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## **Origins of the Modern Exchange Clearinghouse: A History of Early Clearing and Settlement Methods at Futures Exchanges**

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A History of Early Clearing and Settlement Methods at Futures Exchanges**

by

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**Origins of the Modern Exchange Clearinghouse:  
A History of Early Clearing and Settlement Methods at Futures Exchanges**

**Abstract**

Defining futures contracts as substitutes for associated cash transactions enables a discussion of the evolution of controls over contract nonperformance risk. These controls are incorporated into exchange methods for clearing contracts. Three clearing methods are discussed: direct, ringing and complete. The incidence and operation of each is described. Direct clearing systems feature bilateral contracts with terms specified by the counterparties to the contract. Exchanges relying on direct clearing systems chiefly serve as mediators in trade disputes. Ringing is shown to facilitate contract offset by increasing the number of potential counterparties. Ringing settlements reduce counterparty credit risk by reducing the accumulation of dependencies as contracts are offset. Ringing settlements also lower the cost of maintaining open contract positions, chiefly by lowering the amount of required margin deposits. Exchanges employing ringing methods generally adopted a clearinghouse to handle payments. Complete clearing interposes the clearinghouse as counterparty to every contract. This measure ensures that contracts are fungible with respect to both the underlying commodity and counterparty risk.

Development of the Chicago Board of Trade Clearing Corporation is discussed. Two principal objections to adoption of complete clearing at the CBOT were anti-gambling provisions and privacy concerns. The Christie case overcame the gambling concern. The Grain Futures Administration mitigated privacy concerns by giving the exchange members a choice between reporting their trades to the Department of Agriculture or to an exchange-controlled clearinghouse. Once these objections were overcome, CBOT members adopted a complete clearing system.

## I. Introduction

This paper studies the development of futures clearinghouses prior to 1925, the date of incorporation for the Chicago Board of Trade Clearing Corporation (CBOTCC). The date of incorporation coincides with the initial years of regulatory oversight by the Grain Futures Administration, a fact which is sometimes construed as the *raison d'être* for the CBOTCC. Despite this synchronism, the signal innovation of the incorporation, guarantees of contract performance, was not imposed on the exchange by regulators. Indeed, well before passage of legislation enabling federal regulation exchange members had expressed interest in provisions to guarantee contract performance via an incorporated clearinghouse.

A broad definition of futures contracting facilitates this discussion. The definition adopted here stems from recognition of the force of contractual obligations in two distinct regions of the statespace: contract performance and contract nonperformance. In performance states one counterparty, referred to as the short position, delivers the underlying asset to its counterparty, the long position. At delivery, the long position makes a contracted cash payment to the short position. This portion of the definition conforms to the standard definition of a futures contract as an obligation between counterparties to make a future-dated exchange at a price determined at the contract's inception. This definition is insufficient in two senses. First, it omits the choice available to each counterparty to not perform the contract. This choice will be optimal to one side of the contract when a nonperformance state is realized. Availability of the choice, which is usefully construed as a nonperformance option, has value. Contract counterparties recognize that the cost of absolute performance assurances will generally exceed the value of benefits derived from trading. Thus, provision of the nonperformance option substitutes for absolute performance assurances and enables the realization of trading benefits. Second, the standard futures definition obscures institutional incentives to innovate contract design. These incentives stem from the need to achieve both smaller probabilities of realizing nonperformance states and mitigation of the extent of losses should nonperformance occur. Further, the effectiveness of contract innovations should depend on loss-sharing arrangements. Exchanges adopting complete

clearinghouses internalize nonperformance losses increasing their incentives to innovate in ways which reduce these losses.

Definitions of futures contracts which omit the nonperformance option are common. Emery (1896, p. 46) defines a futures contract "as a contract for the future delivery of some commodity, without reference to specific lots, made under rules of some commercial body, in a set form, by which the conditions as to the unit of amount, the quality, and the time of delivery are stereotyped, and only the determination of the total amount and the price is left open to the contracting parties." This definition is typical in that it defines futures contracting on the basis of contractual details.<sup>1</sup> The approach taken here is to define futures contracts as enforceable substitutes for transactions in cash commodities or assets. Defined this way, contractual details can be seen as measures aimed at controlling the incidence and extent of contract nonperformance.

This definition serves two purposes. First, it broadens the category of contracts referred to as futures. Williams (1982), for example, argues that contracts traded at the Buffalo Board of Trade during the 1840s might be classified as futures because their contract terms were similar to terms later adopted by the Chicago exchanges. The success of the Buffalo contracts developed from a shared commercial interest to lessen the costs resulting from contract nonperformance. The Chicago merchants had similar commercial interests, leading them to develop similar terms for contracts traded at the Chicago exchanges. Both the New York merchants and the members of the Chicago exchanges faced the potential of nonperformance loss and responded by adapting the terms of traded contracts in order to control these losses. Thus, for the purposes of this paper, the important commonality is the economic interest in controlling losses.

The second purpose served by this definition follows from the first. An improved understanding of futures contracts stems from understanding that their terms are chosen to minimize nonperformance losses subject to available legal arrangements for loss sharing. The specific measures adopted to

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<sup>1</sup> For a recent example of the standard definition see Kolb (1991, p. 4). In contrast see Edwards (1984, p. 225) who takes a position similar to that taken here stating that the clearinghouse "transforms what would otherwise be forward contracts into highly liquid futures contracts."

control losses are determined by the legal environment. Contracts traded at the Buffalo Board of Trade rapidly developed use of performance bonds (margins) and delivery standards.<sup>2</sup> However, enforcing contract performance beyond this point would have been costly. Thus, reputational capital probably played an important role. Unobservability of reputational capital tends to lessen the number of potential counterparties, a result which is inconsistent with liquidity needs. Subsequent changes in commercial law enabled the Chicago exchanges to surpass the Buffalo precedent with clearinghouse guarantees of performance. In this sense, the contracts traded at the Buffalo exchange served the same commercial purposes as the futures contracts exchanged in Chicago. Differences in the details of these contracts owes more to differences in legal environment than to any fundamental difference in their economic purposes.

Nonperformance issues are often ignored because failures are infrequent; that is, nonperformance states are seldom realized. I argue that the record of successful avoidance of nonperformance is largely due to the internalization of information and incentives obtained when an exchange-affiliated clearinghouse offers performance guarantees. This aspect of the paper draws on the arguments of Coase (1937).

The plan of this paper is as follows. Section II describes clearinghouse operations. Section III offers a history of clearing operations preceding the CBOTCC. Section IV describes the development of the CBOTCC. Section V summarizes the paper.

## **II. Clearinghouse operations**

A general description of modern clearing and settlement operations puts the development of the CBOTCC into a useful context. Clearing is the process of reconciling and resolving obligations between counterparties. Settlement, the last step of the clearing process, extinguishes the current liabilities between counterparties. This section develops clearing and settlement in two subsections.

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<sup>2</sup> See Williams (1980, p. 140-145) for a discussion of early margin rules. The literature on grain standards is extensive. It is well established that by 1860 grain contracts traded for delivery of other than specific lots. Hill (1990) reviews this literature. For further examples, see Williams (1982) for evidence of delivery standards based on location and Odle (1964) for delivery standards based on grades.

First, clearing is examined absent consideration of nonperformance. Second, the problem of nonperformance is further developed. Following Telser (1986), it is useful to develop parallels between the clearing operations of futures exchanges and those used by commercial bank clearinghouses (CBCHs).

#### A. Clearing absent nonperformance

Clearing of futures contracts is done in three steps. Clearinghouses initiate the clearing process with the registration of traded contracts. This registration identifies the contractual counterparties and records their respective liabilities. Contract standardization simplifies registration. In banking, contract standardization is obtained by restricting payment on checks to a single medium of exchange. Clearinghouse acceptance of a draft presented by a clearing member registers a claim against another member of the clearinghouse. Banks which are not members of the clearinghouse gain access to clearing facilities by opening correspondent accounts at member banks. Checks presented for payment at correspondent banks are registered in the name of the clearing bank and processed through the clearinghouse. Payments made to the clearing bank are then credited to the accounts of its correspondents.

Standardization of futures contracts is more complex. Items being exchanged vary not only according to the commodity underlying the contract, but also according to the month of delivery. Thus, registration of contracts is by type of contract and by delivery month. At futures exchanges, registration occurs as the buy and sell sides of traded contracts are matched.<sup>3</sup> Futures clearinghouses require nonmember futures commission merchants (FCMs) to "give up" their trades to member FCMs.<sup>4</sup> A "give up" occurs when the nonmember FCM relinquishes the trade to a member FCM. Like the

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<sup>3</sup> Unmatched buy and sell sides are referred to as "out trades."

<sup>4</sup> I use the term "give up" to demonstrate the functional equivalence between present usage of the term "give up" and the relationship between clearing members and their associated nonmember firms. In present usage, a "give up" occurs when a thinly capitalized FCM noted for good order execution is engaged to handle a large order. The FCM's thin capitalization prevents him from taking the order. Under a give-up arrangement, he executes the order, then gives it up to a better capitalized member. Similarly, FCMs who are not members of the clearing house execute orders. Because they lack clearing house capital, these orders must be given up to a member of the clearing house.

correspondent services offered in banking, the nonmember "gives up" his claim to the clearing member who proceeds to clear the contract through the clearing organization and then adjusts the accounts of the nonmember.

Registration at a central clearinghouse facilitates the second stage in the clearing process, the offsetting of claims. Aggregation of the related transactions of each member of the clearinghouse enables identification of offsetting commitments. Offset occurs when the aggregated claims against any member are netted against the aggregate of the member's claims against all other members. In banking, the due-from and due-to claims of each clearing member are netted one against the other resulting in payment obligations into or from the member's clearinghouse account. In futures markets, the clearinghouse nets the buy and sell orders registered to each clearing member. The current liabilities of the clearinghouse and its members are based on the net of these obligations. Thus, clearing reduces the number of liabilities by relying on the fungibility of individual contracts.

In the third step, contract settlement extinguishes the current payment liabilities of the counterparties to the contract. In banking, settlement occurs when the accounts of the clearing members are adjusted to reflect amounts paid. On payment, the obligations of all parties are satisfied.<sup>5</sup> In futures markets, outstanding contracts are settled periodically by marking them to market. Generally, marks are either the most recent market-determined price for each contract or, at the contract's delivery date, the cash-market price of the underlying asset.<sup>6</sup> All outstanding contracts are marked to the settlement price. As contracts are marked to market, payments are determined on the basis of the netted obligations. Increases in settlement prices result in gains to long positions and losses to short positions. Conversely, decreases in settlement price result in losses to long positions and gains to short positions. Settlement occurs when payments due to the net positions of clearing

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<sup>5</sup> The practice of using offsets rather than cash settlements dates to banking practice in early Florence. See Lane and Mueller (1985, p. 81).

<sup>6</sup> Marks are determined by the settlement committee which generally follows the rules outlined in the text. In exceptional circumstances, these committees can determine marks by substituting their assessed valuations for market-determined prices.

members are made.

Unlike drafts, the futures contract generally remains outstanding following settlement. However, like drafts, settlement sets the current payment amount between counterparties to zero. Credit risk, that is, the risk that one counterparty may fail to meet his obligations does remain; periodic settlement reduces this risk to a proportion of the amount of price change realized at the end of the next settlement period.

