td>1981</td>
<td>39</td>
<td>66,203</td>
<td>106,939</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>1982</td>
<td>40</td>
<td>68,980</td>
<td>113,542</td>
<td>0.06</td>
<td>0.04</td>
</tr>
<tr>
<td>1983</td>
<td>34</td>
<td>73,296</td>
<td>120,487</td>
<td>0.05</td>
<td>0.03</td>
</tr>
<tr>
<td>1984</td>
<td>307</td>
<td>66,279</td>
<td>116,850</td>
<td>0.46</td>
<td>0.26</td>
</tr>
<tr>
<td>1985</td>
<td>144</td>
<td>71,381</td>
<td>127,024</td>
<td>0.20</td>
<td>0.11</td>
</tr>
<tr>
<td>1986</td>
<td>752</td>
<td>69,954</td>
<td>130,231</td>
<td>1.07</td>
<td>0.58</td>
</tr>
<tr>
<td>1987</td>
<td>707</td>
<td>67,916</td>
<td>133,609</td>
<td>1.04</td>
<td>0.53</td>
</tr>
<tr>
<td>1988</td>
<td>361</td>
<td>68,914</td>
<td>139,299</td>
<td>0.52</td>
<td>0.26</td>
</tr>
<tr>
<td>1989</td>
<td>118</td>
<td>66,814</td>
<td>140,384</td>
<td>0.18</td>
<td>0.08</td>
</tr>
<tr>
<td>1990</td>
<td>342</td>
<td>72,269</td>
<td>151,486</td>
<td>0.47</td>
<td>0.23</td>
</tr>
<tr>
<td>1991</td>
<td>399</td>
<td>69,228</td>
<td>151,371</td>
<td>0.58</td>
<td>0.26</td>
</tr>
<tr>
<td>1992</td>
<td>380</td>
<td>73,412</td>
<td>162,207</td>
<td>0.52</td>
<td>0.23</td>
</tr>
<tr>
<td>1993</td>
<td>596</td>
<td>73,120</td>
<td>163,204</td>
<td>0.82</td>
<td>0.37</td>
</tr>
</tbody>
</table>


\(^1\)NCE trades include carloads of barrels and blocks sold on National Cheese Exchange.

\(^2\)American and total cheese manufactured were converted to carloads using 40,000 lbs. per carload.

\(^3\)American includes Cheddar, Colby, granular, stirred curd, washed curd, and Monterey Jack.

\(^4\)All cheese includes all types of cheese including cream cheese but excluding cottage cheese.
indicate that the price remained unchanged for a number of weeks. The longest such period was November 11, 1990, to May 26, 1991, when NCE prices were below the price support level.

Most changes in price, often including very large ones, resulted from bids to buy or offers to sell that did not result in actual transactions. Frequently prices rose or fell by substantial amounts over a number of trading days without any cheese actually traded. For example, from May 12, 1989, through November 3, 1989, the price per pound for barrels rose from $1.19 to $1.505 on bids and increased bids without a single consummated transaction. Each year the largest daily price increases most often occurred with no transactions.

Table 3.2 summarizes the frequency of price changes within trading sessions (usually in 0.25 cent increments) that occurred with and without transactions. For total barrel and block activity combined, prices changed without transactions about nine times as frequently as with transactions.\textsuperscript{41} Overall trading activity patterns are quite similar for barrels and blocks.

The following statement of a sometime buyer on the NCE illustrates the potential impact of buying even a few loads of cheese on the thinly traded NCE.

If we had competed with [Company X] for the bid lead for barrels, (1) we may have secured 5-8 loads, but (2) the barrel market would have closed at a significantly higher level (4-6 cents).\textsuperscript{42}

On the day referred to above, this company did make one bid and an increased bid for three loads of barrels. These bids, though not filled, increased the NCE barrel price 0.25 cents. On the other hand, the company "had secured 8-10 loads (barrels and 640's) of cheese for

\textsuperscript{41} The pattern was about the same for price increases and price decreases.

