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OWNERSHIP OF ELECTRONIC COMMODITY EXCHANGES

by

David L. Holder, Allen B. Paul,
and Thomas L. Sporleder

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David L. Holder is Program Leader, Livestock and Meat Marketing, Extension Service, U.S. Department of Agriculture.

Allen B. Paul is Senior Economist, Farm Sector Economics, Economic Research Service, U.S. Department of Agriculture.

Thomas L. Sporleder is Professor, Department of Agricultural Economics, Texas A&M University.

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Summary and Conclusions

Organized exchanges are common institutions in the developed economies of the world. Most of them are owned by users (buyers and sellers), some are owned by governments, and few are owned by "outside" investors. There are also a few combinations. Each exchange is somewhat unique in the way it functions and in its performance. The optimum form of ownership cannot be specified in general terms. The optimum depends, among other things, on the structure and conduct of firms within a particular industry and the performance criteria used to evaluate the ownership form.

Users are the most likely ones to initiate an exchange because they are intimately involved in the marketing process, see the needs, and can often design means of meeting those needs to the satisfaction of both buyers and sellers. User ownership rather than investor ownership might result in greater availability and better quality of information. However, quality is partly a function of share of the commodity traded on the exchange, and investor or government exchanges may have greater volume. Investors may not be as close to the problems which at times gives them the advantage of a fresh perspective. They may have somewhat greater problems than users in generating support for new exchanges, but as investors, they probably have greater access to capital and other sources for overcoming these difficulties. They also have fewer limits on membership and could achieve greater exchange usage. Because of this potentially greater volume, investor or government owned exchanges

are likely to have the greatest impact on the market structure and competition. This would be especially true of a government owned exchange that required traders to use it.

Government usually assumes some responsibility for facilitating commerce and ensuring fair business practices in organized exchanges. In most environments this can be done without direct ownership. Government might, however, need to provide risk capital or tax incentives to get an exchange started. Government might also provide operating capital if the expected social benefits exceed the private benefits but private benefits do not equal or exceed private costs. Moral suasion and other rhetorical encouragement may also be applied.

Electronic exchanges have the potential for improving performance of agricultural markets by increasing operating and pricing efficiency, providing more competitive markets, and distributing benefits more fairly to producers, processors, and consumers. Some improvement will inherently depend on the type of ownership, but most of the results will depend on how the owners themselves design and operate the exchange within a particular market environment.

OWNERSHIP OF ELECTRONIC COMMODITY EXCHANGES

Introduction

Electronic commodity trading began with teletype and telephone auctions in the early 1960's, but received little attention until the 1978-81 period when the U.S. Department of Agriculture co-sponsored five pilot projects. These projects centered around the technological and economic feasibility of computerized electronic trading. Ownership was not a matter of major concern during the experiments. It was either retained by the public agencies involved in the projects or vested in a few cooperating firms. Once the testing period was over and commercial application was anticipated, however, ownership became a very important consideration.

This manuscript considers several ownership alternatives and examines the impact of each one on the trading process itself and on the performance of electronic trading systems. After a brief overview of electronic trading, a description of various types of ownership arrangements is offered with examples of operating exchanges. Finally, the effect of ownership on certain exchange functions and performance factors is evaluated.

Brief History

An electronic exchange includes electronic communications equipment, such as telephones, computers, and teletypewriters, plus established uniform trading procedures to enable buyers and sellers to negotiate transactions from several remote locations (2, pp. 25-42).

The concept was first applied to agriculture in 1961 when the Ontario (Canada) Pork Producers Marketing Board instituted a teletype system to sell hogs to all major packers in the Province. The Board was given legislative authority to require all packers in the Province to buy Ontario hogs through the marketing system developed by the Board. It devised a system that offers virtually every hog produced in the Province over a teletypewriter terminal in each major packing house. Bidding is conducted in a "Dutch" auction which starts at a price slightly above the market price and descends in five-cent-per-hundredweight intervals until a packer pushes his "bid" button. The sale is then confirmed and the next lot of hogs is offered.

Since 1961, two other Provinces have tried the teletype approach for hogs, but only the Ontario system is still in operation. The other Provinces seemed to lack sufficient buyer competition to maintain an effective electronic exchange.

The first U.S. electronic exchange began in 1963 when the Virginia Department of Agriculture developed a teleauction to sell slaughter hogs to packers in Virginia and nearby States. The teleauction consisted of an ascending price auction conducted over a conference telephone call with an auctioneer and several buyers. Since 1963, teleauctions have been adapted to sell feeder pigs, feeder cattle, slaughter cattle, and slaughter sheep and lambs in several States.

In 1971, Egg Clearinghouse, Inc. established a telephone-computer exchange for eggs. In 1975, Plains Cotton Cooperative Association began a sophisticated remote access computerized exchange to connect several Texas cotton

gins with major merchants. Other electronic exchanges developed and tested include HAMS for slaughter hogs in Ohio, and CATTLEX for feeder cattle in Texas, EMA for slaughter lambs in several States, and CATS for wholesale meat nationwide (4).

The application of telecommunications and computer technology to agricultural marketing provides a mechanism for giving large numbers of buyers and sellers access to one another without having to physically assemble people or products, or both, in one location as is done in traditional markets.

Several trends could encourage the expanded use of electronic marketing. These include: (1) higher transportation and labor costs encouraging the minimization of physical movement of personnel and products; (2) fewer buyers in local areas causing sellers to want to contact more distant buyers; (3) the need to generate reliable market information that is available to all traders as former sources of market information, mainly traditional terminal markets, continue to disappear.