#### B. Nonperformance problems

The nonperformance problem is well illustrated by the experience of several Peoria, Illinois grain elevators offering forward contracts to local farmers. Quoting from the Federal Trade Commission's *Report on the Grain Trade*:

Contracting for grain at a fixed price has proven an unsatisfactory practice with many elevators. The principle objection thereto is that if prices are in advance of those stipulated in the contract when the time of delivery arrives the farmer becomes dissatisfied and often refuses to fulfill the contract. If the elevator then attempts to enforce it the usual result is that the farmer transfers his business to another elevator. His dissatisfaction easily spreads to other farmers, especially if the elevator in question is an independent or one of a line company and may result in serious loss of business.<sup>7</sup>

Forward contracting is motivated by the expectation of benefits; in the above case, these beneficiaries are farmers and grain elevators. However, despite the motivation to enter into forward contracts, subsequent performance is conditional on the realization of prices at the delivery date. In some states, a counterparty will find failure to perform as contracted preferable to realizing losses due to his performance of the contract. Recognizing this, counterparties have incentives to restrict their nonperformance opportunities. Doing so improves their access to the benefits of forward contracting. Along these lines, Smith and Warner (1979) demonstrate how restrictions imposed by bond covenants lower debt costs by lessening the default risk of corporation-issued bonds. Similarly, counterparties are motivated to adopt contract terms which restrict their nonperformance opportunities. These restrictions lessen both the likelihood of nonperformance and the extent of losses should nonperformance become unavoidable. Despite these incentives, contract modifications which assure contract performance are

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<sup>7</sup> FTC (1920), Volume I, p. 113.

costly. When these costs exceed the benefits derived from further assurances of performance, it becomes optimal for counterparties to exchange nonperformance options.<sup>8</sup>

Edwards (1984) distinguishes between bank and present-day futures clearinghouses. Bank clearinghouses settle by netting payments due between members, issuing credits and debits on the clearinghouse accounts of its members to cover. The CBCH is obligated only to the extent of a member's account balance. Thus, it does not provide a full guarantee of member performance. Futures CHs guarantee performance of cleared contracts. At the CBOT where, by one estimate, six sevenths of all US contracts traded, clearing of futures contracts prior to 1925 was similar to that provided by CBCHs.

The contention of this paper is that the evolution of clearing arrangements was importantly influenced by the needs of members to control their risk of losses from contract nonperformance. Thus, exchange policy on contract details like margin and marking contracts to market stems from its interest in the clearing mechanism.

### **III. Precedents of the CBOTCC**

Three clearing methods developed prior to formation of the CBOTCC. These are clearing by direct settlement, clearing through rings, and complete clearing. This section explains each clearing method and summarizes its use.

#### **A. Direct Settlement**

Direct settlement is bilateral reconciliation of contractual commitments. Direct settlement is obtained through delivery or by offset between the original counterparties. For example, A contracts with B to sell 5,000 bushels of wheat in May at \$1.00 per bushel. There are three categories of possible outcomes in a system of direct settlements.

First, the specified terms of the contract can be performed. Thus, the contract is settled when A delivers 5,000 bushels of wheat to B in May and B pays \$5,000 to A. Settlement, in this case, is by direct delivery.

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<sup>8</sup> This is the incompleteness referred to in Kane (1980).

Second, the parties can settle the contract prior to May by establishing a mutually agreed price at which both are willing to extinguish the pending liabilities of the other. This method is referred to as direct offset. I extend the previous example to illustrate. Suppose A and B agree to a second contract in March as follows: B commits to deliver 5,000 bushels in May to A and A commits to pay B \$0.95 per bushel, or \$4,750. The two contracts could be settled in May as follows: A delivers 5,000 bushels to B and B pays A \$5,000. Then B delivers 5,000 bushels to A and A pays B \$4,750. The net from settling both contracts is a \$250 payment by B to A; the wheat deliveries between them cancel. Alternately, both parties benefit by recognizing in March that the earlier contract has been offset on payment by B of \$250. This payment is referred to as a payment of the difference. The benefit from paying the difference is shared by A and B. Specifically, both avoid the expense of transferring title and both enjoy the benefit of reduced recording-keeping expenses.

It might be objected that the present value of \$250 paid in March is greater than \$250 paid in May, thus B would refuse to settle on these terms. However, recall that the price for the March settlement is mutually agreed upon. B will agree to settle early provided the difference amount paid in March is less than the price change expected to be realized in May. A is willing to take an amount smaller than his expected price change because the payment amount can be invested. Thus, a mutually agreeable settlement price in March would be based on the present value of a settlement occurring in May.

Alternately, B could be compensated by a payment of interest from A on the amount of profit realized by A in March. Some exchanges required payment of interest on the amount of profit.<sup>9</sup> Note, however, these approaches are equivalent provided the interest rate used by the exchange to determine interest on profits is equal to the market rate over the same term for an equal-risk

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<sup>9</sup> Forrester (1931) indicates the rules of the Liverpool Cotton Association required payment of interest on profits. As of 1882, the General Rules of the New York Produce Exchange also specified payment of interest on profits. It is doubtful, however, that these rules were intended to solve this present-value problem. More likely, the rules' substitution of one commercial transaction for another avoided the appearance of futures trading without intending delivery, an appearance which might lead to a charge of gambling.

investment.<sup>10</sup>

As a last outcome, one of the parties could fail to perform and the contract is settled on the basis of standing enforcement procedures.<sup>11</sup> As this contract is described, recognition of nonperformance can only occur in May. Prior to May, neither party has a performance obligation. Inferences might be drawn about the ability of a counterparty to perform and these inferences might be recognized as completely accurate; nevertheless, until a counterparty fails to perform a contract term the contract stands. This aspect of the contract elevates risk in two ways. First, the possibility of accumulating substantial losses increases as the time remaining in the contract increases. Second, the failing counterparty has incentives to gamble in hopes of resurrecting his net worth, further increasing credit risk. Recognition of these additional sources of risk motivates adoption of contract terms which impose periodic demonstrations of continued performance capability. Inclusion of these provisions curtails the buildup of additional losses and restricts incentives to gamble on resurrection.

Direct settlement is the oldest clearing arrangement. Emery (1896, p. 35-36) describes trading in the warrants of the East India Company in 1733. The warrants were bearer instruments which gave title on a future date to a warehouse receipt for a quantity of metal; iron being frequently mentioned. Endorsement signified sale of the warrant, thus transfers were directly settled at the time of sale. The early form of these warrants was for specific lots of a metal, later "general warrants" were adopted which gave title to a quantity of the specified grade of metal.<sup>12</sup>

These warrants did not trade on exchanges organized to facilitate trading in these contracts. Thus, resolution of legal disputes arising from trading in warrant contracts was obtained through the court system. Resolution of disputes through the courts proved costly. Obtaining a less costly route to

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<sup>10</sup> Since there is some possibility of default on these interest payments, the rate is likely to exceed the default-free rate of interest.

<sup>11</sup> One motivation for the formation of trading associations is to move arbitration of contract disputes out of the courts. See Milgrom, North and Weingast (1990) for an early example.

<sup>12</sup> Nevin and Davis (1970, p. 17-19) suggest that assignability of contracts developed much earlier. Thus, it would not be surprising to find similar contracts trading well before 1733.

handle trade disputes served as an impetus for the formation of exchanges and trading associations.<sup>13</sup> Section 7 of the Act incorporating the CBOT in 1859 provided that its arbitration decisions "have the force and effect" of the judgements of the Circuit Court.<sup>14</sup> A 1884 article in the Chicago Tribune illustrates the importance of this provision in lessening the cost of resolving trade disputes. The article compared the timeliness and cost of resolving the 1883 McGeoch contract dispute to the alternative of a court settlement. J.R. Bensley, receiver in the dispute, estimated that had the issue been resolved in the courts: "...it probably would have taken ten years to settle the estate, and probably the creditors would have realized about 15 cents on the dollar,..." Instead the dispute, involving contracts having a total value of six million dollars, was resolved in six weeks at a total cost, including legal fees and damages, of \$20,000.<sup>15</sup>

Ellison (1905, p. 15) records that trading in Liverpool began shortly after trading in "to arrive" contracts for cotton in London.<sup>16</sup> By 1802 the practice of warehouse inspections prior to offering a bid had become too time consuming and bids were based on samples brought from the warehouse. In 1826, the Liverpool market for "to arrive" contracts had developed to the point of attracting legal intervention: the case of Bryan v. Lewis determined that uncovered short selling amounted to wagering.<sup>17</sup> By 1832 a market report had become necessary to keep current with the Liverpool market. Published as the *General Circular*, the report "gave an account of the imports, sales, deliveries, stocks, and prices current..."<sup>18</sup> During the 1840's, buyers retained a right of inspection prior

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<sup>13</sup> For similar instances, see Powell's (1984) description of the development of arbitration in England.

<sup>14</sup> Quoted from Andreas (1894), III, p. 326.

<sup>15</sup> *Chicago Tribune*, 1-1-1884, p. 9.

<sup>16</sup> Ellison (1905, p. 15) reports that listed prices for "to arrive" contracts were recorded in London in 1781.

<sup>17</sup> See Dumbell (1927, p. 199).

<sup>18</sup> Ellison (1905, p. 292).

to completion of the transaction. This became cumbersome as the buyer could keep the cotton off the market until completing his inspection. The practice was replaced and the system of samples was augmented with credible assurances that lot quality matched that of the samples.<sup>19</sup>

Indications are that contracts were directly settled in the early years of the Liverpool market. Ellison describes the market prior to 1860 as follows: "The merchant sold his cotton through a selling broker; the spinner purchased it through a buying broker. There were brokers who bought and sold, but they were an exception to the rule, and comparatively few in number."<sup>20</sup> Preparation of market reports also indicates direct settlement. To obtain the amount of cotton sold: "The sellers furnished an account of all cotton sold, but the buyers returned only the purchases for export or speculation, the balance, after deducting these two items, being put down as deliveries to customers."<sup>21</sup>

There is evidence that measures were taken by members of the Liverpool Association to assure contract performance. The early measures were left to negotiation between counterparties to fit existing circumstances. Ellison (1905) describes an 1825 transaction involving the placement of "two letters of credit of \$50,000 each" on a contract for 6,000 bales of cotton estimated to be worth \$500,000. By 1871, the system of voluntary performance bonding was replaced by a rule stipulating performance bonding of all contracts. The necessity of an association rule to replace individual arrangements suggests that voluntary bonding had proved inadequate.

The effectiveness of Liverpool clearing methods is indicated by rule changes adopted at that exchange. Ellison (1905, p. 292-295) describes clearing problems as: "numerous disputes arising out of the gigantic speculative transactions developed by the occurrences incidental to the American [Civil] War." Dumbell (1927, p. 196) indicates that "the confusion of the war years forced the Association to prescribe for itself a constitution and a gradually increasing number of rules and bye-laws." Williams

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<sup>19</sup> Ellison (1905, p. 126-133). Williams (1982, p. 311, fn. 28) cites an 1864 market summary in the *Manchester Guardian* indicating that the Liverpool Association replaced contracting for lots with contracting for grades by 1864.

<sup>20</sup> Ellison (1905, p. 244).

<sup>21</sup> Ellison (1905, p. 292).

(1982, p. 306, fn. 2) finds a record of a vote on the adoption of Association rules on June 17, 1864 in their archives. Ellison (1905, p. 325-326) states that lack of grade standards created bargaining situations which contributed to contract-settlement problems: "At other times the importer would discover that his property had been sold 'short', in which case he would refuse to part with it except at a smart premium on current prices." These comments suggest that direct settlement of individually arranged contract terms used in the earlier years had proved unwieldy in the volatile markets of the 1860s. The members of the Association responded by standardizing contract terms, particularly grade standards. Grade standards increase contract fungibility. In terms of transfers of the underlying commodity, contracts became close substitutes for one another, increasing the ability to offset positions.

