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**COTTON PRICE DISCOVERY
AND PRICING EFFICIENCY**
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INTRODUCTION

The marketing channel for upland cotton lint extends from the cotton producer through the textile mill. Beyond the mill level is a fiber marketing channel, where many economic forces combine to determine general price levels for all fibers — not just cotton. Cotton lint represents one factor input at the mill level that is in direct competition with substitute fibers for most end uses. Cotton's competition at the mill level in the manufacture of cloth are man-made, such as polyester, rayon, and nylon.

This paper focuses on pricing efficiency and price discovery at the producer-first handler level in the marketing channel for upland cotton lint. Specifically, spot cotton price discovery processes and problems are described. Then, institutional and structural elements, which may have led to a computerized spot market for cotton, are investigated. In addition, the pricing efficiency resulting from the market information and pricing systems for cotton is assessed.

COTTON PRICING

Price Determination

As background for current cotton price-discovery processes, several important economic factors in price determination must be discussed. During the past decade, domestic cotton consumption has declined while production has ranged from 10 to 14 million bales (Table 1). Production in excess of domestic consumption is either exported or added to carryover. During the 1970-78 period, average annual domestic mill consumption declined by about 257,000 bales per year. Annual exports have been variable in the range of 3 to 6 million bales, depending mostly on world-wide production of cotton lint.

Although total domestic fiber mill consumption has been increasing slightly during the 1970s, the total consumption of cotton has been declining. As a result, cotton's share of the total fiber market has been declining rather dramatically (Table 2). In 1965, cotton's share was over 50 percent, but has steadily declined to a new low of 24 percent in 1978. Conventional wisdom is that a major factor in this decline is changing technology. Man-made fibers possess characteristics such as permanent press and flame-retardancy, which have been difficult to copy in cotton. At the same time, however, cotton

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possesses characteristics such as absorbency and "coolness" which man-made fibers have not successfully duplicated. Shafer [6] indicated that: . . . The absolute decline in the domestic mill consumption of cotton after 1965 was probably associated to a significant extent with the problems of availability and price variability that mills thought they saw in cotton. The substitution of man-made fiber, particularly polyester, for cotton during 1962-72 was somewhat of a unique historical event in the textile subsector accompanied by a number of circumstances adverse to cotton and favorable to manmade fibers (Shafer [6] p. 26).

Table 1. Cotton: Production, Consumption, Exports, and Imports of All Cotton in the United States, 1965 and 1970-78.

Year beginning August 1	Production	Mill Consumption	Total Exports	Total Imports
	— — — — — — — — 1,000 bales — — — — — — — —			
1965	14,938	9596	3035	118
1970	10,192	8204	3897	37
1971	10,477	8259	3385	12
1972	13,704	7769	5311	34
1973	12,974	7472	6123	48
1974	11,540	5860	3926	34
1975	8,302	7250	3311	92
1976	10,581	6674	4784	38
1977	14,389	6509	5484	5
1978 ^a	10,841	6265	6030	20

^a Preliminary

Source: U.S. Department of Agriculture, *Cotton and Wool Situation*, Economics, Statistics, and Cooperatives Service, Washington, D.C., February, 1979.

Table 2. Domestic Mill Consumption of All Fibers and Cotton's Share of the Fiber Market, 1965 and 1970-78.

Year beginning January 1	All Fibers, Domestic Mill Consumption ^a	Cotton's Share of fiber market
	— Million Pounds —	— — Percent — —
1965	8492	53.5
1970	9603	40.1
1971	10714	37.2
1972	11656	33.2
1973	12484	29.3
1974	11110	29.8
1975	10557	28.7
1976	11595	29.4
1977	12195	26.1
1978 ^b	12504	24.3

^a Fibers include wool, cotton, flax, silk and man-mades.

^b Preliminary.

Source: U.S. Department of Agriculture, *Cotton and Wool Situation*, Economics, Statistics, and Cooperatives Service, Washington, D.C., February 1979 and February 1974.

Price Discovery

Within the general context of these economic factors, which determine price levels, price discovery for cotton takes place. The pricing points for cotton lint are between the producer and merchant, the merchant and domestic mill, and the merchant and foreign mill (Sporleder, *et. al.* [9] p. 5). At the producer-first handler level, producers may sell spot cotton in many small-volume, geographically dispersed markets throughout the cotton belt. Typically, these spot sales are either to cooperatives or local or regional merchants. Other producer alternatives are to sell over an organized regional exchange for spot cotton (TELCOT), or to contract for future delivery to cooperatives or merchants.