Need to Analyze Ownership Alternatives

Most agricultural applications of electronic trading have been limited to relatively small geographic areas or small numbers of participants. Groups of producers dissatisfied with existing market conditions have implemented electronic systems designed to meet their particular needs. Generally, these systems have not realized their full potential for bringing all buyers and sellers in the Nation or a major region together

into a single market. In such a market a trader would enjoy instantaneous accurate information about the whole market as well as simultaneous contact with all relevant buyers and sellers. The market would be very competitive.

Organizing and operating such a market would require the cooperation of a large number of traders and interest groups with a diversity of goals and objectives. Producers could take the initiative through marketing cooperatives or other producer organizations, or non-cooperative firms could initiate an electronic exchange. In either case there would likely be rivalry among marketing firms, even among marketing cooperatives. In most areas the task of getting these diverse interests to support a single electronic exchange would be difficult. Furthermore, electronic trading may facilitate more direct marketing, making the services of many cooperative and non-cooperative market agencies obsolete.

Cooperative processing plants also could hinder the development of an electronic exchange by keeping products out of the open market. Likewise, non-cooperative processors could use production contracts to procure a supply of raw material thereby eliminating the usefulness of an open market for the farm product.

At the heart of the problem of bringing these opposing forces together, this question ultimately must be faced: who will own and control the exchange? More specifically, who will decide trading rules? Who will decide collection and payment procedures? Who will determine grade standards and attending discounts and premiums? How will the benefits

of the exchange be distributed? Who will have access to the information generated by the exchange?

Different types of owners will approach the design and implementation of electronic trading with different perspectives and objectives. Each will seek to design a system that meets his or her own objectives. Conflict among industry participants is likely and a compromise will be necessary. For example, producers usually are interested in obtaining access to more buyers and having more information. They believe this will result in higher prices for them. Buyers, on the other hand, usually would like to keep local markets segmented and keep access to information limited. Electronic marketing could increase competition and raise procurement costs to buyers. It is likely, therefore, that producers would design the system differently than buyers. Yet it is possible for both to gain if the design recognizes these natural conflicts. In fact, both must gain if the market is to be successful.

How, then, should these exchanges be owned? The remainder of this paper explores the alternatives and the consequences.

Ownership Defined

Ownership in a broad sense can be defined as the "collection of rights to use and enjoy property, including the right to transmit it to others" (1).

Property may be corporeal or incorporeal, tangible or intangible, visible or invisible. It has value if others want to have access to the rights associated with the property. These rights are established and protected

by government, and owners may sell them or give them away either temporarily or permanently, voluntarily or involuntarily (1).

In a dynamic society the value of rights and access to them can change. Owners may voluntarily sell rights or give them away. The transaction may be permanent or for a specified period of time. Government may take old rights away or give new ones. The rise and fall of pressure groups can also change access to rights. As rights are given to individuals, groups, or government, the owners lose degrees of control over their property. In effect, they have less than full ownership of their property.

Owners of an electronic exchange have a certain bundle of rights to use and enjoy the benefits of the exchange. These include the rights to: (1) buy and sell assets; (2) hire and fire employees; (3) establish and change trading rules; (4) establish, collect, and change trading fees; (5) distribute profits; (6) select buyers and sellers to be given access to the exchange; (7) release information and select the receivers; and (8) dissolve the exchange.

Some of these rights are limited by government regulations such as those that deal with futures markets, antitrust, fair trade practices, and income taxes. Others are limited by contracts that the owners of the exchange make with buyers and sellers that use the exchange. This paper will refer to owners as the primary decisionmakers and beneficiaries of an exchange but it should be understood that their ownership is never complete.

Types of Owners

An electronic exchange could be owned by users, investors, government, or some combination of the above.

Users

Owners of an electronic exchange may be the buyers or sellers who use it. These could be the primary sellers such as farmers, or the buyers that process the commodity, or buyers that act as traders to assemble merchandise and resell it. Brokers also could be the exchange users, trading on behalf of sellers or buyers.

An exchange owned by its users would be organized and operated as a mutual company, mutual exchange, or cooperative. Each user would invest capital and would be charged fees to cover operating costs. "Profits" would be either retained for essential reserves or distributed to users on the basis of their patronage of the exchange, or fees may be kept low to minimize the exchange's profits. The objective of the users is to provide themselves with a valuable service at cost.

Many electronic exchanges for agricultural commodities are owned by sellers. Producers faced with a declining number of local buyers have invested in electronic marketing to improve competition for their cotton, lambs, hogs, feeder pigs, feeder cattle, and other commodities. Some of these have been implemented with government (State and Federal) assistance. But government has not undertaken any of these projects with the intention of owning or operating them on a permanent basis.

An existing commodity exchange with expertise in cash and futures markets could consider an electronic market as a means of increasing access to its cash markets and eliminating physical inspection and handling of commodities on the trading floors. Processors or handlers might initiate a system to decrease the cost of contacting a large number of sellers and coordinating the flow of products through their facilities.

Other variations of the user-owner approach include a trade association representing either buyers, sellers, or both that invests on behalf of its members and uses any exchange "profits" for their collective benefit. Also, an established producer cooperative could organize and own an electronic exchange and not distribute profits on a patronage basis for users of the exchange itself but could distribute profits for the general welfare of all cooperative members.

The user-owner approach has some advantages. The buyers and sellers are often the first ones to realize a marketing problem exists because they use the market on a regular basis. They are the most interested in overcoming a problem because they already have a major investment in the industry. They should be quick to make changes in the marketing system to fit their emerging needs when profitable to do so. In addition, group action could generate substantial support for implementing an electronic exchange. This support could include financial commitment of capital to the new market and commitment of product necessary to generate sufficient operating revenues. Substantial user investment in a marketing system may result in substantial loyalty to make it succeed.

