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A COMPUTERIZED REMOTE-ACCESS COMMODITY MARKET: TELCOT

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Cotton marketing, like the marketing of other agricultural commodities, traditionally has been done through relatively small country markets. Problems for cotton producers resulting from this type of market structure are the limited availability of market price information and the limited degree of buyer competition for their product at the local level. Though these are seemingly inherent problems in local markets, new technologies in the form of electronic markets can help to overcome them.

The marketing of cotton is complicated because of the official grading system which reflects the heterogeneous nature of cotton fiber. Consider that there are about 45 grade, 23 staple lengths, and 7 micronaire groups [9], making a total of 7,245 distinct quality categories of cotton under Smith-Doxey classification. In addition, many cotton merchants and textile mills have established their own "house grades" or "types." Though the large number of quality categories adds to the description of the physical product itself and presumably aids in the allocation of the product to its most efficient end use, it makes accurate price discovery — the determination of the market price of a particular quality of cotton in a given location at a specific point in time — much more complex.¹

Most producers sell cotton in mixed lots with little regard to the specific quality characteristics of the lots. Cotton shippers, in contrast, frequently seek cotton with characteristics to meet specified mill orders. Thus, a function fulfilled by local merchants is the sorting and combining of cotton lots into more homogeneous, and frequently larger, lots. Because each lot of cotton is essentially unique, at least in configuration if not in average quality charac-

teristics, the problem of price discovery is complicated.

The traditional approach to producer spot marketing of cotton relies heavily on the gin offices. After cotton is harvested, ginned, and classed, the class cards are returned to the gin offices. Some producers merchandize their cotton themselves, but the more common approach is for the gin office staff to recap² a producer's cotton from the class cards, telephone several (typically 3 to 6) merchants to relay the quality information from the recap(s), and seek bids. The office staff then either relays offers to the producer or sells the cotton on his behalf.

"Central remote-access market," or "electronic market," is a term used to describe the marketing of commodities by bringing geographically separated buyers and sellers together through electronic communications. Electronic spot markets have been organized and have functioned in the trading of several agricultural commodities since the early 1960s. With the exception of cotton, most electronic trading has been in livestock commodities. The primary objectives of electronic markets have been to increase producers' access to potential buyers and to provide reliable and timely market news.

The modern technology of electronics offers the potential for spot markets to perform the basic function of an organized exchange—giving all potential buyers and sellers instantaneous access to the prices of all transactions. In the past this access was available only when all buyers and sellers or their representatives were present in a single room. Communications and computer systems now can be substituted for the physical concentration of buyers and sellers.

TYPES OF ELECTRONIC MARKETS

There are four basic types of electronic markets [4, 10].

1. Manually operated telephone clearinghouses. Offers to buy and sell a commodity with defined quality and quantity characteristics are made by telephone to the clearinghouse where offers are manually matched. Telephone clearinghouses have been used in marketing eggs since 1971.
2. Telephone auctions. A commodity is traded via conference telephone between an auctioneer and a group of geographically dispersed bidders. This procedure has been used in trading slaughter hogs, feeder pigs, slaughter and feeder cattle, and market and feeder lambs since 1962.
3. Teletype auctions. Sellers' consignments of a commodity are listed on a teletype network of potential buyers and bids are received by teletype. Teletype auctions have been used in marketing butcher hogs in Canada since 1961.
4. Computerized trading systems. Sellers' consignments are offered for sale to potential buyers on a network of remote terminals connected to a central computer. The computer receives, compiles, and stores bids and offers, completes transactions, and keeps records. Computerized trading has been used for cotton since 1975.

Though these types of organized electronic markets have in common the use of electronic communications equipment, they differ in method of operation and degree of complexity. The costs and benefits of each depend on many factors and may vary among commodities. Because computerized marketing is the newest and most complex and encompasses most elements of the other three approaches, a description of a computerized marketing system follows. Implications and impacts discussed in other sections refer to electronic markets in general even though they are drawn specifically from a computerized market.

TELCOT

Telcot, operated by Plains Cotton Cooperative Association (PCCA) in Lubbock, Texas, is the only computerized spot market currently in operation and has been used in marketing cotton since 1975. The system has the capability of amassing recaps from data on the individual bales, allowing producers to retain

selling decisions, providing potential buyers with as much or more information as traditional procedures, and providing current market price estimates.

Telcot uses a network of remote terminals connected to a central computer at PCCA. The terminals are in the offices of PCCA and 29 subscribing cotton merchants. Terminals also were placed in 75 gin offices in 1977/78. Any subscribing buyer can examine recaps of cotton for sale in terms of specific quality characteristics, average quality characteristics, asking prices, gin location, and warehouse location. The buyer also can obtain estimates of spot market prices by grade, staple, and micronaire, or transmit bids to the computer from his terminal and obtain printed copies of recaps. Price, quality, and sale information is stored on disk in the computer and is used each day in updating market price estimates.