Contracts traded at the Buffalo Board of Trade appear to be the first instance of extensive futures contracting in the United States. These contracts arose as traffic in grain via the Great Lakes increased. The early market was limited to cash transactions financed by bank advances. The Buffalo Board of Trade was organized in 1844. Williams (1982, p. 310) documents an extensive futures market by 1847 stating that: "most often the forward sales considerably outnumbered sales of flour on the spot." Settlements were direct, Williams (1982, p. 314) describes them as "between pairs of parties."

The Buffalo Association adopted measures to ensure contract performance. Contracts were most often settled by payment of differences rather than delivery. Contract offset was obtained because "individual traders were themselves adept at enforcing the terms of contracts and keeping them comparable to others..."<sup>22</sup> Contract offset was assisted by standardizing deliverable grain with stipulations on the source of deliverable grain or flour. Market participants understood the quality implied by these locations, enabling them to substitute contracts for one another. Later the Chicago markets would adopt grain-quality standards. Both approaches increased the fungibility of contracts.

The measures proved effective. Williams (1982, p. 313) quotes Buffalo newspaper descriptions of that market's response to late-Spring ice on the Great Lakes. This ice prevented delivery on May contracts. Prices were high "...as contracts are interested in having high prices maintained that the

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<sup>22</sup> Williams (1982, p. 315) and see Williams (1986, p. 125).

damages for nonfulfillment of contracts may be corresponding." In other words, long positions expected full compensation. Apparently, this expectation was justified as a subsequent news account stated: "All the houses which contracted to deliver breadstuffs have so far settled without litigation or delay, except one, though the balances in many cases have been very heavy..."

Futures contracts for oil traded at several exchanges prior to formation of Standard Oil.<sup>23</sup> The rules of these exchanges indicate that settlements were exclusively direct. Rules of the Titusville Oil Exchange do not provide for other than direct settlement of its contracts.<sup>24</sup> The rules of the nearby Oil City Exchange likewise provide only for direct settlements.<sup>25</sup> A *Petroleum Age* article further describes contracting at the Oil City Exchange, stating "futures were regulated to suit the convenience of either party."<sup>26</sup> This lack of uniform contract terms would have impeded contract offsets except those between original counterparties. Proceedings from the 1883 annual meeting of the New York Petroleum Exchange indicate the extent of trading on that exchange. Cash transactions and futures contracts for 1.5 billion barrels were exchanged during 1882. That exchange stipulated standard contracts to be 1,000 barrels, giving some indication of the number of contracts exchanged. Like the Pennsylvania exchanges, these appear to have been directly settled, as the rules of the New York exchange omit provisions to enable more advanced clearing methods.

Rules for each of the petroleum exchanges contained provisions to control nonperformance risk. Rules of the Oil City exchange allowed counterparties to "call for mutual deposit on margin of not more than ten percent of the contract price." The Titusville and New York Petroleum Exchange had similar provisions. Similarly, contract nonperformance could result in suspension of trading privileges or expulsion from the exchange.

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<sup>23</sup> Weiner (1991) attributes the decline of petroleum futures to the development of the Standard Oil Trust in the mid-1890s. I am indebted to Rob Weiner who provided copies of most of the petroleum-futures references which are used here.

<sup>24</sup> General and Local Rules of the Titusville Oil Exchange, 1878.

<sup>25</sup> Constitution and By-Laws of the Oil City Oil Exchange, 1876.

<sup>26</sup> "Speculative Halls--The Oil City Oil Exchange," *The Petroleum Age* IV, no. 4, May, 1885.

To facilitate clearing of its contracts, the New York Petroleum Exchange engaged the Seaboard Bank as its clearinghouse agent. Its agreement with Seaboard, required each member of the exchange to complete a daily statement of "all Oil coming in and going out." This statement would be sent with a certified check "if the difference is against the sheet, or with the Oil, if the sheet shows more going out than coming in." Thus, payments were made when deliveries were accepted and oil certificates were presented when deliveries were made. Members not fulfilling these requirements were in default of their contracts and faced fines or expulsion from the exchange.<sup>27</sup>

Exchanges using more advanced clearing mechanisms generally permitted direct offset. The New York Produce Exchange required clearing through designated trust companies acting as its clearinghouse only for contracts held overnight.<sup>28</sup> Traders were entitled to directly offset any contracts made during the day.<sup>29</sup> Chicago Board of Trade rules permitted direct settlements even after incorporation of its clearinghouse. Morris Townley, CBOT counsel in an opinion rendered to the exchange's board of directors, states "...it is entirely lawful and proper for members to make trades, stipulating as between themselves that such trades are not subject to clearance through the Board of Trade Clearing Corporation. Such trades would be ex-clearing house and would be settled by direct delivery between buyer and seller."<sup>30</sup> Similarly, the Italian Bourse offered complete clearing as an option. Counterparties submitted contracts to the clearinghouse within three days of the trade to gain a

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<sup>27</sup> Kulp (1931) comments on these early petroleum-contract markets: "Now nothing remains of these early markets except the vague recollections of veteran oil men, who tell us that between 1870 and 1880 petroleum was so handled in nine cities in western Pennsylvania, and in Philadelphia, Cincinnati, Pittsburgh, Cleveland and New York."

<sup>28</sup> Exchange rules were developed to the point of considering the problem of failure of banks holding margin deposits. These rules stated that "the loss shall be borne by the party or parties to whom it may be found said margins are due, taking the average price of like deliveries on the day such Bank or Trust Company failed as a basis of settlement." The rule made ownership of the balance contingent on realized prices rather than providing the original depositor with a claim on the balance.

<sup>29</sup> Emery (1896), p. 66.

<sup>30</sup> Chicago Board of Trade, Board of Directors meeting 1-1-1926. Hereinafter cited BOD and the date. Williams (1986, p. 307) also concludes clearing through the clearinghouse was not mandatory until the 1920s.

clearinghouse guarantee. Otherwise, settlement was left to the original counterparties.<sup>31</sup>

#### B. Settlement by Ringing

Direct settlement limits settlement to the original counterparties. This is particularly important in the case of contract offset because the ability to obtain direct offset depends on the joint interests of both counterparties. Contract fungibility simplifies these joint interests. This simplification means that settlements for large numbers of contracts can be accomplished simultaneously. Ring settlements are relatively informal arrangements between three or more counterparties having an interest in settling their contracts. Incentives to enter a ring stem from reduced exposure to counterparty risk and from reductions in the cost of maintaining open positions. To achieve these benefits, participants in a ring were required to accept substitutes for their original counterparties. Exchanges adopted rules and practices which facilitated ringing settlements thereby enabling access to those benefits.

To illustrate settlement by ringing, consider four parties having positions in a contract requiring delivery of 5,000 bushels of wheat in May. A sold to B at \$1.00; B sold to A at \$.95; C sold to B at \$.97; and D sold to C at \$.93. The following table enumerates these positions.

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<sup>31</sup> I am indebted to Giorgio Szegö who described these aspects of early practices at the Italian Bourse to me.

**Table 1**  
**Summary of Contracts and Counterparties**

Counterparty	Buy Price	Sell Price	Profit (Loss)
A	.95	1.00	.05
B	1.00	.95	(.05)
	.97		
C	.93	.97	
D		.93	

The table details these transactions by counterparty. Long positions are indicated by entries under buy price. A short position is indicated by an entry under sell price. Profits (losses) based on directly settling the contracts are indicated for each transaction that reverses a previously listed transaction.

The three possibilities previously examined are available here; that is, contracts can be settled between original counterparties through deliveries, offset, or by standing rules for contract nonperformance. Thus, the two contracts between A and B can be directly settled through offset. A fourth possibility, settlement by ringing, becomes available provided each of the parties regard the contracts as fungible. Clearly, the contracts are fungible with respect to the commodity delivered and the date of delivery. Differences in the prices of the contracts can be settled as before at mutually agreed prices. However, complete fungibility requires acceptance of substitutes for original counterparties. Thus, B must regard the exposure stemming from a substitute contract with D as no worse than the exposure from his original contract with C. Given the equivalence of nominal contract terms and the substitutability of credit risk, the contracts are fungible and settlement by ringing becomes possible.

The equivalence of nominal contract terms is achieved by standardizing contract terms. The literature on contract standardization emphasizes the early development of standard deliverable grades.

Standardization was in the interest of participants in these markets because it created benchmark contracts. Absent nonperformance concerns, individual commercial interests can be restated in terms of the benchmark contract.<sup>32</sup> Trades in the benchmark contract can then substitute for trades in specific-but-similar commodities. Transactions in these separate and usually illiquid markets for specific commodities are replaced by transactions in a liquid market for the benchmark commodity.<sup>33</sup> The literature which recognizes the importance of contract standardization omits consideration of credit-risk concerns. Like the standard definition of futures contracting, this literature ignores the nonperformance option. Nevertheless, contract fungibility depends on the substitutability of counterparty credit risk.

Working through a ringing settlement helps to establish the importance of counterparty credit risk. A ring formed by the counterparties A, B, C and D would need to arrive at a mutually agreed price at which all contracts will be settled.<sup>34</sup> This price must produce payoffs identical to those obtained using the present value of the expected settlement in May. The most recent futures price provides this.<sup>35</sup> Taking the contract between C and D as the most recent price, the settlement price for the ring is .93. Reconstructing the previous table based on this price gives:

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<sup>32</sup> This practice is currently referred to as "pricing off the futures."

<sup>33</sup> The significance of the ability to transact in futures markets is demonstrated by a 1923 letter from a J.C. Wood. Wood compares transacting in the cash markets and the futures markets: "In other words, the service performed by the broker in the execution of orders for 'seller the month' or 'future month delivery' in the pit is an entirely different service than the service performed by the cash broker, whose work is largely specialized and carries with it technical knowledge and represents an expensive activity." BOD 11-23-1923.

<sup>34</sup> Counterparty D has no incentive to enter this ring as he has no contracts to offset. D is included to demonstrate that his interests are not damaged by the settlements arrived at within the ring.

<sup>35</sup> This is because arbitrage restricts futures prices to the cost of acquiring and financing a position in the underlying asset. Thus, the most recent futures price provides the current "cost of carry" for the underlying commodity. This price gives then the present value of a May settlement.

Counterparty	Buy Price	Sell Price	Profit (Loss)	Net Profit
A	.93 .95	1.00 .93	.07 -.02	.05
B	1.00 .93 .97	.93 .95	-.07 .02	(.05)
C	.93 .93	.97 .93	.04 .00	.04
D		.93		

From the table, A records a net profit of .05 and B records a net loss of (.05). Both of these amounts are the same as would be determined were their contracts directly settled.<sup>36</sup> Thus, as regards the profits and losses from their two contracts, A and B will be indifferent between settling directly and settling through the ring. C has opted to entirely offset his contract made with B, while B has opted to remain long in the contract. Recall that a system of direct settlements requires that both counterparties are willing to offset. To obtain a direct settlement, C might find it necessary to give up a portion of his .04 profit per unit in order to obtain an offset of the contract with B. A ring settlement enables C to avoid this bargaining problem, establishing a weak preference for settling through the ring relative to a direct settlement.<sup>37</sup>

The interests of counterparty B in the contract with C deserve special attention. Note that B loses his bargaining position with C upon agreeing to the ring's settlement price. In addition, B has a

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<sup>36</sup> This is true despite settling the contracts at .93 rather than at .95 as in the direct-settlement example. As long as all gains and losses are computed from the same price and payments are netted, the payoffs are the same for all closed contracts regardless of settlement price. Use of the most recent price eliminates loss and gain carryovers for contracts remaining open. Cox, Ingersoll and Ross (1981) show that the investment implication of nonzero carryover amounts for these open contracts can affect the cost of carrying a futures contract.