The user-owner approach is not without costs and risks. Experience shows that sellers have spent considerable amounts of time to organize electronic markets and to convince others to use them. Sellers have also been abused at times because other market interests have tried to thwart their efforts with various threats and with higher prices to non-participants. Sometimes producers cannot count on going back to their former marketing system if the new one fails. Hard feelings, for example, may block the restoration of old trading relationships, or old trading firms and facilities may be removed from service.

Investors

This second category of owners includes those who invest primarily for the purpose of making a profit from the operation of an exchange. Being a buyer or seller would not be a condition for ownership, and profits would be distributed to the owners on the basis of investment, not patronage.

Several types of investor owners are possible for an electronic exchange in agricultural products. These would be people or organizations that see an opportunity to profit by offering a service that takes advantage of modern telecommunications and computer technology to improve various commodity markets for buyers and sellers.

A market news firm, for example, might view an electronic exchange as a way to improve the efficiency, accuracy, and timeliness of its data collection and dissemination services while at the same time offering buyers and sellers a more efficient means of conducting transactions.

An existing commodity exchange might use its experience and resources in futures and cash markets to branch into electronic cash commodity markets and expand the scope of its marketing systems to include more than its regular members. An existing marketing firm might offer an electronic means of bringing buyers and sellers together.

Government

A State or Federal agency might develop, own, and operate an electronic exchange to achieve some desired socio-economic goals. The services might be provided at cost or include some level of subsidy because the value of the service extends beyond the immediate users. For example, the government might subsidize an electronic exchange because it would provide market information to all market segments. The subsidy could be at least partially offset by savings from eliminating the current system of information collection and dissemination if the electronic exchange included a substantial portion of the commodity being traded.

A subsidy also might be justified if the use of an exchange reduced the government's antitrust costs. An exchange, for example, might enable smaller buyers and sellers to compete more effectively with larger ones because an electronic exchange eliminates some of the advantages of large size. It gives smaller sellers and buyers the same market access and information that larger buyers and sellers often enjoy. The electronic exchange could also provide an "audit trail" for judging the conduct of firms in the market. This public policy issue could be evaluated on the basis of whether the subsidy costs to taxpayers would be less than the public benefits from creating a more competitive market.

Combinations

An ownership combination might occur when two parties each can bring some unique advantages to a marketing system. The most likely combinations of ownership would probably involve government with either a user or investor group. Government could provide some of the risk capital for system design and development and some rules to enhance the system's chances of success. A user group could encourage trader participation and provide experienced management. An investor group could provide risk capital and experienced management.

Examples of Organized Exchanges

An "organized exchange" consists of a qualified group of traders that buy and sell in accordance with an explicit set of rules. Each trader has equal and ready access to all other traders in the exchange and to information generated by their transactions. An electronic exchange would be an organized exchange. It would accomplish most of the same functions as exchanges organized before the electronic revolution.

A variety of exchanges are reviewed in this section. The list is not intended to be complete. Rather, these exchanges were chosen to demonstrate different types of ownership and operating procedures and the relationship of ownership to organization and functions performed.

New York Stock Exchange (NYSE)

The oldest and largest U.S. exchange dealing in securities is the New York Stock Exchange, a non-profit unincorporated association of persons, mainly commissioned brokers, who buy and sell stocks and bonds for others.

Some members trade for their own account, such as specialists and dealers who have the responsibility to "make a market" in particular issues. That is, they stand ready to buy or sell to any one at a price a little below or above the last price. A membership is a personal franchise even though its purchase may be largely financed by the firm in which the person is a partner. That is, the person can retain the membership even if he or she departs the firm, providing the firm is reimbursed.

Control over the affairs of the NYSE, its rules, regulations, services, and investments, is vested in the membership and delegated through a grant of authority to the Board of Governors elected by the membership. The Board consists of members (one of whom is chairman), the president (who must not be a member), and public representatives. In addition to the president, the Exchange has a large staff of other paid employees whose services are subject to the direction of the board or the standing committees. Legal title of the property of the exchange is vested in all the members collectively. There can be no proportional division of property. The real estate is held by a corporation whose stock is owned by the NYSE.

Various committees oversee the day-to-day operations of the exchange. For example, there is a committee on member firms which sees that members observe the regulations of the exchange. A committee on floor procedures sees that Exchange and the U.S. Securities and Exchange Commission (SEC) rules governing floor procedures are observed. A board of arbitration is available to constitute working groups to settle disputes, and an executive committee coordinates the work of these and other committees.

A most important function of the exchange is to protect the public against loss from insolvent members. It monitors the minimum capital requirements of member firms, arranges for the merger of weak brokerage houses, and raises a special fund to save brokerage houses and to reimburse customers who lose money when they fail. The importance of this security function was underscored during 1969 and 1970 when stock prices gyrated widely. The Exchange through its president and standing committees intervened directly into the affairs of 200 member firms which is over one half of the members that had dealings with the public (3, p. 327).

Federal regulation of the NYSE began with the 1934 Securities Exchange Act which impowers the Securities and Exchange Commission (SEC) to regulate trade practices (short-selling, floor trading, insider information, insider trading, concerted buying and selling to move prices, etc.). The oversight is accomplished through a private body, the National Association of Security Dealers, which the SEC holds accountable for seeing that the brokers and dealers adhere to Federal rules.

Foreign Stock Exchanges

The London Stock Exchange differs from the NYSE in several significant respects. Its membership is not readily transferable--a nomination to membership must be obtained from a retiring member. Upon acceptance by the exchange, the candidate purchases the seat and three members must become sureties for him for the first four years. Memberships are for 12 months but subject to re-election.