Producers from any of 190 participating cooperative gins can use Telcot to sell cotton. The gins are in the High and Rolling Plains areas of Texas and Oklahoma and in the Texas Rio Grande Valley. After a producer's cotton has been harvested, ginned, and classed, the class cards are delivered to PCCA where the data on them are coded and placed in the central computer storage under the producer's identification number(s). The producer then has access to a current record of his cotton available for sale. The producer using Telcot has essentially two alternate procedures by which to sell his cotton on a spot basis: (1) the regular offer system or (2) the firm offer system.

In the regular offer system, the producer, through a member gin, contacts PCCA via a WATS telephone line and obtains PCCA's estimate of the current market price for a particular lot of cotton, i.e., the "asking price." If the producer elects to offer the cotton for sale, he so notifies PCCA and the cotton is placed on the system. When the data describing the cotton enter the system, potential buyers can access the recap of that lot on their remote terminals to determine whether they want to bid. Bidding on the lot is open for 15 minutes; if the high bid is within 25 points (.25¢/lb.) of the asking price, the cotton is automatically sold to the highest bidder. If the high bid is more than 25 points below the asking price, the producer may still accept the bid, but he must do so within 15 minutes. The producer also can obtain bids on a lot of cotton from nonsubscribing merchants independent of Telcot, then offer it for sale through the Telcot bid system, but this variation of alternative [1] requires the consent of the nonsubscribing merchants who made the initial bid.

With the Telcot firm offer system, a producer can specify the price he will accept for a lot of cotton and it will be sold to the first buyer willing to meet the price. This procedure lets the producer establish an offering price. It also allows buyers to search a pool of firm offers for specific characteristics. For example, through his remote terminal, a buyer can obtain a list from the firm offer system of lots of cotton for sale with average values of (1) grade 42 or better, (2) staple 32 or better, (3) micronaire 3.5-4.9, (4) lot size of 100 bales or larger, and (5) firm offer price of 60¢/lb. or lower. The list of any and all lots of cotton in the firm offer system meeting the selected criteria is displayed on the buyer's remote terminal. Other criteria such as gin, warehouse location, etc., could be used, but no more than five criteria can be specified in one inquiry.

In either of the two procedures, the computer prints the invoices for both buyer and seller. No direct costs of the system are paid by the producer. The costs of the system borne indirectly by the member producers are the cost of financing the initial investment and the annual operating costs. Gins pay a service fee of \$1.00/bale for communication, records, and invoicing services to PCCA; this fee applies to all cotton sold through subscribing gins whether or not the cotton sells over Telcot and each gin signs an agreement establishing this fee structure. Each gin establishes its own fees for services charged to merchants, which typically range from \$1.00 to \$2.00/bale, and the fees are not a function of whether cotton is purchased over Telcot.³ Subscribing merchants pay a lease fee on the remote terminals of \$500 per month, which includes the cost of the printer and the telephone line connection with the computer.

The Telcot system also has the capability of handling pooled spot sales. Lots of cotton belonging to different producers can be combined into larger lots, the lots sold, and sale proceeds divided among producers on the basis of the computed price differentials among qualities. Pooled sales increase the handling capacity of the system and provide merchants with access to larger lots.

Another option of the computerized system is trading of forward contracts. This capability effectively makes Telcot an organized forward deliverable contract market as well as a computerized spot market. The forward contracting option is similar in operation to the firm offer option. Producers can offer acreage contracts on designated farms at a stated price

per pound for the cotton production on that acreage.⁴ A sale is made to the first buyer who meets the producer's price. Each producer has the option of specifying only certain merchants with whom he is willing to forward contract and of exchanging letters of credit. After a trade is made, PCCA prints copies of the contract and forwards them to both buyer and seller for signatures.

Use of the Telcot spot marketing systems by producers and merchants has more than doubled since 1975/76 (Table 1). Many factors seem to be responsible, including volume of production, availability and use of forward contracts, use of the loan program, etc.

TABLE 1. UTILIZATION OF TELCOT, BY MARKETING YEAR

	1975/76	1976/77	1977/78 ^a
Bales sold.....	240,000	400,000	665,000
(Regular offer).....	(240,000)	(335,000)	(319,200)
(Firm offer).....	(0)	(65,000) ^b	(345,800)
Bales produced in ^c			
trading area.....	638,000	590,000	936,000
Percent of production			
marketed through Telcot....	37.6	67.8	71.0
(Regular offer).....	(37.6)	(56.8)	(34.1)
(Firm offer).....	(0)	(11.0)	(36.9)
Number of gins			
participating.....	75	126	190
Number of gins			
with terminals.....	0	15	75
Number of merchant			
subscribers			
Buyers.....	16	24	34
Firms.....	16	24	28

Source: Mr. Kent Bennett, Plains Cotton Cooperative Association, Lubbock, Tx.