<sup>37</sup> The preference is weak because at a profit of .04 from direct settlement C is indifferent.

concern that his counterparty risk will increase. B's decision regarding counterparty risk has several dimensions. First, since C has an unrealized gain of .04, prices must rise .04 before B has any loss exposure. Replacing C with a substitute counterparty of equivalent creditworthiness at the current settlement price increases B's loss exposure. B will prefer a ringing settlement only if the new counterparty poses less credit risk than presently posed by C and his unrealized gain. This first dimension of B's decision dictates a preference for direct settlement.

The second dimension of B's decision compares his alternative counterparty risk absent C's unrealized gain. B's present counterparty risk is subject to the contract performance of D in that D's failure to perform can lead to C being unable to complete his obligations with B.<sup>38</sup> Thus, the extent of loss that B may suffer is conditional on the extent of loss that C incurs from his remaining open contracts. An informed decision by B requires information on the status of his positions with C and the dependency of those positions on all other contracts affecting C's performance. The exposure from directly contracting with D may be less than the exposure from a contract with C whose performance is dependent on the contract between C and D. To see this, consider two alternative contracts each having no performance dependencies. In a contract between B and C, C fails if state 1 occurs but performs in all other states. In a separate contract between B and D, D fails if state 2 occurs but performs in all other states. To obtain an upper bound on B's current risk, add the condition that C's performance on the contract with B depends on the performance of D. With these conditions, B suffers a loss on occurrence of states 1 or 2. In contrast, directly contracting with D reduces B's exposure to the occurrence of state 2 only. Thus, B's upper bound is decreased from its present level. This second dimension of B's decision is determined by the extent and importance of these dependencies. As they increase, B's preference for a ringing settlement increases.<sup>39</sup>

In addition to affecting counterparty risk, ringing can affect the cost of maintaining open

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<sup>38</sup> Counterparty D will also be concerned with counterparty substitution. As his concerns are the same as B's, the discussion which follows focuses on B's concern only.

<sup>39</sup> Although not explicitly stated, the example implies that these risks do not diversify away.

positions.<sup>40</sup> Maintaining margin deposits constitutes a significant portion of these costs. To illustrate, assume each counterparty maintains a margin deposit of .05 per bushel; that is, \$250 per contract. From Table 1: A and C have two contracts each, B has three and D has one. Margin deposits while these contracts remain open are: \$500 for A and C, \$750 for B and \$250 for D. With direct settlements, A and B would recognize that their cross exposures are nil so under direct settlement rules A deposits no margin and B deposits \$250 for his open position with C. Direct settlement does not reduce the deposits of C because his two contracts remain open. D maintains a \$250 deposit for his one open position with C.

In a ring settlement, D is substituted for C so that margin deposits are \$250 each for B and D and zero for A and C. Thus, absent ringing, C incurs the opportunity cost of maintaining deposits of \$500. With respect to their costs of maintaining margin deposits, A, B and D are indifferent between settling directly or through rings. C, on the other hand, has a preference for ringing.

Summarizing, A is indifferent between direct and ringing settlements. B's preference is determined by comparing the value of his bargaining power over C with his assessment of the effect that entry into the ring will have on his credit risk. C strongly prefers a ringing settlement as he avoids a weak bargaining position and reduces his cost of maintaining open positions. Finally, D shares counterparty substitution risk with B. Hence, the interests of B and C can be in conflict. An optimal ringing rule should enable C to improve his position without imposing costs on B or D. The exchanges obtained this result by recognizing ringing settlements while making entry into rings voluntary. However, the rules stipulated that once a ring was entered, its results were binding on its participants. From the above, B's minimum condition for entry into the ring is reduced loss exposure after a ring settlement. On satisfying this condition, B will enter the ring and allow himself to be bound by its settlements.

Rules enabling settlement through rings must provide finality for all offsets arranged through

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<sup>40</sup> These arguments for the cost of maintaining open futures positions closely follow Baer, France, Moser (1994).

rings. Referring to the above example, finality is obtained when neither B or D can enforce a claim against C should their substituted counterparty fail to perform. Exchange practice clearly intended finality.<sup>41</sup> The courts upheld the principle of offset finality in the case of *Oldershaw v. Knoles*.

Referring to the 1879 decision of this case in which a commission merchant arranged for a substitute counterparty who later failed, *Bisbee and Simonds* (1886, p. 158) state:

The customer was held bound by this similar transaction on the part of his commission merchant; because, in employing the merchant, the customer was taken as intending that the business should be done according to the custom or usage of that market, whether or not he knew of such custom or usage.

Thus, counterparty C could obtain offset in his original contract with B and be assured that termination of this liability was final. The finality established by this decision did not depend on either specific commodities or apply only to the original counterparties to the contract. Practice of the trade did not require delivery of specific lots nor did practice prevent commission merchants from obtaining contract offsets with substitute counterparties. As these practices facilitated trading of contracts to the benefit of customers, these customers could not choose to invalidate their contracts on the basis of these practices on realizing losses unrelated to these practices.<sup>42</sup>

To facilitate ring settlements, exchanges adopted centralized mechanisms for payments and deliveries. These arrangements performed like bank clearinghouses.<sup>43</sup> Counterparties realizing a loss following a ring settlement submitted a record of their offset contracts along with a suitable draft to the

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<sup>41</sup> An FTC report observed in 1920 that while counterparty substitution was implicitly "recognized in the rules of various exchanges, only in Chicago and St. Louis is it set up as a right of traders executing contracts." FTC II, p. 284.

<sup>42</sup> *Oldershaw v. Knoles* (4 Bradwell 63-73 and 6 Bradwell 325-333) built on two prior cases: *Horton v. Morgan*, 19 NY 170, an 1859 case in New York involving transfers of stock; and *Bailey v. Bensley* 87 Ill 556, an 1877 case involving CBOT futures.

<sup>43</sup> *Nevin and Davis* (1970, p. 6) indicate that similar clearing systems were employed by the French in the 13th century. Merchandise was bought and sold at fairs with transactions debited or credited accordingly by an on-the-spot banker. At the close of the fair, all transactions were cleared with settlement made in a single payment as needed between the banker and each merchant. This substantially reduced the number of necessary cash transactions.

clearing facility. These offset contracts were matched with the offset contracts submitted by counterparties realizing gains. The clearing facility credited a clearing account in the amount of drafts received and debited this account when it disbursed payments to counterparties realizing gains. Deliveries were made by passing warehouse receipts to the clearing facility which then passed them to parties taking delivery. Clearing fees were charged for each contract settled through the clearing facility.<sup>44</sup>

Although the earliest futures clearinghouses operated like CBCHs, the timing of this innovation suggests it originated with innovations in the clearing of stock transactions. The London Stock Exchange adopted a clearinghouse in 1874. Referring to that innovation, Stanley Jevons writes: "An important extension of the clearing principle was effected by the establishment, in 1874, of the London Stock Exchange, which undertakes to clear, not sums of money, but quantities of stock."<sup>45</sup> Ellison (1905, p. 341) refers to an operating clearinghouse for the Liverpool Cotton Association in 1879. Emery (1896, p. 69, fn. 1) says the Liverpool clearinghouse was adopted in 1876, stating that this was the first clearinghouse for a produce market.

Nevertheless, clearinghouse operations originated in banking and the operations of bank clearinghouses probably were an important influence in the development of futures clearinghouses. Spahr (1926, p. 70-71) dates the London CBCH to 1773. The London CBCH formalized clearing operations which previously took place between bank messengers frequenting bank-district coffee houses. Gorton (1985) and Gorton and Mullineaux (1987) study the economic forces motivating formation of the New York clearinghouse in 1853 as drafts on individual bank deposits replaced bank-issued claims on specie.

Like direct settlement, ringing leaves resolution of nonperformance to individual counterparties.

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<sup>44</sup> A case described by Parker (1911) suggests that demand for clearing services can be substantial. The membership of a German exchange in 1908 sought to avoid government regulation by moving the membership to another building and dropping its clearing house arrangements. Soon after, a private firm offered to clear settlements for those who chose to patronize it.

<sup>45</sup> Jevons (1903, p. 281-282).

This is illustrated by an extract from a letter by T. P. Newcomer to the Secretary of the Chicago Board of Trade. The letter complains that margins were collected for his positions by his broker. The brokerage firm did not meet its margin calls and subsequently failed. Newcomer accurately describes his position with the CBOT stating: "We understand your Board is not a collecting agency and do not expect you to get us our money..."<sup>46</sup>

A 1923 letter from the CBOT Rules Committee further describes the position of a trader with respect to the CBOT, stating:

That part of the regulation referring to the financial standing of a correspondent should be understood to mean that the principal should keep himself well informed, as business transactions between the two would warrant, as to the financial condition of his correspondent, so as to protect himself and the trade in general against any losses which might occur through the correspondent becoming insolvent.<sup>47</sup>

Thus, each counterparty retained responsibility for monitoring the financial condition of his counterparties and to collect from them any payments due. The exchange did not take on this responsibility.

The exchanges provided their members with several routes to control nonperformance risk. The first of these was margin. Like direct-settlement clearing systems, exchange rules enabled counterparties to call for margin. Two forms of margin deposit could be required of contract counterparties. The first, original margin, was generally limited to no more than ten per cent of the value of the contract at its most recent futures price. This established an upper limit on the level of liquid assets which an exchange member would need to maintain. The limit curtailed the ability of members to call for excessive amounts of margin in order to force a counterparty into default. Margin amounts were set by mutual assent; members calling for margin were required to post amounts equal

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<sup>46</sup> BOD 9-18-1900.

<sup>47</sup> BOD 10-2-1923.

to those called for on their positions.<sup>48</sup>

The second form of margin, sometimes referred to as variation margin, was based on the amount of the difference between the contract price and the current settlement price. This amount applied only to the counterparty with an unrealized loss from the contract. Amounts paid as variation margin were also kept on deposit, they were not paid out until the contract was offset.

The right to assess margin was well recognized by the courts. The Illinois Supreme Court, in the case of Denton *et al.* v. Jackson, held that absent an agreement between counterparties on margin, then the transaction was governed by the rules of the exchange. If the rules of the exchange enabled a call for margin, failure to meet a margin call put the counterparty into default.<sup>49</sup>

Exchange rules generally provided that margin amounts called from members had to be placed in accounts agreed to by the counterparties or with a bank approved by the exchange. A 1915 amendment to CBOT rules permitted members to fulfill margin requirements with cash or securities.<sup>50</sup> The rules stipulated the timing of these deposits with an expectation of rapid compliance. Rules often stipulated that margin amounts called for in the morning had to be deposited by early afternoon.<sup>51</sup> During this period the form used for customer-trade confirmation by Edwards, Wood & Co. Stock Brokers and Commission Merchants included a pre-printed notice that customer positions can be closed out "when margins are running out without giving further notice." Like most, this firm was

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<sup>48</sup> The CBOT attitude toward margin determination is expressed in a letter from a special committee which considered exchange-determined margin: "mandatory rules are impossible and that anything else would operate simply in the nature of a suggestion and would not only be unenforceable but ill-advised, because of the fact that each member of this exchange governs his transactions with his customers by his own ideas of credits." BOD 9-17-1912.

<sup>49</sup> Bisbee and Simonds, p. 150. The court went on to add that absent a contractual stipulation for margin and absent an exchange, common law enabled a call for margin. Under common law, a reasonable period had to be provided to meet the margin requirement before the contract could be regarded in default.

<sup>50</sup> The rule does not stipulate the types of allowable securities. This determination was left to the counterparties.

<sup>51</sup> The CBOT adopted a one-hour rule in 1887. It required members to meet calls for margin within one banking hour. Prior to that date three banking hours were allowed.

leaving no doubt that it could close out positions as it deemed necessary.

Failure to make a required margin deposit constituted a default on the contract. This provision enabled members questioning the ability of their counterparties to perform the terms of a contract to demonstrate financial ability by posting a suitable margin amount. Failure to post the margin was nonperformance, enabling members to curtail the accumulation of further losses and prevent gambles to resurrect net worth.