Dealer and broker businesses must not be joined together. A dealer must always bid (offer) a price on a security if someone wishes to sell

(buy). Before 1954, only some members of the London Stock Exchange were its proprietors, and they collected all of the profits. In 1954, a reorganization abolished this feature and compensated the proprietors. The Exchange is currently owned and controlled by all the members.

In other European countries the security exchanges are under more direct governmental control. In Milan the rules governing stock exchanges are fixed by law and supervised by the government. In Amsterdam the stock exchange is a private association but it is subordinate to the finance minister. Commercial banks are members and many transactions are made in these banks and not on the exchange. However, all such trades are based on official quotations and governed by exchange regulations.

The Paris bourse has a three-tier market: the stock broker operating in the "official" market is a sworn government employee who must not trade for his own account or give advice on what stocks to buy or sell. In the "curb" market and in the "free" market, private commission agents execute trades in securities not listed on the official market. New shares are first listed on the free market and then, after seasoning, they move to the curb market. Ultimately, they may be listed on the official market.

The Chicago Board of Trade (CBOT)

The organization of the Chicago Board of Trade is in many respects similar to the NYSE described above. However, because it deals in time contracts that may extend well into the future, the clearinghouse has a central role in the financial performance of the system. It assumes legal responsi-

bility for each and every contract and requires initial margin deposits and daily (intra-day) "margining to the market." It will liquidate contracts if margin calls go unheeded.

The clearinghouse is organized as a non-profit corporation. Its stock is owned by CBOT members who are large active traders or dealers and who can meet the large financial requirements of the clearinghouse. The salaries and other expenses of the clearinghouse are met by clearance fees on the transactions cleared.

Internal control is vested in the Board of Governors and an extensive system of committees. Some committees are appointed by the board and consist only of board members, other appointed committees consist of members at large. Finally, the membership elects certain committees.

Public control over the affairs of the CBOT has become greater over time. The Illinois Warehouse Act of 1870 increased the integrity of the warehouse receipt which was most commonly used to satisfy grain futures contracts at delivery time. In 1922, an agency in the Department of Agriculture (the Grain Futures Administration) was set up to monitor all grain exchanges and gather information about their operations.

In 1936, the agency was given broader powers and renamed the Commodity Exchange Authority (CEA). These new powers included the authority to promulgate and enforce rules such as limits on speculative trading.

The CEA could also audit the books of futures brokers handling customer deposits. In 1974, an independent agency, the Commodity Futures Trading Commission (CFTC), was created. Its powers were further enlarged and for the first time extended to all things traded on futures markets.

An important control principle was adopted in 1968 legislation. It gave the CEA explicit power to require exchanges to enforce their own rules. Thus, a new facet of public control emerged. It recognized that commodity exchanges usually have a host of rules and regulations for equitable dealing but that these are not necessarily enforced. The government now requires that such rules and regulations be enforced by exchanges--a power that remains to be clarified and tested in the courts.

Thus, ownership of this venerable institution, the Chicago Board of Trade, remains as a private association of trade interests--buyers, sellers, and their agents--but it has progressively been subject to more public scrutiny and control. How to best exercise that scrutiny and control still remains to be solved because the CFTC has too few resources to effectively discharge all the functions it now has. In 1981, the CFTC designated the newly formed National Futures Association (NFA) as a self-regulatory body of futures commission merchants and other persons associated with futures trading. Membership will be more or less mandatory. NFA will formulate and oversee rules of conduct and function similar to the National Association of Security Dealers for stock brokers.

British Commodity Exchanges

Organization of British commodity exchanges is much like U.S. commodity exchanges except for variations in the guarantee system. There is little public supervision over the exchanges with respect to what is traded on futures, the maximum size of individual positions, the fairness

of trading, the handling of customer funds, minimum financial capacity of futures merchants, and settlement of claims of small traders against their brokers. The Bank of England has come to exercise a general oversight of the British exchanges because of its general powers over the flow of foreign exchange which is such an intimate part of British commodity markets. In short, more scope is given private industry to operate as it chooses.

Growing out of historical circumstances, a private for-profit organization, known as the International Commodities Clearinghouse Ltd. (ICCH), was founded in 1888 by continental financiers. Since World War II, it has become a wholly-owned subsidiary of United Dominions Trust Ltd. It performs clearing and guarantee functions for several futures exchange organizations currently trading in coffee, sugar, cocoa, soybean meal, and wool. This commercial firm performs daily clearing of accounts, assigns deliveries, makes payments, and requires margin on all unsettled contracts just as the clearinghouses of U.S. exchanges do.

Because ICCH serves several futures exchanges (including exchanges of Sydney and Paris), it can readily balance off the various debits and credits accruing to a given brokerage firm's accounts on different commodity exchanges and arrive at a net position requiring margin deposits.

A different type of organizational system to guarantee accounts is reflected in the London Metals Exchange. There is no exchange operated clearinghouse and no margins are required of the exchange members on open contracts they hold; rather a relatively small club-like group of brokers and

dealers who are quite selective of who they admit to membership, look to each other's credit-worthiness and occasionally bring moral suasion to bear on a member who acts imprudently in assuming futures commitments.

Pacific Commodity Exchange (now defunct)

In August 1972, a for-profit commodity exchange was started in San Francisco to foster futures trading in coconut oil, crude palm oil, nest-run eggs, live cattle, silver, and other commodities. A total of 660 shares were sold for about \$1 million. After about three years of trading, the venture ceased. Opinions on why the venture failed vary. The exchange incurred a high cost structure because of heavy investments in modern trading facilities and high legal expenses. It ran into unforeseen problems in developing trading volume. Trading in coconut oil ran into difficulties in 1974 as floor traders lost heavily, anticipating a price break that did not materialize, and the clearing members lost considerable money. The nest-run egg contract turned out to be inherently squeezeable and other contracts did not attract traders. Because of a lack of money, the exchange's surveillance procedures were found wanting by the CFTC, and it feared that exchange ownership could wind up in the hands of a few vested interests.