^aPartial year; data are as of early April 1978.

^bIntroduced in mid-January 1977.

^cBales ginned at participating gins less bales forward contracted and bales entered CCC loan program.

IMPLEMENTATION OF ELECTRONIC MARKETS

A prerequisite for any kind of remote trading, electronic or otherwise, is a standardized grading system which is accepted by buyers and sellers. The Smith-Doxey classification of cotton is widely used in the cotton trade, especially for producer sales, and generally meets the grading requirements for cotton. The USDA grading system for grains also is

³Gins commonly act as marketing agent between producers and merchants.

⁴Prices are usually stated in terms of cents or points above loan value in order to allow for quality variations.

standardized and is accepted widely enough to allow remote trading [8, p. 15], but additional descriptive standards might be required for some livestock commodities [6, p. 23]. The complexity of the grading system would be a barrier to the use of manually operated telephone clearinghouses, telephone auctions, and teletype auctions for marketing cotton. The requirements for large amounts of quality information, trading in mixed lots, and rapid transfer of information would be difficult, if not impossible, to fulfill without computer assistance. However, commodities with less complicated grading systems may be suitable for marketing through clearinghouses, telephone auctions, or teletype auctions.

The investment cost for an electronic marketing system is high, requiring large amounts of capital. Computerized markets probably have the highest initial investment of the four types of electronic markets, as investment is needed in hardware, technical expertise, and education of users. For example, the cost of the Telcot computer alone was about \$1 million; the cost of software development has not been quantified, but that cost component may well have exceeded the cost of the computer. However, leasing is an alternative to computer purchase. Investment costs and/or incentives would be likely to preclude all but such organizations as (1) cooperatives, (2) large firms, groups of firms, and trade organizations, or (3) government from implementing an electronic market.

Electronic marketing systems have higher fixed costs than other marketing approaches, and thus the per unit cost of trading is more sensitive to volume traded. Enough of a commodity must be traded to make the net marketing costs at least equivalent to the net costs of marketing methods, but actual marketing costs can be higher if benefits are higher. The annual volume of cotton required to make Telcot cost competitive was originally estimated by PCCA to be about 800,000 bales, but that estimate has not since been verified. The system is expected to accommodate one million bales in the 1977/78 season. Thus, a sufficient number of buyers and sellers with enough product to make the system cost efficient is necessary for success. Geographic location of buyers and sellers may be unimportant. Merchants now subscribing to Telcot are located in Dallas, Littlefield, Lubbock, and Vernon, Texas, and Memphis, Tennessee. The only barrier to geographic dispersion is the cost of the telephone connection with the central computer. Telcot, or a similar system located elsewhere, could conceivably include merchants and producers located anywhere in the U.S. and possibly in foreign countries. The

current system has the technical capability to service up to 200 remote buyer terminals, to service independent as well as cooperative gins, and to be used for intermerchant trading as well as trading between merchants and producers [5].

IMPACTS

Quantification of impacts of electronic markets in general and Telcot in particular is extremely difficult. One would prefer to test propositions such as: Telcot has (1) reduced daily price variations and price variations among producers in the market, (2) reduced marketing margins, (3) increased cotton prices received by growers, etc. However, numerous market forces other than Telcot have affected daily prices and price variations, data on individual sales are costly to obtain, and no reliable data on marketing margins are available. The problem is compounded by the external effect of the market price information from Telcot, which increases knowledge of prices in the entire market rather than for Telcot trades alone. Consequently, no attempt to quantify the market impacts of Telcot has been made.

A conceptual examination of impacts may nevertheless be useful. The concept of marketing efficiency, including both operational efficiency and pricing efficiency, is applied hereafter. Operational efficiency is related to the costs of accomplishing the basic marketing functions — assembly, processing, storage, distribution, etc. [3, p. 202]. Pricing efficiency is related to the ability of prices and price signals to allocate commodities among buyers and the returns for them among sellers and depends, in part, on how rapidly and accurately markets evaluate pricing information and how accurately the information is transmitted to buyers and sellers [3, p. 202; 11, p. 122]. In the following discussion of the potential operational and pricing efficiencies, the electronic market is assumed to handle a sufficient volume of commodity to make the system cost effective.

Electronic markets may be able to improve operational efficiency, although the gains may be small. For example, the bookkeeping and invoicing services performed by the system should reduce the amount of clerical work in buying (assembly) operations. If an individual merchant pays the same agent fee to the gin for Telcot and non-Telcot purchases and buys the same quantity of cotton with Telcot as he would have without it, the \$500 per month lease for the terminal is roughly equivalent to the cost of one clerical office worker. However, a single cotton buyer probably can increase his assembly productivity by using Telcot to

examine and bid on a larger volume of cotton in a given period of time. Evidence indicates that only 3 percent of the cost of merchandising cotton in Texas and Oklahoma is incurred in buying and local delivery [2, p. 28], so gains in operational efficiency for buyers would not have a major impact on marketing costs.⁵ Gins and producers may also achieve some operational efficiency through savings in time and clerical costs.