\textsuperscript{42} [[Source deleted in public report as not essential.]]
Table 3.2. Frequency of Price Changes Associated with Various Types of Trading Activity, 1988-1993

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
<td>%</td>
<td>No.</td>
</tr>
<tr>
<td>Barrels and Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price Changed with a Trade</td>
<td>37</td>
<td>6%</td>
<td>9</td>
<td>1%</td>
<td>54</td>
<td>7%</td>
<td>51</td>
</tr>
<tr>
<td>Price Changed without a Trade</td>
<td>207</td>
<td>35%</td>
<td>410</td>
<td>59%</td>
<td>748</td>
<td>53%</td>
<td>318</td>
</tr>
<tr>
<td>Price Unchanged with a Trade</td>
<td>70</td>
<td>12%</td>
<td>20</td>
<td>3%</td>
<td>115</td>
<td>8%</td>
<td>99</td>
</tr>
<tr>
<td>Price Unchanged without a Trade</td>
<td>281</td>
<td>47%</td>
<td>260</td>
<td>37%</td>
<td>490</td>
<td>35%</td>
<td>334</td>
</tr>
<tr>
<td>Total Actions</td>
<td>595</td>
<td>100%</td>
<td>699</td>
<td>100%</td>
<td>1407</td>
<td>100%</td>
<td>804</td>
</tr>
<tr>
<td>Barrels</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price Changed with a Trade</td>
<td>33</td>
<td>8%</td>
<td>4</td>
<td>1%</td>
<td>18</td>
<td>3%</td>
<td>29</td>
</tr>
<tr>
<td>Price Changed without a Trade</td>
<td>109</td>
<td>27%</td>
<td>209</td>
<td>49%</td>
<td>337</td>
<td>64%</td>
<td>159</td>
</tr>
<tr>
<td>Price Unchanged with a Trade</td>
<td>69</td>
<td>17%</td>
<td>19</td>
<td>4%</td>
<td>45</td>
<td>9%</td>
<td>62</td>
</tr>
<tr>
<td>Price Unchanged without a Trade</td>
<td>189</td>
<td>47%</td>
<td>197</td>
<td>46%</td>
<td>123</td>
<td>24%</td>
<td>241</td>
</tr>
<tr>
<td>Total Actions</td>
<td>400</td>
<td>100%</td>
<td>429</td>
<td>100%</td>
<td>523</td>
<td>100%</td>
<td>441</td>
</tr>
<tr>
<td>Blocks</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Price Changed with a Trade</td>
<td>4</td>
<td>2%</td>
<td>5</td>
<td>2%</td>
<td>36</td>
<td>4%</td>
<td>4</td>
</tr>
<tr>
<td>Price Changed without a Trade</td>
<td>98</td>
<td>50%</td>
<td>201</td>
<td>74%</td>
<td>411</td>
<td>46%</td>
<td>46</td>
</tr>
<tr>
<td>Price Unchanged with a Trade</td>
<td>1</td>
<td>1%</td>
<td>1</td>
<td>1%</td>
<td>0</td>
<td>0%</td>
<td>37</td>
</tr>
<tr>
<td>Price Unchanged without a Trade</td>
<td>92</td>
<td>47%</td>
<td>63</td>
<td>23%</td>
<td>367</td>
<td>42%</td>
<td>143</td>
</tr>
<tr>
<td>Total Actions</td>
<td>195</td>
<td>100%</td>
<td>270</td>
<td>100%</td>
<td>884</td>
<td>100%</td>
<td>363</td>
</tr>
</tbody>
</table>


1 An action refers to bids and offers whether or not they result in a transaction.
processing...just prior to today's market." Since these loads were purchased in the spot market, they did not exert an upward pressure on the market.

An even more dramatic illustration of the thinness of trading occurred when Pizza Hut attempted to sell three loads of blocks on the Exchange May 13, 1994. The block price dropped 10.5 cents per pound during the session without Pizza Hut selling a single load.  

An indication of the thinness of NCE trading is that even small companies may avoid selling for fear of lowering prices. The president of Edelweiss Cheese Company said he did not offer cheese on occasion because he did not want to lower the Exchange price. When he did not sell on the NCE, he sold the cheese in the spot market the following week.  