Contracting: Cotton contracting has accounted for a major portion of the crop in certain years. Since 1970, the proportion of the total domestic crop contracted has ranged from 10 - 75 percent (Table 3). Reasons for this variability in the importance of contracting are attributed to buyer's desires to assure particular seasonal quantities and qualities to allow them to forward sell (Sporleder, *et. al.* [9, p. 12]). Motives for contracting and other economic implications of contracts as a price discovery process are found in the literature and will not be repeated here (see, for example, Branson, *et. al.* [1] and Nichols and Sporleder [4]). For purposes of this paper, it is sufficient to note that market information on contracts, either in terms of price or other contract provisions, is difficult and, therefore, relatively expensive to collect or disseminate. Most contracts are through private negotiation and at the buyer's initiative. Contracts do not have standardized non-price terms; therefore, price comparisons are difficult.

Spot Markets: USDA market news price quotations for daily cotton spot markets originate from Spot Cotton Price Quotations Committees, composed of cotton traders. The USDA has administered and supervised this "official" system for quoting spot cotton prices since 1916. The system was established under the U.S. Cotton Futures Act of 1916, with legislative authority now incorporated in the Internal Revenue Code of 1954. Section 27.97 of these regulations read:

There shall be established and maintained in each bona fide spot market a competent quotation committee. . . . Such committees shall impartially and carefully ascertain and publish on each business day the value of Middling cotton and the differences between the prices or values of Middling cotton and of other grades of cotton represented by the official cotton standards of the United States. The committee shall disregard any transactions which it finds were not bona fide, or were made for the purpose of influencing its action improperly . . .

There are currently 10 officially designated spot markets, each with a committee. These markets are: Augusta, Georgia; Greenville, South Carolina; Montgomery, Alabama; Greenwood, Mississippi; Memphis, Tennessee; Phoenix, Arizona; Dallas, Texas; Houston, Texas; Lubbock, Texas; and Fresno, California. The committees are composed of cotton traders within the geographic area covered by the market.

The committees have two somewhat distinct functions. One is to generate spot quotes which become USDA's spot market news. A second function is the establishment of a basis and price differentials for settlement of delivery against futures contracts. These functions are complementary, even though there may be no general agreement as to what constitutes a "quotation." As Soxman and Holder [7, p. 5] indicate: "To some persons, quotations are precise records of actual prices paid as a result of specific transactions. This is not necessarily true for spot cotton quotations. While quotations often are based on averages of specific transactions, they at times represent the best judgment of values by informed groups of dealers for lots of average size."

The spot quotations committees essentially decide on the price differential between the nearest futures month and the same quality (Strict Low Middling inch and one-sixteenth) in the spot market. This sets a basic spot price level for a quality which is traded on futures. Spot quotes for other qualities are determined by establishing premiums or discounts from the base-quality spot price level. In each of the committees, a USDA market news reporter surveys actual trades of cooperating firms. This information is made available to the quotation committee prior to their deliberations. Results of the deliberations are reported by AMS as spot cotton prices by market area for different qualities.

One interesting aspect of market news reporting for cotton is that "quasi-mandatory" reporting exists. As indicated by Sporleder, *et. al.* [9, p. 21], the law is the "if asked, you must respond" variety, meaning that if USDA asks a cotton trader to divulge price and other terms of sale, the firm is legally obligated to comply with the request. However, USDA has not chosen to actively require compliance, but rather has relied on voluntary cooperation by cotton traders.

Table 3. Forward Contracting of Upland Cotton by Farmers in the United States, by Area, 1970-78.^a

Year	Geographic Area				
	United States	South-eastern	South-Central	South-western	Far West
	— — — — — percent contracted — — — — —				
1970	11	8	17	7	6
1971	43	28	59	37	23
1972	36	23	65	13	24
1973	75	73	87	68	75
1974	48	10	30	6	48
1975	30	5	15	1	30
1976	68	53	75	26	68
1977	32	9	17	19	32
1978	25	16	39	11	52

^a If producers sign a fixed marketing agreement with their cooperative, then the USDA considers the crop under marketing agreement to be contracted.

Sources: U.S. Department of Agriculture, Agricultural Marketing Service, Cotton Division, January 12, 1979 and Crop Reporting Board, Economics, Statistics, and Cooperatives Service, Washington, D.C.