Rules requiring margin deposits were also facilitated by the clearinghouse. The ability to offset contracts and, thereby, substitute counterparties required notification rules. The clearinghouse kept track of contract offset, enabling identification of counterparties. However, because it was customary for commission merchants to not disclose the names of their principals, the commission merchants obligated themselves to fulfill the terms of contracts.<sup>52</sup> Thus, exchange rules generally regulated calls for margin between commission merchants and not their customers, the actual principals. The commission merchants, in turn, arranged for margin deposits from the actual principals. The calls for margin from actual principals who were not members of the exchange were not subject to exchange limits on margin requirements.

Periodic contract settlement, now referred to as marking to market, was not generally adopted by the exchanges. An exception was the Liverpool Cotton Association. Ellison (1905, p. 354-356) indicates that periodic settlements were adopted by that exchange in 1883 as a result of heavy broker losses incurred during a corner. Forrester (1931, p. 196-207) states: "Liverpool has weekly settlements; all outstanding contracts are reduced to a weekly settlement price and all differences must be cleared." Liverpool's adoption of periodic settlement followed its adoption at the London Stock Exchange. Forrester (1931, p. 196-207) indicates the motivation for both organizations was the same:

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<sup>52</sup> See Bisbee and Simonds (1886, p. 182-183). In 1894, the CBOT sought to control bucketshop operators by requiring brokers to name their principals. This would enable customers to determine if their orders had been filled on the exchange floor or simply bucketed. Failure to give the name was punishable by suspension or expulsion. See Lurie (1979, p. 227-228). However, the name given would be the principal's counterparty. Most often this was the commission merchant acting for the other counterparty, not the actual counterparty.

"to prevent plungers without capital and unduly optimistic speculators from proceeding so far as to hurt the market before a check is applied." Periodic settlement curtailed nonperformance losses in two ways. First, it lessened the probability of incurring a loss by imposing repeated demonstrations of financial ability to perform. Second, the accumulation of losses was curtailed.

Another route to control nonperformance risk was control over the financial integrity of exchange members. The CBOT took early steps to lessen credit risk by regulating membership on the basis of their financial ability. On March 27, 1863, its membership adopted a rule stating

Any member of the association making contracts either written or verbal, and failing to comply with the terms of such contract, shall, upon representation of an aggrieved member to the Board of Directors, accompanied by satisfactory evidence of the facts, be suspended by them from all privileges of membership in the association until such contract is equitably or satisfactorily arranged and settled.<sup>53</sup>

Thus, failure to comply with the terms of a contract could result in loss of a membership in the association, the value of this membership stemming from the right to trade contracts "on 'Change." The principle of controlling nonperformance through controlling membership was illustrated a year later in a debate over initiation fees: "The amount of initiation fee is not one of the questions taken into account when a man is proposed for membership. The character and standing of the applicant is the only matter for consideration."<sup>54</sup>

In 1873, the CBOT extended its efforts by making nonperformance of any contract, on or off the exchange, grounds for requiring a demonstration of financial ability. The rule states:

Any member of this Association who fails to comply with and meet any business obligation or contract, may, on complaint of any member of this Association, be required to make an exhibit of his financial condition on oath to the Directory of this Board, which shall be open to any aggrieved member; and should such member, failing as aforesaid, refuse to make such

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<sup>53</sup> Quoted from Andreas (1894), Volume III, p. 351. The following communication illustrates a typical settlement between counterparties. "We beg to advise you that a private settlement has been arranged on the Sept. Barley on which we yesterday reported default. This settlement is satisfactory to all parties concerned; consequently we ask that our request for the appointment of a Committee to determine a settlement price be withdrawn." BOD meeting 10-7-1919.

<sup>54</sup> FTC II, p. 72.

statement, he shall be expelled from the Association.<sup>55</sup>

Thus exchange rules provided the membership with routes to obtain protection from nonperformance losses. However, the usefulness of these measures depended on the ability to ascertain the risk that a counterparty will fail. This dependency weakened the effectiveness which could be offered by these measures. In particular, failure of one's counterparty could result from failure on a contract made by that counterparty with yet another member. Thus, like dominoes, contract failures could cause a string of seemingly unrelated counterparties to fail. The ringing system, because it left assessment of counterparty risk to individual members who lacked the ability to determine the exposures of their counterparties, was susceptible to these systemic failures. The 1902 bankruptcy of George Phillips serves to illustrate this problem. Losses from the Phillips bankruptcy reached the accounts of 748 members, over 42% of the CBOT membership.

The US exchanges generally permitted settlement of contracts by ringing. Arrangements for payments from counterparties varied between arrangements with banks to handle payments to adoption of a clearinghouse within the association. The CBOT developed a clearinghouse for the purpose of handling difference payments in 1883. A contemporary description of its operations stated: "It takes no cognizance of the transactions on the board, but simply plays the part of a common fund, to which each member pays the excess of his daily debit over his daily credits, or receives the excess in case the later aggregate be greater than the former."<sup>56</sup> This clearinghouse began operating on September 24, 1883. Summarizing its operations during its first fourteen weeks, Chicago's *Tribune* reported that 26,986 checks had been processed. That newspaper reported that under the previous system 260,000 checks would have been required.<sup>57</sup> The *Annual Report* for that year stated that the clearinghouse

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<sup>55</sup> Quoted from Andreas (1894), Volume III, p. 299.

<sup>56</sup> Chicago *Tribune*, 1-1-1884, p. 9.

<sup>57</sup> A newspaper report of check clearing by the Chicago Clearing Association indicates that growth in check clearings had declined. This was explained as due to the operations of the clearing house. Chicago *Tribune*, December 3, 1883, p. 6.

"meets a want which has long been felt by the trade." The *Annual Report* of the following year indicates that the initial role of clearing operations was limited, stating: "we heartily indorse the proposed system of checking trades through the medium of the same Clearing House force which was adopted last Saturday." The comment suggests that contract registration initially occurred only at contract settlement. Introduction of contract registration in 1884 extended clearing operations beyond the handling of difference payments and beyond the clearing operations conducted by banks. After this date, traders intending to clear contract settlements through the clearinghouse were required to turn in Check Slips at the inception of these contracts. This contract registration requirement provided the clearinghouse with a record of all outstanding contractual obligations.

The extent of clearing operations in the years before CBOTCC cannot be directly ascertained. Indications of activity by the CBOT clearinghouse are reported in a series of monthly reports to the Board of Directors. These provide the dollar amount of clearings occurring during the month for all contracts. Since the exchange did not report trading volume, the proportion of contacts processed through the clearinghouse cannot be determined.

Nevertheless, indications of the importance of the CBOT clearinghouse does come through in various communications. A 1906 letter describes the consequences realized by a member on being denied access to the clearinghouse: "It started a run on my firm. Those who had credits with us wanted their money at once, while those who owed us refused to pay, waiting, as some of them said, till they could settle for 10%."<sup>58</sup> In 1910 the exchange found it had to rely on its clearinghouse so that it could offer option contracts. Trading in "privileges", the early term for what are today called options on futures contracts, was prohibited by an Illinois anti-gambling statute. This put the exchange at a disadvantage as other states permitted trading of these contracts.<sup>59</sup> The exchange determined in

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<sup>58</sup> BOD 10-17-1906.

<sup>59</sup> In March, 1901 a group of members organized an exchange in Milwaukee partially to avoid the Illinois restriction on option contracts. See FTC II, p. 138. Subsequently, the CBOT felt that it was losing volume to this exchange and to the Winnipeg exchange which also permitted trading of option contracts.

1910 that the law did not restrict option trading if the investor held the underlying futures contract. To assure its compliance with anti-gambling statutes, the CBOT renamed these option contracts "indemnities" and required clearing of all indemnities through the clearinghouse. This enabled the clearinghouse to verify that counterparties to indemnity contracts had previously registered futures contracts consistent with their indemnity positions.

Other evidence points to an increasing role for the CBOT clearinghouse, thereby confirming its importance. A 1903 change to the rules required that loss or damages from defaulted contracts be paid through the clearinghouse. While this left determination of these amounts to the affected parties, their processing through the clearinghouse provided the exchange with a record of the performance of each of its members.

In 1917 the exchange altered its rules by requiring notification of the clearinghouse when a member was called for margin. The member making the deposit was required to notify the clearinghouse of his compliance. On failure to make the required margin deposit, the calling party had the right to offset the contract on the exchange floor. The defaulted contract then became "due and shall be payable through the Clearing House,...., the same as though the said contract had fully matured."

A federal stamp tax imposed during the first World War was charged on futures transactions. Members were required to report their transactions to Internal Revenue, the federal tax-collecting agency, so that tax assessments could be made. To verify their reported numbers of transactions, the clearinghouse was required to file reports with the agency giving total numbers of transactions. This implies that the majority of transactions were clearing through the clearinghouse.

Ringling, generally with a facilitating clearinghouse or bank, was the predominate method of clearing at the US exchanges. Emery (1896, p. 66) quotes from a copy of the clearing sheet used at the New York Produce Exchange: The clearing bank is intended "to facilitate the payment of differences

on the deliveries, direct settlements and rings of the previous day."<sup>60</sup> Rules for Lard and Provisions contracts traded at the New York Produce Exchange stipulated that on agreement to form a ring, the parties were compelled "to settle their differences on said contract with each other, on the basis of the settlement price." This rule bound exchange members to the settlements reached by the ring. The New York Cotton Exchange, established on April 8, 1871, used direct and ringing settlements with no clearinghouse until 1896.<sup>61</sup> Boyle (1931) describes clearing at the New Orleans Cotton Exchange. The exchange organized on September 19, 1871 allowed contracts to "be settled through the Clearing House of the Cotton Exchange, or by offset between members, or by ringing out and paying only the balance due." The London Corn Exchange relied on ringing settlements.<sup>62</sup> The New York Coffee Exchange allowed ring settlement.<sup>63</sup> The London Metal Exchange continues to use the ringing method to the present day. Forrester (1931, p. 196) describes the London Metal Exchange as follows:

There are two classes of members: (1) the ring members, who are principals and deal direct; and (2) the brokers and dealers, who, although members, are without those privileges. There are 40 seats in the ring, but the membership is 155, including 94 firms.

### C. Settlement with Complete Clearing

Complete clearing interposes the clearinghouse as a counterparty to each side of every exchange-traded contract. Contracts agreed to on the floor of the exchange and accepted for clearing require the clearinghouse to take the buy side of every contract to sell and the sell side of every contract to buy. This role substitutes the credit risk of the clearinghouse for the credit risk of individual counterparties. Thus, contracts exchanged in a complete clearing system are completely fungible: grade standards imply that commodities underlying contracts are the same and complete clearing implies that

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<sup>60</sup> It is not clear when the New York Produce Exchange adopted a clearing bank. Trading at that exchange began in 1877. A *Chicago Tribune* article summarizing business developments in 1883 reported that the New York exchange formed an in-house clearinghouse on October 29, 1883 on a three-week trial basis. The operation halted after the trial period.

<sup>61</sup> Emery (1896), p. 68

<sup>62</sup> Forrester (1931).

<sup>63</sup> Huebner (1911), p. 301.

all contracts have equivalent credit risks.

The following table adds the clearinghouse as counterparty to the contracts used to illustrate the ringing system.