The preceding facts illustrate three frequent characteristics of so-called "thin" markets: (a) the small percentage of total cheese production actually traded on the Exchange, (b) price changes on the NCE most often resulting from bids to buy or offers to sell rather than from consummated transactions, and (c) the extreme sensitivity of the Exchange price to relatively small purchases or sales. We turn next to a fourth factor relevant to the competitive performance of thin markets, the concentration of transactions among relatively few traders.

**Number and Relative Size of Traders**

In perfectly competitive cash auction markets there are sufficient traders so that (a) each buyer and each seller has a relatively small influence, such that none, acting alone, can affect price or output; (b) buyers and sellers are well informed; and (c) there are no barriers to entry

---

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

44 See Chapter 4, pp. 35-36.

Public Report

facing new traders. In such a market, price is determined by impersonal market forces, not by the interests, desires or whims of individual traders. Such conditions, according to economic theory, maximize social welfare.

The competitive ideals of economic theory are seldom realized in real world markets. Close approximations exist in heavily traded securities markets and many agricultural futures markets. On the other hand, markets for most manufactured products do not meet the conditions of perfectly competitive markets. Economic theory predicts and empirical studies verify that a market's structural characteristics and the conduct of various market participants determine how well it performs.\(^46\)

Important structural characteristics include the concentration of purchases among leading buyers and the concentration of sales among leading sellers. Also important are whether any market participants enjoy competitive strategic advantages over other traders, whether traders have equal access to market information, and whether they make price and output decisions independently of one another. As a result, it is necessary to examine the actual market conduct of leading market participants as well as the market's structure.\(^47\) Much of the remainder of this study examines market conduct. But first we examine the concentration of trading on the NCE.

In theory, other things being the same, the intensity of competition diminishes as the concentration of trading increases. Many empirical studies have verified this theory for both

---


\(^47\) *Id.*
industrial and auction markets.\textsuperscript{48} One measure of market concentration is the number of traders. Other measures are designed to capture the size distribution of traders. The most commonly used such measure is the \textit{concentration ratio}, which measures the share of sales and purchases held by the largest participants in a market. In recent years, economists and public regulatory bodies have made increased use of the Herfindahl-Hirschman Index (HHI), which is the sum of the squares of the market participants' individual market shares.\textsuperscript{49} The virtue of this measure is that squaring market shares gives greater weight to the market shares of the leading firms.\textsuperscript{50}

The United States Department of Justice and the Federal Trade Commission have classified markets based on HHIs as follows:\textsuperscript{51}

- HHI below 1000: Unconcentrated market
- HHI 1000 to 1800: Moderately concentrated market
- HHI over 1800: Highly concentrated market

\textsuperscript{48} Leonard Weiss (ed.), \textit{Concentration and Price}, MIT Press, 1989. This comprehensive review of the literature covers 121 studies, including such diverse American industries as airlines, beef packing, cement, banking and supermarkets, as well as several auction markets. Based on his review of these studies, Weiss concludes that the evidence "seems to give overwhelming support to the concentration-price hypothesis." \textit{Id}, p. 268. For auction markets see McAfee and McMillan, \textit{op. cit.}

\textsuperscript{49} For example, if a market had 10 sellers, each with a share of 10\%, the HHI would equal 1000, i.e., $10 \times 10 = 100 \times 10$ sellers = 1000.


\textsuperscript{51} Department of Justice and Federal Trade Commission, \textit{Horizontal Merger Guidelines}, April 2, 1992, Section 1.51.
In the context of horizontal merger analysis, the antitrust agencies presume that increases of 100 points or more in markets with HHIs of 1800 and over "are likely to create or enhance market power or facilitate its exercise."52

Trading on the NCE has always been concentrated among a relatively few traders.53 Table 3.3 displays for each year during 1974-1993 the total number of traders selling blocks and barrels on the NCE; the concentration ratios, CR1 to CR5, which refer to the combined market shares of the top one to five firms; and the HHIs. In only one year during this period were there more than nine sellers. In all years, the five largest sellers accounted for over 87 percent of total carloads of barrels and blocks sold on the NCE. Seller HHI values ranged from a low of 1759 in 1986 to a high of 8251 in 1989 (Table 3.3).