TELCOT

TELCOT is a large electronic exchange using a central computer and remote terminals to trade about 35 percent of the Texas and Oklahoma cotton crop. For the 1981-1982 season it creates a central market for 20,000 producers using terminals located in about 450 cotton gins and in the offices about 50 major cotton merchants.

TELCOT was initiated in 1975 by Plains Cotton Cooperative Association (PCCA) to reduce its price risks in buying and selling producer members' cotton. Such risks were very nominal prior to 1971 when prices were stabilized at the support level, and PCCA concentrated on being a very efficient cotton merchant. The cooperative provided a weighted average price bid on any member's lot of cotton at any participating cooperative gin at any time a producer wanted to know the value of his cotton. PCCA was obligated to purchase the cotton whenever a producer wanted to sell and could not obtain a better price. Constantly fluctuating prices since 1971 complicated the problem of keeping a current bid at 175 cooperative gins for about 3,500 different classes of cotton. PCCA bought too much cotton when prices were declining and too little when prices were increasing (5, pp. 169-70).

The computerized TELCOT network solved this problem for PCCA and improved the marketing system. Producers now can obtain an instant estimate of the value of their cotton at any participating gin. If they decide to sell, they have several options: auction, firm price offer, forward contracting, or government loan. Their cotton is offered simultaneously to all 50 buyers instead of just a few local buyers, and PCCA, as a buyer, only bids on the cotton it wishes to buy. Computerization of the market provides automatic financial and inventory records for PCCA, buyers, and gins; and it generates accurate summary market reports from actual transactions.

To increase volume and reduce per unit costs, PCCA contracted with a proprietary firm, CXS, to make TELCOT services available to noncooperative gins beginning in 1979. Thus, TELCOT is now owned by some users and contracts its services to other users.

Trading rules initially were developed by PCCA. Many were made part of the computer software and must be followed if a trader desires to use the system. Other rules are enforced by various organizational arrangements. The performance of producers is guaranteed by local gins. Cooperative gins must perform because they are part of the PCCA system. The performance of noncooperative gins is guaranteed by CXS. Buyers performance is monitored by PCCA which can, if necessary, remove them from the system.

Exchange Functions

The operation of an organized exchange involves standardization of trading terms and trading procedures and provision of trading facilities and services including information. An exchange often provides guarantees of performance and redress of grievances. Moreover, in an era of rapid industrial change, a viable exchange often promotes its services to potential users and continually adapts trading arrangements to changing conditions.

Organized exchanges are not ordinarily owned or operated by a government agency either in the United States or abroad. Rather, perceived self-interest of some group causes an exchange organization to be developed, and the group usually likes to run it. Public control over selected aspects of an exchange has followed where significant public participation has occurred, as in securities and in futures markets. Protection of the public has not required government ownership of the facilities nor government involvement in the guarantee system.

Government's role mainly has been that of maintaining an economic environment stimulating commerce. It provides the underlying protection of fair practices and antitrust. It also reduces the threat of catastrophic market failures or threatened failures, as in the 1979-1980 silver speculative trading spree that threatened larger losses than major brokerage houses could absorb. It also is possible for government to prevent such a recurrence by insisting on rules and procedures that impose tighter constraints on individual speculative positions rather than periodic bail-outs.

To analyze the effect of ownership on various exchange functions it is desirable to further disaggregate the several functions into their subfunctions and to analyze who might best assume the responsibility for them. A listing of the main functions and subfunctions is given in Table 1.

Table 1--Likely distribution of the responsibility for different exchange functions among users, investors, and government.

Exchange function	Locus of responsibility		
	User	Investor	Gov't
1. Standardization of trading terms			
a. Standardization of terms	X	X	
b. Estab. of grade standards	X	X	X
c. Grading		X	X
2. Standardization of trading rules and procedures			
a. Time, place, language, etc.	X	X	
b. Search and negotiation	X	X	
c. Standards for equitable dealing	X	X	
d. Oversight and enforcement	X	X	X
3. Guarantees of performance			
a. Inspection of products	X	X	X
b. Min. cap. & credit standards	X	X	
c. Escrow accounts	X	X	
d. Audits	X	X	X
4. Redress of grievances			
a. Appeals and arbitration machinery	X	X	
b. Commercial court procedures	X	X	X
5. Facilities and services			
a. Housing	X	X	
b. Equipment	X	X	
c. Communication services	X	X	
d. Clearinghouse	X	X	
e. Information assembly, storage, distribution	X	X	X
6. Developing and promoting trade arrangements			
a. Research into needs and possibilities	X	X	X
b. Promoting knowledge	X	X	X
c. Decisions to foster revised arrangements	X	X	

One cannot generalize whether some functions always might be best performed by users, investors, or government. Yet, experience has a great deal to teach about what each can do best. For example, under the heading "Standardization of trading terms" it is common practice for government to take the lead but to work with users to establish grade standards. Government is often responsible for providing objective third party grading. However, investors could perform the establishment of grades and apply those grades as a disinterested third party. Also, some markets operate successfully with user established grades and user employed graders. The standardization of other trading terms such as quantity, quality, time of delivery, and payment procedures is a function that is well handled by users.

Under the heading "Standardization of trading rules and procedures" users or investors rather than government ordinarily appear to be the best locus for the first three subfunctions. The oversight and enforcement function might best be shared by government and users or investors. Government provides the creation and enforcement of basic laws and users and investors add the necessary refinements.