**Table 3**  
**Illustration of Complete Clearing**

Trader	Buy Price	Sell Price	Profit (Loss)	Clearinghouse		
				Buy Price	Sell Price	Profit (Loss)
A	.95	1.00	.05	1.00	.95	(.05)
B	1.00	.95	(.05)	.95	1.00	.05
C	.93	.97		.97	.93	
D		.93		.93		

The first four columns repeat Table 1. The three columns on the right of the table give the clearinghouse position in each of these contracts. The clearinghouse can be seen to take the opposite side of each contract. Naturally, these contracts offset one another in performance states. Thus, in states of the world where nonperformance options expire unexercised, the final outcome from a complete clearing system is identical to that of a ringing system. The routes taken by payments do differ in a complete clearing system. In complete clearing, the cash payment made by A goes to the clearinghouse. The clearinghouse, in turn, makes a cash payment to B. However, since the cash flows of counterparties A and B remain unchanged, A and B are indifferent between a ringing settlement and complete clearing. Thus, from the perspective of A and B, the complete clearing system operates like a ringing system augmented by a clearinghouse to facilitate payments between counterparties.

Contrasting this offset with that made through the ringing settlement, B's original and substituted counterparty is the clearinghouse. Recall that B's minimum condition for entering a ring settlement was a reduction in counterparty loss exposure. Provided a choice between ringing

settlements and settlements through a complete clearing house, B again requires lower loss exposures as his minimum condition for accepting complete clearing. With complete clearing, B is assured of no contract dependencies. A result which, in itself, will frequently obtain reduced loss exposure. Given B's participation in a ringing settlement, counterparty C's ability to offset his contract with B is unchanged by the adoption of complete clearing. C prefers complete clearing when it reduces his dependence on B's decision to participate. Otherwise, C is indifferent between ringing and complete clearing. Finally, like B, D's preferences are determined after comparing the loss exposures obtained from each settlement arrangement.

Treating the adoption of a clearing system as a permanent choice, B will prefer a complete clearing system if he expects his loss exposure from the clearinghouse to be generally less than that typically obtained from ringing arrangements. While some counterparties may pose less exposure than the clearinghouse, the avoidance of contract dependencies obtained by complete clearing will frequently imply lower loss exposures than those realized with ringing arrangements. Electing to not adopt a complete clearing system implies that B regards the proposed complete clearinghouse as a greater risk than his typical counterparty.

C's consideration of these alternative clearing systems focuses on his cost concerns. C can anticipate the increased costs he incurs each time that B elects to not participate in ringing settlements. C is indifferent between clearing arrangements provided B's participation is assured. Complete clearing makes C's offset automatic rather than at B's option, thus C's vote is entirely based on his higher expected costs under a ringing system.

As all traders can expect to find themselves on occasion in B or C shoes, ballots for the adoption of complete clearing express a consensus of the members' assessments of the net values of these future loss exposures and cost savings. Traders favoring adoption of complete clearing will be those who can either expect substantial savings on their margin deposits or generally less counterparty loss exposure. Traders having modest required margin deposits will expect little savings from adoption of complete clearing. If these traders can also sufficiently manage their counterparty loss exposures

through a ringing system, they will lack incentives to vote for adoption of a complete clearinghouse.

Once adopted, complete clearing shifts the realization of nonperformance losses to the clearinghouse. The loss-sharing arrangements made between members of the clearinghouse serve to allocate any losses among these members. Their need to control loss exposures from nonperformance motivates the clearinghouse to adopt measures which reduce its exposure to nonperformance risk.

The adoption of rules by the clearinghouse is constrained in two ways. First, the additional cost of adhering to clearinghouse rules cannot exceed the value added from adoption of a complete clearing system. Thus, members exert an external influence on clearinghouse decisions. Second, clearinghouse loss-sharing arrangements imply loss exposures from all open contracts. Members will avoid any loss-sharing arrangement which does not adequately compensate for this risk. As lack of participation in the loss-sharing arrangement implies the clearinghouse is nonviable, this results in internal pressures on clearinghouse decisions.

The internal pressure motivates pricing of clearing services in order to compensate participants in the loss-sharing arrangement for their exposure to losses from contract nonperformance. However, compensatory payments reduce the value of benefits obtained from complete clearing creating external pressure to limit rates of compensation. The compensation rate for the complete clearinghouse is its contract-clearing charge per unit of loss exposure. Pricing its services at a level which just satisfies its external pressures, its rate of compensation can be controlled by adopting trading rules which limit loss exposures. However, as trading rules impose explicit and implicit costs, these costs when added to the clearing fees would invoke external pressure against the clearinghouse. Hence, adoption of contract rules requires clearing fees at or below the indifference point of a majority of members. The clearinghouse satisfying this externally imposed boundary price will find its marginal condition is met when reducing clearing fee revenues just equals the incremental cost stemming from a rule change.<sup>64</sup>

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<sup>64</sup> This marginal condition presumes that most members are indifferent to an addition or loss in the number of members. If additional members are valued, the sum of clearing fees and the cost of rules may need further reduction to offset the value lost when members dissatisfied with the cost structure leave the exchange.

Parties to the clearinghouse arrangement will be those members who find this rate of compensation adequate for the level of exposure which results. Risk neutral clearinghouse members will demand compensation just equal to expected losses.

The analysis here suggests that adoption of complete clearing systems would stem from needs to reduce counterparty exposure and to lower the cost of maintaining open positions. The following comment provides direct evidence of the importance attached to reductions in margin costs. After the Kansas City exchange adopted complete clearing an observer contrasted its complete clearing with its former arrangements, stating:

Under the system the tying up of large sums of money in margins, in event that a long or short on the other end refuses to 'ring out,' is avoided. Thus, an evil which tends to concentrate future trading into the hands of the stronger firms is eliminated.<sup>65</sup>

At times, exchange members avoided the cost of carrying these balances by simply not conforming to rules requiring quick responses to calls for margin. The following 1920 complaint from the Rogers Grain Co. to the Board of Directors of the CBOT illustrates:

This rule has practically become a dead letter with many. Very few members put up margins until after the close even though they are called at Nine O'clock in the morning, while the rules provide that margins shall be put up and evidence is submitted of same within one hour....<sup>66</sup>

This response reduced the cost of carrying margin balances, but increased nonperformance risk and, notably, further elevated margin requirements to safeguard against this risk.

Complete clearing systems originated in Europe. Emery (1896, p. 71-72) indicates that European coffee exchanges featured complete systems. In France, a complete clearinghouse was referred to as a *Caisse de Liquidation* and in Germany as a *Liquidationskasse*. Hirschstein (1931, p. 213) indicates that after 1924 the produce exchanges of Germany adopted complete clearing systems modelling them on a system used for many years by a futures exchange operating in Hamburg. De Lavernge's (1931, p. 218) description of French clearing is consistent with the system described by

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<sup>65</sup> "The Exchanges of Minneapolis, Duluth, Kansas City, Mo., Omaha, Buffalo, Philadelphia, Milwaukee and Toledo," *Annals of the American Academy of Social Science*, 1911, p. 227-252.

<sup>66</sup> BOD 10-26-1920.

Emery in the late 19th century:

To replace the collateral security which might theoretically be required, but in fact is not, there has been set up at some of the exchanges a bureau of settlement (Caisse de Liquidation) in the form of an independent corporation. Such bureaus are attached to the exchanges at Havre, Lille, and Roubaix, as well as the sugar exchange at Paris.

When a contract is entered into, the function of the bureau of settlement is to substitute for the original contract between buyer and seller, two new and distinct contracts--one between the bureau as buyer and the original seller, and the other between the buyer and the bureau as seller. As a result of this operation, the individual buyers and sellers have no direct relations with one another, but each has a contract with the bureau.

In the United States, officials of the New York Coffee exchange proposed to copy the clearing system used in the European coffee exchanges, but the proposal was rejected--apparently more than once.<sup>67</sup> Complete clearing was first adopted by the Minneapolis Chamber of Commerce in 1891.<sup>68</sup> That exchange, later renamed the Minneapolis Grain Exchange, was first organized in October 1881. The adoption of Rule VI in 1891 implemented its complete clearinghouse:

Section 1. All transactions made in grain during the day shall be cleared through the clearing association, unless otherwise agreed upon by the parties to the transaction. Upon acceptance by the manager of such transactions, the clearing association assumes the position of buyer to the seller and seller to the buyer in respect to such transactions and the last settling price shall be considered as the contract price.<sup>69</sup>

The operation of the Association's clearinghouse is described as follows:

Most of the larger firms own memberships in it and it has been found to be almost a vital necessity to the trade. Certainly it insures less friction than the old way of trading and also facilitates business generally. When the trades are checked at the close of the session the member gives a check to the clearing house for margins or in case the market has fluctuated in favor of their customers they receive a check. It does away with a great deal of trouble. To settle with the clearing house at a certain time every day is a far different matter than calling each other for margins.<sup>70</sup>

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<sup>67</sup> Emery (1896), p.72.

<sup>68</sup> See FTC II, p. 17. I am indebted to Lester Telser who provided this reference.

<sup>69</sup> FTC II, p. 146.

<sup>70</sup> Annals (1911), p. 232.

Rule VII provided the Chamber of Commerce with the right to control its exposure to nonperformance risk by requiring margins. The rule states:

Section 1. The manager of this Association may call from purchasers below the market and from sellers above the market such reasonable margins as in his judgement may be necessary for the protection of the association. Such margins to be placed to the credit of the party paying the same and to be retained by the manager, in whole or in part, as he may deem necessary until the trades for which such margins have been paid have been settled.<sup>71</sup>

The Board of Trade of Kansas City (Missouri) was organized in 1869, but by the mid-1890s was regarded as unsuccessful. In March 1899, the Kansas City exchange organized a Board of Trade Clearing Company modeled after the clearing corporation of the Minneapolis Chamber of Commerce. Referring to control over its exposure to nonperformance risk, George G. Lee, clearinghouse manager said: "As the clearinghouse is responsible for all trades put through it, close tab must be kept on the position of each member." The clearing manager of the Kansas City exchange had wide latitude in setting margin requirements.<sup>72</sup> The Duluth Board of Trade, first organized in 1881, incorporated its clearing association in 1909 with rules patterned after those adopted by the Minneapolis Association.<sup>73</sup>

The complete clearing systems established in the United States prior to 1925 all followed the Minneapolis model for loss sharing. Each was incorporated with share purchases limited to members of the exchange. Shares entitled clearing members to clear the trades of the exchange and to charge for this service. No other members were permitted to clear trades. Incorporation limited the loss to the owners of the clearinghouse to the value of their shares and the sum of their deposits held by the clearinghouse.

#### D. Evolution of clearing systems

This section summarizes the three methods of clearing. Markets employing these methods have certain commonalities. Each market sought to increase the ability of members to obtain contract offset. This ability increased the benefits which could be derived from transacting in benchmark

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<sup>71</sup> FTC II, p. 146.

<sup>72</sup> Annals (1911), p. 227.

<sup>73</sup> FTC II, p. 158.

commodities rather than making similar but more costly transactions in the actual commodities.

Participants in direct settlement markets were able to offset contracts provided they could be assured of the performance of their counterparties. The rules developed by markets relying on direct settlement systems were responses to the problem of contract nonperformance. The intent of these responses was to lessen the frequency and extent of nonperformance problems. Successfully avoiding these problems moved the members of these exchanges closer to obtaining full contract offset. The two most common rules adopted were exchange arbitration of disputes and the right to collect margin deposits. Arbitration of disputes through the exchange avoided the slower and more costly resolutions available through the civil courts. Provision of the rights of a member to collect margin moved this source of protection from a right under common law where adequate time had to be allowed for the posting of the required margin. Making the right to require margin a right of membership, enabled quicker access to this protection as well as establishing margin nonperformance as a contract default. This later feature enabled members to protect themselves against further build up of nonperformance exposure.