Table 3.4 displays for each year during 1974-1993 the degree of concentration among buyers on the NCE. The number of buyers ranged from three in 1982 to 14 in 1979. In all but two years, the five largest buyers accounted for over 90 percent of barrel and block sales. The HHI values ranged from a low of 1675 in 1980 to a high of 7324 in 1986.

Although both NCE sales and purchases of total barrels and blocks were very highly concentrated in virtually all years, seller concentration was generally higher than buyer concentration. This was particularly true during 1988-1993, when the seller HHI averaged 5990,

52 Id., Section 1.51. "The presumption may be overcome by a showing that [other] factors...make it unlikely that the merger will create or enhance market power or facilitate its excise [despite the presence of high market concentration]." Id.

53 For a description of concentration in earlier years see Arthur Miller, op. cit.
Table 3.3. Seller Concentration on the National Cheese Exchange, 1974-1993
Barrel and Block Sales

<table>
<thead>
<tr>
<th>Year</th>
<th>Carloads Traded</th>
<th>No. of Sellers</th>
<th>CR1</th>
<th>CR2</th>
<th>CR3</th>
<th>CR4</th>
<th>CR5</th>
<th>HHI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974</td>
<td>43</td>
<td>9</td>
<td>39.5 (L)</td>
<td>58.1 (K)</td>
<td>69.8 (DP)</td>
<td>79.1 (BF)</td>
<td>88.4 (MA)</td>
<td>2255</td>
</tr>
<tr>
<td>1975</td>
<td>167</td>
<td>8</td>
<td>47.6 (K)</td>
<td>60.2 (BA)</td>
<td>72.9 (B)</td>
<td>84.9 (L)</td>
<td>91.6 (BF)</td>
<td>2806</td>
</tr>
<tr>
<td>1976</td>
<td>490</td>
<td>6</td>
<td>64.7 (L)</td>
<td>83.3 (K)</td>
<td>93.1 (BF)</td>
<td>96.5 (B)</td>
<td>99.4 (KP)</td>
<td>4647</td>
</tr>
<tr>
<td>1977</td>
<td>553</td>
<td>8</td>
<td>74.9 (L)</td>
<td>84.6 (KP)</td>
<td>91.1 (K)</td>
<td>95.3 (BF)</td>
<td>99.1 (B)</td>
<td>5774</td>
</tr>
<tr>
<td>1978</td>
<td>325</td>
<td>9</td>
<td>78.8 (L)</td>
<td>86.8 (K)</td>
<td>90.8 (S)</td>
<td>93.2 (B)</td>
<td>95.4 (BN)</td>
<td>6302</td>
</tr>
<tr>
<td>1979</td>
<td>440</td>
<td>4</td>
<td>63.0 (K)</td>
<td>82.3 (L)</td>
<td>98.9 (B)</td>
<td>100.0 (S)</td>
<td>100.0 (MA)</td>
<td>4613</td>
</tr>
<tr>
<td>1980</td>
<td>264</td>
<td>6</td>
<td>65.2 (L)</td>
<td>86.0 (K)</td>
<td>92.4 (B)</td>
<td>96.6 (BF)</td>
<td>99.2 (TD)</td>
<td>4745</td>
</tr>
<tr>
<td>1981</td>
<td>39</td>
<td>4</td>
<td>41.0 (B)</td>
<td>82.1 (L)</td>
<td>97.4 (K)</td>
<td>100.0 (MA)</td>
<td>100.0 (MA)</td>
<td>3609</td>
</tr>
<tr>
<td>1982</td>
<td>40</td>
<td>3</td>
<td>55.0 (L)</td>
<td>80.0 (MA)</td>
<td>100.0 (K)</td>
<td>99.2 (B)</td>
<td>97.1 (MG)</td>
<td>3962</td>
</tr>
<tr>
<td>1983</td>
<td>34</td>