"Guarantees of performance" could be handled by individual traders relying on their own commercial intelligence and society's general commercial code. However, in a broad based electronic market, involving dozens of buyers and sellers, an internal guarantee system could improve marketing efficiency. Depending on the circumstances, a bonded, regulated, and audited organizational entity may be needed. This entity could be a subunit of a user organization such as an association of sellers or buyers or a subsidiary of a profit seeking firm. Government may also perform an auditing role to protect the public interest.

"Redress of grievances" could be handled by standard commercial legal processes, but it is probably handled best by a user or investor appointed system within the electronic exchange to obviate a constant recourse to outside legal services. Some disinterested person or committee could hear and dispose of grievances. Only in extreme cases would recourse to the courts be necessary.

Under "Facilities and services" the provision of information needs special attention. There should be safeguards over the credibility of the information generated and distributed by the exchange. In particular, safeguards from a persistent bias in reporting prices and volumes are necessary. In some cases the structure of trading will provide its own safeguards. In others the users or investors will have to work together with government to accomplish this objective.

For the most part, the group that can best perform a given function will depend on each group's current role in the market. An incumbent usually has the experience and is accepted by the trade in its current function. In some situations enlightened self-interest of sellers (buyers) could work to the mutual advantage of both buyer and seller--whether it results in an equal or unequal advantage. A strong forward looking firm--whether a cooperative seeking profits for its members or a noncooperative seeking profit for its investors--could serve the fostering role. One viable ownership configuration would be analogous to the role of the ICCH serving British commodity exchanges, namely a profit-making subsidiary of a financially strong firm that seeks out and promotes trading in different commodities in order to sell its services.

An operating producer cooperative could have an advantage in implementing an electronic exchange. Many of the costs and time lags necessary to organize a producer association would not be necessary, experienced marketing personnel may be on hand, and producers may have sufficient confidence in the organization to submit to its leadership. Under these conditions many start-up costs could be avoided.

On exploring the available avenues of ownership of an electronic exchange one should ask why an existing commodity futures exchange would not be interested. The London Metals Exchange carries on trading in "actuals" along side trading in futures under the same general rules. Trading is conducted in the ring for each metal for only 15 minutes twice a day. Before and after the auction, trading between members takes place anywhere, but such trades must be promptly reported to the clearinghouse. It would be but a short step in technique to institutionalize such trading in actuals and place it through a computer network. This would only make sense where wide physical dispersion of buyers and sellers makes the search and negotiating process costly. Yet the day may come when people will see an advantage in conducting futures trading by computer. In that case there could be a common ground for trading in actuals along side futures through the same machinery.

The responsibility for functions that might best be lodged wholly or partially with government would seem to come down to those that present intractable difficulties for users or investors, either because (1) there are important economies of scale in their proper execution that cannot be realized by users or investors, or (2) there is an important referee or enforcement role that users or investors cannot handle.

One might expect a minimum of government involvement in electronic trading of actual commodities because widespread participation by the general public is not likely. Most trading probably would be naturally limited to those who want to buy or sell the actual commodity. Such trading would be comparatively unattractive to those interested primarily in speculative gains. Hence, there would not be a compelling reason for government to own an electronic exchange in a commodity in order to protect the general public against abuses. The argument for government ownership would have to rest on other grounds.

One reason for government ownership might be to protect a certain group of traders, such as farmers, who have inherent trading disadvantages. Conceivably, if ownership of the trading mechanisms were wholly or preponderantly in the hands of buyers (or sellers), the rules and procedures could be rigged in their favor. Or market information necessary for an efficient, open-market economy may not be released. Government could establish an electronic market to protect the public interest unless the buyers (or sellers) were able to accomplish their trading outside the government system. That is, if they are not required to use the government's electronic trading system.

Performance Factors

Performance can be measured in terms of the availability of information, efficiency, market structure and level of competition, and the distribution of benefits.

Information Availability

One outstanding feature of an electronic exchange is its ability to generate a vast amount of market information. The possibility for instant and precise information concerning price levels, price differentials (by quality, location, or temporal characteristics), and volumes is inherent in a computerized electronic market. This information is presumed to have economic value to traders in the electronic market and often may have value to others, including those who are producing and selling competing and complementary products.

For example, firms producing grain sorghum may rely on market information about cotton when making their planting decisions because these two enterprises compete for the same resources. Because the quality and quantity of cotton market information enters into grain sorghum production decisions, the cotton information has a positive marginal product in the production of the competing product, and under conditions of pure competition would have a positive market price. However, grain sorghum producers cannot easily protect their interest in the production of market information on cotton, and their profit maximizing decisions may fail to allocate resources at the margin because of their lack of information ownership.

The actual distribution of market information also will depend, in part, on the type of ownership. Under government ownership of an electronic exchange, information could be available equally to both users and non-users as a means of improving both pricing efficiency and operational efficiency within commodity marketing channels. The information generated

from the electronic exchange could be disseminated to nonusers through conventional market news outlets of the U.S. Department of Agriculture. The government alternative for ownership could mean that both users and nonusers of the electronic exchange would have free and open access to the information generated by the market. In addition, information needed for research and for market regulation would be available to public agencies.

Ownership externalities could arise given the investor ownership alternative. Although the marginal cost of providing information to another user is zero, a positive market price could be charged to nonusers. However, the premium charged nonusers may not be very large, especially in the long run, because agricultural markets have a large number of users and valuable information would soon leak out and be widely distributed.

The user ownership alternative would likely disseminate information to both users and nonusers although this would not necessarily have to be the case. Market information generated in TELCOT, for example, is available to anyone at all participating gins and is summarized and made available to nonusers through conventional market news reporting services. This same situation is likely to prevail for any cooperative or user form of ownership.