Ringing systems took advantage of the increased contract fungibility obtained from the adoption of standardized contract terms. Participants in a ring could be assured that the nominal terms of all contracts entering the ring were identical. Thus, offsets could be obtained by ring participants who accepted an externally imposed settlement price and who were willing to accept the loss exposures implied by substituted counterparties. The benefits obtained from ringing were the reduction in contract dependencies and reductions in the cost of maintaining open positions. This later reduction coming principally through lower margining requirements as contracts were offset. Thus, access to these features enabled members to be more cost efficient in their control over nonperformance risks. Exchange rules adapted by binding the participants to every ringing settlement to the agreements made by the ring.

Complete clearing established contracts as completely fungible. As every contract accepted by the clearinghouse involved the clearinghouse as a counterparty, the credit risk of every contract was

identical. Exchanges created clearinghouses as synthetic members of the exchange. Members of the clearinghouse became participants in a loss-sharing arrangement. Faced with nonperformance risk, clearinghouses adopted rules to limit their exposures to nonperformance losses and sought compensation for exposures remaining.

Thus, clearing evolved from arrangements negotiated between individuals to rules imposed by the exchanges. Flexibility lost during the course of this evolution resulted in lower risks of contract nonperformance and lower costs of maintaining open positions. The memberships of these acted in a manner consistent with Smith and Warner (1979); that is, by binding themselves to externally determined rules they achieved lower rates of contract default and lower costs of operation.

#### **IV. Development of the CBOTCC**

By 1900 precedents for operation of the CBOTCC were established. Complete clearing was well established at several exchanges in Europe and the United States and procedures enabling clearinghouse control over their exposure to nonperformance risk had been developed. In 1903, some members of the CBOT saw a need for establishing a system of complete clearing. Two impediments were generally recognized to its adoption. First, anti-gambling statutes prohibited trades which lacked an intent to deliver. Since the clearinghouse became a counterparty in all contracts, a clearinghouse delivery intent was necessary to avoid the charge that its contract positions were wagers. As this intent was clearly absent, the operations of the clearinghouse could be construed as gambling and, therefore, illegal. Second, complete clearing required regular disclosure of the positions taken by members of the exchange.<sup>74</sup> Once these impediments were removed, the exchange moved to a system of complete clearing. In the interim, the members approved a series of measures which increased the importance of the existing clearinghouse.

The first of the objections to complete clearing was resolved in May of 1905 by the US Supreme Court in the case of the Board of Trade v. The Christie Grain and Stock Company. Writing for the majority, Justice Holmes comparing direct settlement with settlement through a clearinghouse,

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<sup>74</sup> Emery (1896), p. 89.

wrote:

The contracts made in the pits are contracts between the members. We must suppose that from the beginning as now, if a member had a contract with another member to buy a certain amount of wheat at a certain time and another to sell the same amount at the same time, it would be unnecessary to exchange warehouse receipts. We must suppose that then as now, a settlement would be made by the payment of differences, after the analogy of the clearing house. This naturally would take place no less that the contracts were made in good faith for actual delivery, since the result of actual delivery would be to leave the parties just where they were before. Set-off has all the effects of delivery...

The fact that contracts are satisfied in this way by set-off and the payment of differences detracts in no degree from the good faith of the parties, and if the parties know when they make such contracts that they are very likely to have a chance to satisfy them in that way and intend to make use of it, that fact is perfectly consistent with a serious business purpose and an intent that the contract shall mean what it says.

The decision implied that the stated intent of a contract to deliver sufficiently distinguished the contract from a wager. Thus even though the process of clearing might involve transactions lacking a delivery intent, the original intent of the contract predominated. Hence, methods used by the exchanges to clear contracts could not detract from the legitimacy of their business purpose.

Exchange records of 1903 refer to a petition listing twenty-plus signatures proposing the adoption of a new system of clearing. The system proposed was referred to as the Horsford System.<sup>75</sup> Action on this proposal was slow. In 1907 the committee assigned with formalizing the Horsford proposal reported out. Their plan stipulated that "The Clearing-House at the end of each day will (unless the contracting members otherwise agree) be substituted as the buyer from the seller and the seller to the buyer in every contract, and so remain until such contract is performed or settled." The proposed initial capitalization was \$1,000,000 to be obtained from sale of shares to members of the exchange. As protection from nonperformance losses, the plan enabled the proposed clearing house to collect margins in accordance with standing rules between members. There is no record that this

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<sup>75</sup> Extensive efforts were made to identify the source of the term "Horsford" which in one reference is referred to as "Hosford." A Henry E. Hosford & Co., a commission brokerage firm, is listed as holding a membership in 1878 which was suspended in 1880. I was unable to locate a document associating the proposal with this individual.

plan ever came to a vote.<sup>76</sup>

Subsequent proposals for changes to the system of clearing were voted on by the CBOT membership. The dates of these votes and their vote tallies are as follows:

**Table 4**  
**CBOT Ballots for Changes to Clearing System**

Date of Vote	Number Voting For Adoption	Number Against Adoption
September 25, 1911	75	656
January 11, 1915	272	528
October 4, 1920	228	502
January 27, 1922	418	423
September 3, 1925	601	281

The table indicates that interest in changing the CBOT system of clearing was increasing.

Rule changes proposed in the 1911 ballot would have reformulated clearinghouse procedures, but did not incorporate the clearinghouse.<sup>77</sup> Contracts would be offset through the clearinghouse at the daily settlement price and irrespective of counterparty. Thus, the identity of counterparties would not be known. The proposal included daily cash settlements with collections by the clearinghouse. In addition, the clearinghouse would collect margins on all open positions. Thus, with respect to measures to control the extent of nonperformance losses, the clearinghouse would have functioned as a complete clearinghouse. However, the proposed clearinghouse would not offer guarantees of contract performance. The proposed rules were clear on this: "in no case shall the said clearinghouse, its officers, or the Association incur any liability thereby except for the prompt payment and accounting of the moneys so received." In the event of default, the proposed clearinghouse would take control of

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<sup>76</sup> BOD 10-20-1907. The committee report includes a revenue projection for the proposed clearing house based on a yearly average for the previous six years for the standing clearing house. Their projection of \$73,680.45 in revenue implies the standing clearing house had averaged 1,473,609 grain contract clearings per year.

<sup>77</sup> A letter to the Board of Directors dated October 30, 1923 contradicts this, listing the vote on this date as considering incorporation of the clearing house. The proposal voted on does not indicate that incorporation was under consideration.

all the deposits of the defaulting member and distribute them on a *pro rata* basis to all members involved in contracts with the defaulting member.<sup>78</sup> Thus, the 1911 proposal arranged for loss sharing among the counterparties of a nonperforming member. Additional rules stipulating margin and daily marking of contracts to market were intended to limit the extent of losses which might be incurred.

No description of the 1915 proposal is available. At the annual meeting on January 11 of that year it was noted that the petitions had hung for a number of weeks and that a large number of members were against it.<sup>79</sup>

In 1917 a proposal was under consideration to amend CBOT Rule XXII, adding a section 8. The change would incorporate the clearinghouse with the intention "that said Clearing House Corporation shall become substituted as the seller to each buyer, and the buyer to each such seller."<sup>80</sup> Proposed initial capitalization was \$2,000,000. Should capitalization fall below \$750,000, the exchange would revert to its previous method of clearing trades. Rule changes included provisions for margin assessment by the clearinghouse and daily marking of contracts to market. Before the proposal could come to a vote, the US entered the First World War. Herbert Hoover, appointed U.S. Food Administrator, wrote the Board of Directors on August 14, 1917 requesting that the exchange halt trading in wheat futures. Interruptions in trading futures during the war years appear to have led to tabling of the clearinghouse proposal.

The 1920 ballot considered adding a section to CBOT Rule XXII to incorporate a clearinghouse.<sup>81</sup> The proposal required the clearinghouse to "assume the obligations" of contracts made on the exchange. Stockholders of the clearinghouse were entitled to clear trades in proportion to the number of shares held in the corporation. The CBOTCC would hold a first lien on the shares of its

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<sup>78</sup> BOD 7-20-1911.

<sup>79</sup> BOD 1-11-1915.

<sup>80</sup> BOD 8-27-1917.

<sup>81</sup> This left intact rules providing for the existing methods of clearing. Should the clearinghouse fail, these rules would enable the clearing and settlement of trades to continue under the previous system.

stockholders. In the event of failure of a clearing member, this lien enabled the CBOTCC to sell the member's shares in the clearinghouse using the funds obtained to cover the loss. Were these funds inadequate to cover the loss, the remaining members could choose between supplying additional funds or liquidating their shares. Thus, the loss-sharing arrangement under this proposal was limited to clearing members; their losses would be in proportion to the number of trades cleared, but liabilities were limited to the amount of capital. The rules of the proposed clearinghouse, particularly its dividend restrictions, indicate the clearinghouse would have a fund of \$500,000 available to cover its liabilities. The proposal included provisions to limit the extent of losses. Margins would be required on all open contracts and all contracts were to be marked to market daily.

The Grain Futures Act, more often referred to as the Capper-Tincher bill, was signed by President Harding on September 21, 1922. The Act gave the Department of Agriculture regulatory authority over the futures exchanges.<sup>82</sup> To implement its authority, the Grain Futures Administration published Miscellaneous Circular No. 10 on June 22, 1923. The Circular specified the general rules and regulations for the oversight role of the GFA.<sup>83</sup> The Circular documents two primary activities of the GFA. First, it was to collect and record information on trading activity occurring at the exchanges. Second, it was to monitor the policies of the exchanges.

To implement the first of these roles, the Circular stipulated that clearing members provide daily reports of their aggregate futures positions and their cash transactions stemming from these positions. The exception to aggregation of trading activity came when the net position of an individual trader exceeded GFA-specified levels. In these cases, the clearing member was required to report the aggregated trades of these individual traders. If trades were not made through a clearing member, individual traders were required to provide this information. Thus whether reported by clearing members or the individual traders, the reporting arrangement would alert the GFA to a developing

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<sup>82</sup> See Lurie (1980) for a description of the events leading to enactment.

<sup>83</sup> The *FTC Report on the Grain Trade* had noted the difficulty in determining trading activity giving the Minneapolis Chamber of Commerce as the exception. This exception was attributed to the clearing system used by that exchange. *FTC II*, p. 7.

corner or squeeze.

This implementation of reporting requirements had two aspects which favored the clearinghouse proposal. First, the aggregate cost of reporting information to the GFA was substantially less if reports were completed by clearing members only. The contract registration requirements of the clearinghouse provided all needed information. Second, because in most instances clearing members were required to report only their aggregate positions, the GFA would have no record of the trades of individual traders. This aspect of the regulation removed the remaining objection to adoption of a complete clearinghouse. Traders could choose between revealing their trades to a clearinghouse operating under control of the exchange or to the Department of Agriculture.

Initially, the CBOT continued to resist federal oversight. After the Grain Futures Act was signed into law, the exchange filed a case testing its constitutionality. On April 16, 1923, the US Supreme Court sustained the legislation.

The 1922 complete-clearing proposal was being considered as the Capper-Tincher bill was debated. This one-paragraph proposal would have inserted Section 9 1/2 into rule XXII. The section treated the clearing house as an artificial exchange member stating: "If such clearing corporation shall be substituted in trades for members of this Association, such clearing corporation shall have all of the rights, and be subject to all the liabilities, of such members..."<sup>84</sup> The absence of further specifics in this proposal suggests that they did not differ substantially from that voted on in 1920. A newspaper report on the day of the balloting summarized the strong points of the proposal, stating: "the new plan could be used as the basis of taxes and would also answer requirements of the Capper-Tincher bill that certain records be kept." The tax referred to in the newspaper account is the stamp tax collected on futures transactions. The reporting requirements of the Capper-Tincher bill were the reporting requirements which would later be spelled out by the previously described Department of Agriculture Circular. The newspaper report also summarized the position against the clearing house proposal. According to John Hill, Jr., "the average 'pit trader' might be technically guilty of violating the 'bucket

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<sup>84</sup> BOD 1-19-1922.

shop' law of Illinois."<sup>85</sup> This was because substitution of the clearinghouse for original counterparties might be construed as a futures transaction. As this transaction would not take place in a trading pit, it might be regarded as a bucket trade. Illinois law prohibited these. However, the 1905 Christie decision would appear to invalidate this construction: if transactions made in the course of clearinghouse operations could not be construed as wagers, it is difficult to conceive of these same transactions as bucket trades.