<td>6</td>
<td>58.8 (L)</td>
<td>76.5 (BF)</td>
<td>88.2 (K)</td>
<td>94.1 (B)</td>
<td>97.4 (B)</td>
<td>3397</td>
</tr>
<tr>
<td>1984</td>
<td>307</td>
<td>8</td>
<td>44.3 (BN)</td>
<td>78.8 (L)</td>
<td>94.1 (DS)</td>
<td>95.8 (K)</td>
<td>96.2 (B)</td>
<td>3856</td>
</tr>
<tr>
<td>1985</td>
<td>144</td>
<td>6</td>
<td>54.2 (BN)</td>
<td>78.5 (L)</td>
<td>96.5 (B)</td>
<td>98.6 (K)</td>
<td>99.3 (MG)</td>
<td>1759</td>
</tr>
<tr>
<td>1986</td>
<td>752</td>
<td>12</td>
<td>29.3 (BN)</td>
<td>46.4 (MI)</td>
<td>61.7 (L)</td>
<td>75.3 (DS)</td>
<td>87.8 (K)</td>
<td>3018</td>
</tr>
<tr>
<td>1987</td>
<td>707</td>
<td>9</td>
<td>47.0 (K)</td>
<td>71.3 (L)</td>
<td>83.2 (DS)</td>
<td>89.5 (MI)</td>
<td>95.0 (BN)</td>
<td>6130</td>
</tr>
<tr>
<td>1988</td>
<td>361</td>
<td>6</td>
<td>76.7 (K)</td>
<td>89.5 (L)</td>
<td>98.3 (BN)</td>
<td>99.7 (DS)</td>
<td>98.9 (B)</td>
<td>8251</td>
</tr>
<tr>
<td>1989</td>
<td>118</td>
<td>5</td>
<td>90.7 (K)</td>
<td>94.9 (MG)</td>
<td>97.3 (MI)</td>
<td>99.2 (L)</td>
<td>100.0 (DS)</td>
<td>3710</td>
</tr>
<tr>
<td>1990</td>
<td>342</td>
<td>9</td>
<td>56.4 (K)</td>
<td>74.6 (AP)</td>
<td>84.8 (MA)</td>
<td>93.9 (DS)</td>
<td>96.2 (N)</td>
<td>7266</td>
</tr>
<tr>
<td>1991</td>
<td>399</td>
<td>8</td>
<td>85.0 (K)</td>
<td>89.5 (B)</td>
<td>92.0 (L)</td>
<td>96.0 (AP)</td>
<td>97.5 (MK)</td>
<td>4800</td>
</tr>
<tr>
<td>1992</td>
<td>380</td>
<td>8</td>
<td>67.9 (K)</td>
<td>76.3 (BN)</td>
<td>84.2 (AP)</td>
<td>89.7 (B)</td>
<td>92.9 (L)</td>
<td>5784</td>
</tr>
<tr>
<td>1993</td>
<td>596</td>
<td>9</td>
<td>74.3 (K)</td>
<td>89.6 (DS)</td>
<td>93.3 (AP)</td>
<td>96.1 (B)</td>
<td>97.7 (BN)</td>
<td></td>
</tr>
</tbody>
</table>

Source: National Cheese Exchange, Trading Activity Minutes, AMS, USDA, 1974-93.

Notes: (1) CR refers to the concentration ratio measure of market concentration. CR1 refers to the percent of sales on the NCE by the largest seller. CR5 refers to the percent of sales made by the five largest sellers. The codes in column CR1 identify the largest seller. The codes in columns CR2 to CR5 represent the second to fifth largest sellers in each year. HHI refers to the Herfindahl-Hirschman Index of Market Concentration; it is calculated by summing the squares of the individual market shares of all firms selling on the NCE.

(2) Letters in parentheses are trader codes. AP=Alpine lace; B=Borden; BF=Beatrice Food (Includes trades of Pauly acquires in 1984); BN=Bongards; DS=Dairystate; K=Kraft; L=Land O' Lakes; MA=Marathon; MG=Masters Gallery; MI=Mid Am; MK=Marketing Association; N=Northern Wisconsin; S=Schreiber; TD=Twin Dakota. BA, DP, and KP are unidentified.