In many agricultural markets all producers could benefit from having market information available to both users and nonusers. If users generally receive higher prices, it is to their advantage that nonusers not sell too cheaply and undermine the user's market.

Pricing and Operating Efficiencies

Computerized spot markets hold the potential for improving pricing efficiency relative to other alternatives. Pricing efficiency typically includes the elements of timeliness and accuracy. Timeliness refers to the time lag between price discovery and its dissemination to other marketing channel participants that may be interested in receiving that price message. Accuracy refers to the general price level as well as to price differentials attributable to location, quality, and form. Differences over location, quality, or form are important aspects of price if price is to be an unbiased indicator of supply and demand in competitive markets. Improved pricing accuracy could be expected if a significant share of total transactions were conducted over the computerized spot market. For commodities where current publicly reported prices are averaged across many qualities or are not reported for some qualities (such as feeder cattle), the improvement in pricing accuracy could be significant.

The spatial aspect of pricing efficiency is of major concern for many agricultural commodities where price discovery occurs in geographically dispersed, low volume markets. The possibility of local oligopsony or monopsony leads to suspicions that price differentials may not be accurate across space even though the total number and size of buyers in the overall market may not suggest performance problems.

Computerized markets offer instantaneous processing and dissemination of market information. Timeliness is superior in these markets when compared with conventional spot markets. Also, price differentials over space and quality would be expected to be more reflective of supply and demand conditions; that is, more accurate.

Operational efficiency is concerned with the cost of the marketing process. Computerized remote access markets have the potential for bringing all buyers and sellers together electronically, promoting the direct movement of product from the seller to the buyer, improving the timeliness of product flow and the coordination of buyer and seller activities, and reducing product damage.

The form of ownership is likely to have a mixed effect on pricing efficiency and operating efficiency. To gain the maximum potential in pricing efficiency in a marketing channel, nonusers as well as users must have access to the market information generated. If certain forms of ownership were to deny or limit access to the market information, then these forms would dampen the gain in pricing efficiency. Government and user ownership are most likely to foster an environment for maximum dissemination of information.

Gains in pricing and operating efficiency are expected to be in proportion to the share of a commodity traded over the exchange. Increasing market share improves the quantity and quality of information being generated and reduces the average unit cost of operating the system. Government and investor ownership alternatives are likely to have the greatest potential for trading large shares of a commodity. The cooperative or user approach appears to be more limited in its potential to handle a large share of a commodity because of limited cooperative membership. TELCOT, for example, was originally available only to members of cooperative gins. To reduce its per unit costs and increase its effectiveness, TELCOT needed to also serve noncooperative members. This was accomplished by the creation of a new noncooperative corporation (CXS) specifically

designed for the purpose of expanding the system to other users. If a new cooperative were formed specifically for implementing an electronic exchange, this limitation might not exist, as all potential users could be members.

Market Structure and Competition

Competition at a given level in a marketing channel is at least partially dependent upon the number and size of firms. A few large firms acting as either buyers or sellers of a commodity at a particular level are able to influence prices received (or paid) to a greater degree than when the market structure includes a greater number of smaller firms.

Electronic marketing can improve the competitiveness of a market without changing the market structure per se. It can improve the flow of information to all participants and thereby improve the balance of market power (the ability to influence price) between buyers and sellers. It provides equal and ready access to all types of market information such as price levels, quantities, and price differentials over time and space. In addition, electronic marketing includes trading procedures that produce a competitive price discovery process. These features foster the economic performance expected from more atomistic markets even if the structure is imperfectly competitive. Thus, without changing the structure, improved competitive performance is expected from the electronic exchange unless the number of traders is below some minimum threshold level.

Because Government and investor types of ownership are most likely to achieve significant market shares, they are likely to have the greatest impact on market performance regardless of the existing market structure

in the current marketing channel. However, electronic marketing tends to equalize market power, and it would not likely be adopted where relatively concentrated markets exist unless there is government intervention to force the use of an electronic exchange. For example, international trade in food and feed-grains tends to be dominated by a few large corporate trading firms which would not be expected to adopt electronic marketing on their own initiative.

Distribution of Benefits

The ultimate test of the wisdom of changing a marketing institution is the measurement of net benefits generated and the distribution of those benefits. The primary benefits of electronic marketing are improved operating efficiency and pricing efficiency. An electronic exchange would be expected to reduce the long-run costs associated with the marketing process in relation to the share of the commodity traded. Some portion of the cost reduction may be passed on to producers in the form of higher prices and to buyers in the form of lower procurement costs. Consumers may also benefit from lower prices. Increased pricing accuracy may foster a more efficient allocation of resources which in turn may lower costs to producers, processors, and consumers, depending on price elasticities at various levels in the marketing channel.

The distribution of benefits from an electronic exchange may be quite sensitive to the form of ownership. The user type of ownership is most likely to fully distribute benefits to actual marketing channel participants. Given the user form of ownership, any realized profit from the operation

largely would be distributed to the users. Government may also distribute benefits to participants, but may choose to distribute most of the benefits to the general public. The investor form is more likely to be composed of people normally outside of the specific market system and any realized profit would be distributed to the investors rather than the users.

This does not mean that users could not benefit from an investor owned exchange through improved efficiency, but user groups would not share in any distributed profits from the operation of the exchange.