Over the next two years, the Board of Directors' attitude toward adopting a complete clearinghouse was mixed. A petition dated July 1, 1925 which came before the Board requested balloting on an amendment to Rule XXII to enable establishment of a general clearing corporation. The Board denied the petition with the explanation: "The subject has been before the membership on a number of occasions and defeated in every instance." An editorial appearing in the *American Elevator and Grain Trade* remarked that by making the comment, the Board risked losing the support of Secretary of Agriculture Jardine who was, they reported, "staving off tinkering legislation."<sup>86</sup>

Despite the attitude of its Board of Directors, member interest in complete clearing was evident. CBOT members voted on September 8, 1924 in favor of a proposal to establish a cotton contract on that exchange. Specifications for this contract, which began trading on December 12, 1924, included a requirement that all trades in that contract be cleared through a complete clearinghouse established solely to clear cotton contracts. This clearinghouse, referred to as the Chicago Cotton Clearing Corporation, began its operations on January 10, 1925. Bylaws for the corporation required a guaranty fund, formed from contributions of the stockholders of the corporation. Members could clear contracts in proportion to their contributions to the fund. Section 19 of the Bylaws provided that the liabilities and rights of buyer and seller were to be assumed by the Clearing Corporation once the trade has been accepted. To control its risk, contracts were marked to market daily. Price limits of two cents per bale were specified which limited the payment amounts which could be assessed. Clearing members were

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<sup>85</sup> *Chicago Daily Tribune*, 1-27-1922.

<sup>86</sup> "Rubbing it in," *American Elevator and Grain Trade*, 8-15-1925, p. 94.

required to post margin as determined by the Board of Directors, but no less than \$3.00 per bale nor more than \$25.00 per bale. Margin amounts were to be deposited in approved banks. In addition, the clearing manager could call for margin "to meet the variations in the market at any time during the day."<sup>87</sup> The attitude of members toward complete clearing is expressed in a comment of A.T. Martin, Cotton Committee member, who wrote: "The committee feels that a broader interest will develop in cotton as soon as the general clearinghouse plan becomes operative and speculative conditions in cotton become more attractive."<sup>88</sup>

A corner in early 1925 prompted Secretary Jardine of the Department of Agriculture to step up the campaign for exchange reforms. Among these reforms was a complete clearinghouse. At the Toledo meetings of the Ohio Grain Dealer Association (June 23 and 24, 1925) CBOT president Frank Carey reported formation of a special committee to consider the Jardine proposals.<sup>89</sup> This committee sent questionnaires to the 1600 members of the exchange. The preface to the questionnaire stated the concern to be addressed was the wide price swings encountered when the "heavy trading of a limited number of professional speculators" becomes exaggerated by "large participation on the part of the public." The questionnaire then asked for comments on measures to limit these price fluctuations. The committee asked how positions might be disclosed, whether positions should be limited, whether option trading should be prohibited, and whether price changes should be limited.<sup>90</sup> Responses to the questionnaire were positive. The Directors of the CBOT once again put the clearinghouse issue before the membership for a vote.

On September 3, 1925, the CBOT membership approved changes to the Bylaws to provide for a complete clearinghouse. The clearinghouse would be organized as a corporation with 1,000 shares

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<sup>87</sup> A letter from the president of the clearing corporation in August 1925 argued that minimum margins were not required during "dull markets" and suggesting that contributions to the guaranty fund be counted toward margin requirements between clearing members. The proposal was not adopted.

<sup>88</sup> BOD 12-14-1925.

<sup>89</sup> *American Elevator and Grain Trade*, 7-15-1925.

<sup>90</sup> "Acts to Prevent Wide Price Swings," *American Elevator and Grain Trade*, 7-15-1925, p. 28.

authorized at a par value of \$2,500 each. Clearing members were authorized to clear trades in quantities proportionate to the number of shares held in the corporation. Once the clearing corporation accepted a trade "the buyer shall be deemed to have bought such commodity from the clearinghouse, and the seller shall be deemed to have sold such commodity to the clearing house." Section 54 of the document includes a restriction on the liability of the CBOTCC, specifically: "If any check given by any member to the clearing house under section 53, fails to certify on the following morning, all trades made by such member on the previous day shall be deemed rejected by the clearinghouse, and the clearing house shall not be substituted on such trades." Thus, the clearinghouse guarantee would not generally begin until the following business day. To control its nonperformance risks, contracts would be marked to market daily and margins would be set by the clearinghouse. General margin amounts were limited to ten percent of contract value, but individual members could be assessed larger margins where "the market position or financial standing of a particular member is such as to render his trades as unduly hazardous,..." These extra margin provisions required a three-fourths vote of the Clearinghouse Governors. In addition, the rule changes included price limits; the effect of these limits being a restriction on the amount of price change which could be marked to market. This restriction thereby limited the settlement amount which could be called for by the clearinghouse.

A status report to the Board of Directors dated November 2, 1925 states that 680 shares in the clearinghouse had been sold, giving a total capitalization of \$1,600,000. By that time three or four members of the previous clearinghouse indicated they did not intend to subscribe, while "about a dozen new names were added." A meeting of the Board on December 29, 1925 handled the staffing needs of the new clearing house: the retirement benefits of the employees of the former clearinghouse were transferred to the corporation.

The CBOTCC began operating on January 4, 1926. CBOT president Frank L. Carey, commenting on the beginning of operations, said: "For ten years this proposal had from time to time been the subject of lively discussion." Clearing of wheat contracts at the CBOTCC began on Saturday, January 30, 1926.

Thus, the CBOT adopted complete clearing once the anti-gambling and privacy objections were met. The GFA did not impose complete clearing. The clearinghouse proposed in 1911 would have satisfied the contract-reporting requirements of the GFA without providing performance guarantees. The exchange had pursued improvements of its clearing facilities for years. The GFA Circular, like the earlier Christie decision, removed an objection to the adoption of a complete clearinghouse. It did this by nullifying the privacy objection. Once the privacy objection was overcome, exchange members adopted complete clearing.

Prior to adoption of complete clearing provisions, exchange rules left control over nonperformance risk to individual counterparties. Members were required to monitor their counterparties and control their exposure through the protections offered by the rules of the exchange. The pre-1926 clearing arrangement enabled protection against contract nonperformance provided all contracts made with a counterparty were known. The inability of members to adequately monitor the net exposure of a counterparty to all other contracts proved insurmountable when contracts were cleared through rings. Adoption of complete clearing shifted control over nonperformance from individual members of the exchange to the clearinghouse. This shift was accomplished by creating a synthetic counterparty endowed with the ability to monitor the net exposure of all its counterparties. Combining this information advantage with previously developed mechanisms to control nonperformance risk substantially reduced both the incidence of nonperformance and the extent of losses realized from nonperformance.

The motivation to develop complete clearing is similar to that of the banking industry. Gorton and Mullineaux argue that bank clearinghouses organize available information more efficiently than separate markets for the drafts on individual accounts. These authors argue this development is consistent with equilibria described by Coase (1937). Evidence of this consistency is drawn from two banking environments: non-panic and panic. During non-panic times, clearinghouses collected and disseminated information on the ability of member banks to meet the payment obligations imposed by drafts drawn on the accounts of these banks. This organization provided a low-cost substitute for

information reflected through market-determined prices for drafts. During panics, bank clearinghouses adopted a supervisory and regulatory role; in effect, internalizing the costs of industry failure and acting to minimize these costs. Specifically, they provided liquidity through the provision of collateralized loans and disciplined members with expulsion from the clearinghouse.

Complete clearing organizes credit-risk information at the level of the futures clearinghouse. During non-panic times, complete clearinghouses collect information on the ability of exchange members to meet their potential payment obligations. The performance guarantee offered by complete clearinghouses motivates the incorporation of this information into contract specifications to obtain reductions in the risk of contract nonperformance. Incorporation of this information substantially lessens the risk of nonperformance loss, increasing the value of futures contracting. During times of financial crises, complete clearinghouses are empowered to further reduce their exposure to nonperformance risk by imposing additional margin requirements on individual members. This action decreases the risk of market failure. Thus, complete clearinghouses, acting to protect their own interests, increase the value of futures contracting by reducing the realization of losses from contract nonperformance. The realization of these benefits owes much to the centralization of information. Thus, like Gorton and Mullineaux, the clearinghouse arrangements of futures exchanges can be interpreted along the lines offered by Coase (1937). They replace the information flows offered by market-determined contract prices with a centrally coordinated information flow. Unlike the CBCH however, this information is not disseminated, but incorporated into contract specifications so as to lessen losses from contract nonperformance.

## **V. Summary**

Futures contracts are defined as substitutes for associated cash transactions. This definition enables a discussion of the evolution of controls over nonperformance risk. Three clearing methods are discussed: direct, ringing and complete. The incidence and operation of each is described. Direct clearing systems feature bilateral contracts with terms specified by the counterparties to the contract. Exchanges relying on direct clearing systems serve chiefly as mediators in trade disputes. Ringing is

shown to facilitate contract offset by increasing the number of potential counterparties. Increased ability to obtain contract offset is valuable because counterparties can reduce the number of dependencies of their outstanding contracts and can reduce the costs incurred by maintaining open positions. Entry into a ring settlement was voluntary; but on joining the ring, exchange rules bound the participants of the ring to its settlements. Exchanges which cleared through ringing methods generally adopted a clearinghouse to handle payments.

Complete clearing interposes the clearinghouse as counterparty to every contract. This measure ensures that contracts are fungible with respect to both the underlying commodity and counterparty risk. Exchange members benefit from complete clearing because contract offset is automatic rather than dependent on counterparty interest in offset. The loss-sharing arrangements of the complete clearinghouse produces exposure to loss from every open contract. Members of the clearing house respond by requiring compensation for this risk. As the amount of this compensation reduces the value of complete clearing, the amount of this compensation is bounded. Participants of the loss-sharing arrangement will substitute rules for pricing up to the point where the marginal value of risk reduction obtained from rules equals the marginal benefit from compensation.

Development of the CBOTCC is discussed. Two principal objections to adoption of complete clearing were anti-gambling provisions and privacy. The Christie case overcame the gambling concern. The GFA overcame privacy concerns by giving the exchanges a choice between reporting their trades to the Department of Agriculture or to an exchange-controlled clearinghouse. Once these objections were overcome, the members of the CBOT adopted a complete clearing system.

The success of the CBOTCC may have obscured its contribution to the development of present-day financial institutions. Because contract failure is generally infrequent and losses from these failures seldom disrupt markets, little attention is paid to the clearinghouses of the futures market. Despite this lack of attention, the development of clearing systems which provide contract surety to a diverse group of counterparties is striking. Recent regulatory expressions of concern involving credit risk in the rapidly evolving OTC, or "swap", markets demonstrate the importance of contract surety.

Efforts by participants of the OTC market to obtain greater contract surety are similar to the efforts made toward this end in the early years of the futures industry. OTC operators face the additional obstacle of mimicking too closely the features of futures contracts which are aimed at lessening nonperformance risk. Should OTC contracts look too much like futures contracts, present legislation dictates they will be subjected to the regulatory burdens faced by the futures exchanges. Thus, like the early developments in futures markets, attempts to minimize counterparty risk in today's OTC markets are constrained by the existing legal structure.

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