In achieving operational efficiencies, an electronic market would probably reduce the number of people required to perform some of the market functions carried out by merchants. However, electronic markets would not necessarily reduce the number of firms or favor large marketing firms. For example, by using computer or other electronic services to provide greater country market access, smaller marketing firms without a network of field staff may be better able to compete with larger firms.

The potential gains in pricing efficiency may be greater than those in operational efficiency. Gains in pricing efficiency result in increased market competition and are due to two primary factors, improved market price information and decreased local market isolation. The spot market price information generated by Telcot is conveyed with much greater speed, is more current, and is more detailed than information provided by the traditional price reporting process. Price movements within a trading day can be detected easily by observing sales on the remote terminals. Thus, general price movement information is available with only a few minutes' time lag. Computer-generated price estimates for individual lots of cotton are available on a continuing basis. The rapid conveyance of price and price movement information reduces uncertainty about current conditions for both buyers and sellers.

Telcot price quotations are also more detailed than those reported by USDA; prices are reported for more quality combinations and the sample base is more precisely defined. The official reporting of cotton prices is in two forms: (1) the "market news" which is a general summary of prices and price movements (usually of what occurred the previous day) reported in the public news media and (2) the *Daily Spot Cotton Quotations* [1] reported by USDA, which are estimates made by the various Cotton Exchange Quotations Committees based on (a) sample data, often lagged

several days, of unspecified population characteristics and (b) informed judgment of Committee members.⁶ The updating of electronic price quotations includes all recent Telcot sales and thus weights prices of most recent sales heaviest. The sample of prices for the quotations reported consists of all Telcot sales. The reported prices are not necessarily representative of the entire spot market, as cotton from non-cooperative gins is excluded, but the prices are known to represent only producer sales.

Because the computerized system provides the same market price information to both buyers and sellers, it facilitates price discovery for both groups. Merchants tend to be less geographically dispersed than producers and/or have a more highly developed information network, so producers may gain price information in relation to merchants. However, merchants may be more adept at using the information. It is possible that Telcot has not affected the average producer price but has reduced the variation of prices received among the producers for cotton of the same quality.

Electronic marketing can increase the number of potential buyers and sellers in a market by effectively expanding the geographic bounds beyond a local market area. If the number of buyers and sellers participating in an electronic market is large, competitive efficiency is increased in relation to localized markets in which the number of buyers is small. The more potential buyers (sellers) for a seller's (buyer's) produce, the greater the prospect for obtaining the highest (lowest) possible price at any point in time. However, the potential increase in competition and market price information would not remove the risk of market price variation for either party. Both buyers and sellers maintain control of their buying and selling decisions.

SUMMARY

Computerized spot commodity marketing has become a reality through Telcot. The system is the most technically sophisticated of the four basic types of electronic markets. This article provides a basic description of the operation and capabilities of Telcot and examines some of the implications of the use of electronic markets. However, the discussion falls short of a thorough examination of the possibilities for and effects of electronic

⁵"Overhead" costs, constituting about 7.5 percent of marketing costs, are included as another cost category, but the proportion of this attributable to assembly is unknown.

⁶Two points should be noted. First, the purpose of the *Daily Spot Cotton Quotations* is technically for settlement of futures contracts and they are not necessarily meant to represent producer prices received, although many producers attempt to use them as such. See [7] for further discussion. Second, Telcot price information, along with other sales observations, is currently being used in the sample data supporting the Agricultural Marketing Service price quotations for the Lubbock territory.

markets; many questions remain and additional research is needed to examine those questions.

Electronic markets constitute organized exchanges for trading in spot commodities and forward contracts. They do not replace other marketing alternatives such as marketing pools, vertical integration, marketing boards, or joint ventures, and they may be inconsistent or competitive with other alternatives. Electronic markets offer no solutions to certain general market problems such as unstable market supply, unstable demand, or declining market demand. Instead, they address two basic producer marketing problems — non-competitive isolated local markets and lack of

detailed market price information.

The size of the initial investment in electronic markets, and especially computerized markets, is such that only large organizations — regional cooperatives, trade organizations, or government — can undertake their establishment. Electronic markets provide increased price and operational efficiencies. The pricing efficiency benefits are potentially large, but two necessary conditions must be met for an electronic remote-trading market to be possible: (1) a commodity grading system must be sufficiently descriptive and widely accepted by the trade and (2) enough volume must be traded for the system to be cost efficient.

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