Feasibility Factors

In addition to the impact of ownership on exchange functions and performance, there is the impact of ownership on the feasibility of an electronic exchange. Feasibility refers to the likelihood of successfully introducing and operating an exchange. It involves the measurement of costs and benefits and, in particular, the distribution of those costs and benefits among buyers, sellers, and other potential participants. Feasibility also involves a measurement of attitudes of participants. Even if an electronic exchange shows positive net returns to buyers and sellers, they may be unwilling to assume the risks involved in making the change to an electronic exchange, or they may have other reasons to believe that the anticipated benefits do not sufficiently exceed the costs. The party initiating an electronic exchange is likely to have most of the ownership rights and be primarily interested in its own needs, but it will have to design a market that meets at least some of the needs of others to encourage their participation.

Feasibility requires owners with sufficient capital to purchase the development of ownership rights. Capital is needed to design, develop, and promote an electronic exchange. Additional capital is needed to

endure the "start-up" phase when volume is too low to generate sufficient revenues to pay operating costs. This phase could last several months.

Feasibility also will be affected by market structure and the expected changes in market structure caused by a new electronic exchange. Implementation will be accomplished more easily in situations where changes will be minimized, especially changes in short-run market power relationships.

Producers are the ones most likely to gain from a successful electronic exchange, hence they are a likely group to be the owners. They would gain access to better market information and access to more market outlets. Both advantages are likely to result in a relative increase in market power and in market price for producers, especially in the fringe areas of production where buyers are relatively fewer. Government may initiate and own the electronic exchange as a means of achieving a greater balance of market power or improving the collection and dissemination of market information. There will have to be some advantages to buyers to encourage their participation unless government or producers have some power for forcing buyers to participate. State and Federal government powers to force participation are quite limited except perhaps under some market orders. Likewise, most cooperatives in the United States currently have limited power in negotiating with buyers because individual cooperatives do not control a significant share of the market. Therefore, a producers' user group would have to offer some offsetting advantages to buyers, such as increased access to more distant supplies, more efficient procurement, and better coordination of procurement and processing.

Feasibility will also be affected by existing market conduct and expected conduct changes prescribed by the owners of the new exchange. Despite complaints about how an existing market is functioning most buyers and sellers feel comfortable with it and are hesitant to change. An electronic market could result in uncertainties about: the credit worthiness of new buyers, reliability of new sellers, possible misunderstandings caused by new procedures and terms of trade, the availability of an alternative market if the new system fails, and others. Owners cannot ignore these concerns and must design a system that minimizes them.

Certain types of owners and ownership patterns seem to be more feasible than others, depending on the industry structure and conduct. Generally, one would expect a leading firm or group of firms within an industry to have the most potential influence for initiating an electronic exchange but it probably has the least to gain. In most producer-first handler markets for agricultural commodities, leading buyers have relatively more market power. It seems unlikely that these buyers would form a users' group to initiate an electronic exchange unless the loss of market power would be more than offset by decreased procurement costs or other benefits.

A producer cooperative, on the other hand, with a significant market share could introduce an electronic exchange if its members agree to commit their production to it. The cooperative could commit sufficient volume to the system to command the attention of even otherwise reluctant buyers. Similarly, in a market dependent upon market agents between sellers and buyers, the agents might take the initiative and commit

themselves to a new marketing system. In both of the above cases, users take the initiative. In one case the users are producers represented by their cooperative, and in the other case users are market agents. In both of these examples most producers would not trade directly with buyers.

An investor or investor group would appear to have more difficulty in initiating an electronic exchange because it might have more difficulty in gaining the confidence of buyers and sellers and encouraging their participation in the market. Some potential investors, however, are quite powerful and well financed and may be able to overcome this obstacle. They include large computer-communication networks and other large companies with excess computer capacity to sell, and major commodity exchanges with industry respect and marketing expertise. However, the members of these exchanges are primarily interested in futures trading and to date have balked at applying electronic technology to their trading activities.

Although a user group may be able to initiate an exchange in some instances more quickly than an investor, the user group may have more difficulty expanding usage because of its limited membership. Other traders in the industry may not want to join the organization just for the privilege of trading. In the case of an agricultural cooperative, nonfarmer and noncooperative traders must be excluded from ownership by law.

Government ownership seems unlikely in the United States for reasons given earlier. However, government may provide temporary funding such as that needed for research and development. It may also provide funding

for the start-up period when volume is relatively low and operating costs frequently exceed revenues. Government's permanent role is likely to be more regulatory, such as monitoring conduct and performance, enforcing antitrust and fair trade practices, and protecting traders and the public from fraud.

Government support of electronic exchanges has raised issues concerning the ownership of software, procedures, lists of clientele, and other assets developed during the project. As in most publicly sponsored research and development activities, these assets are generally believed to be in the public domain and available to anyone, either for free or at a nominal cost. Such a policy could slow the commercialization of the project because anyone could copy it and offer similar services. Would-be investors may be reluctant to provide risk capital because once they had established a successful system, other investors might initiate competing systems. The market may not be able to support more than one.

Other Issues

Owners that trade on their electronic exchange could have access to "insider" information not made available to all traders. For example, the owners could program their computer to provide information about individual transactions which would be hidden from other traders and thereby create a market advantage for the owners. Owners of an electronic exchange will have to establish an image of fair play if they want their market system to succeed. Ownership by government or by "outside" investors would not have this apparent conflict of interest.

Monopoly of the marketing function is another charge leveled against an electronic exchange. If the owners successfully encourage most buyers and sellers to use the exchange, other marketing systems will be forced out of business. If this happens, however, the exchange will be the most competitive market possible because most buyers will compete there for the products of most sellers. This could result in some eventual inefficiencies with a complacent exchange management, but the condition would not be expected to remain very long given the nature of electronic technology and the rapid development of new technology, as well as the expected continued downward price trend for equipment. Few would accuse the New York Stock Exchange, for example, of being a monopoly that is detrimental to society. Adverse effects from a single electronic exchange are even less likely.

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