The quotation committee is directed to consider actual trades for each quality when that information is available. In the event no trades of a particular quality occur in a particular market for a particular day, the Internal Revenue Code of 1954, Sec. 27.100 states:

If on such a given day there shall have been in such market no sale of spot cotton of any grade, the value of each grade shall be deemed to be the same as its value therein on the last preceding business day, unless in the meantime there shall have been bona fide bids and offers, or sales of hedged cotton, or other sales of cotton, or changes in prices of futures contracts made subject to the act, which in the usual course of business would clearly establish a rise or fall in the value of spot cotton in such market . . .

Cotton is harvested in the fall, and spot markets are active generally from September through March. Markets are slow during the summer months, when spot transactions are likely to be among merchants or shippers, rather than among producers and first handlers. The likelihood of not having actual trades for particular qualities would increase during these relatively inactive spot months. This leads to an additional problem in interpretation of the quotation committee's prices. During periods of harvest and, therefore, active producer-first handler markets, the quotes are most likely to be producer prices (that is, prices actually received by producers). During relatively inactive spot months, the price quotes are no longer likely to be producer prices, but prices received by cotton shippers from sales to other shippers.

Market Information Problems

There are a number of issues relating to market information and price reporting, resulting from the institutional and structural configuration of the cotton market at the producer-first handler level. One comprehensive review of the quotation committee system for cotton price discovery was conducted during 1974 and 1975 by the National Cotton Market Study Committee at the request of the Secretary of Agriculture. The spot market issues addressed by the study committee included:

1. Representation of various industry segments on the spot quotation committees (specifically a lack of producer representation of most committees) and possible conflicts of interest of quotation committee members;
2. Whether spot market quotations should reflect only actual sales; and
3. The adequacy of market news in terms of whether to report volumes and weighted average prices (National Cotton Marketing Study Committee Report, pp. 27-58).

In the author's opinion, the study committee made diplomatic recommendations on these issues with rather insignificant changes occurring as a result.

Along a similar line, price discovery problems previously identified by Sporeleder, *et. al.* [9 pp. 8-9] are:

... Price discovery in cotton markets is based upon only partial reporting of prices and quantities sold. Lack of seller representation on price quotation committees and exclusion of cooperative pool cotton make reported prices suspect. The current price discovery processes result in the following problems for cotton producers:

1. Farmers are frequently at a disadvantage in selling their cotton because buyers are better informed of current prices in market centers and costs of moving the cotton from outlying areas.
2. Because of deficiencies in reporting of contract terms and current rates of forward contracting cotton, producers cannot accurately determine desirability of forward contracting at any particular point in time.

Thus, market information and price reporting, both spot and contract, are considered important aspects of the price-discovery problem in cotton. The structure of the spot quotation committees and their operation are an institutional factor in the price-discovery process, which clearly affects the pricing efficiency in the marketing channel for cotton lint.

One alternative for alleviating some of these price-discovery problems is computerized spot markets. The first fully computerized spot market for an agricultural commodity was for cotton. Its evolution occurred because of some unique institutional and structural elements within the marketing channel for cotton lint. These elements are examined in the following section, and the pricing efficiency of the computerized spot market and the spot quote committee system is compared.

COOPERATIVES AS FIRST HANDLERS

Four major regional producer cotton marketing cooperatives and a major marketing agency in common, called AMCOT, are important at the producer-first handler level. These organizations accounted for about 44 percent of the gross marketing volume in 1973-74 (Schmelzer and Campbell [5, p. 96]).

These four regional cooperatives are substantially different in their internal structure and operation. Calcot (California) and Staplcotn (Delta) both have optional marketing agreements with members. Marketing agreements allow these cooperatives the luxury of forward sales of cotton lint to domestic and foreign buyers based upon seasonal pools. Without marketing agreements, a cooperative can forward sell without major price risk only from inventory, if they have it, or by an opposite futures market transaction. A third cooperative, SWOG, operates mostly in southeastern portions of Arizona and in New Mexico. It is the smallest of the four major cooperatives. The fourth cooperative, PCCA, operates mostly in the Panhandle area of Texas, and is the cooperative responsible for initiation and operation of the computerized spot market.

The Evolution of Telcot

The first major regional computerized spot market for an agricultural commodity was for cotton. It began operation in 1975. The computerized spot market is owned and operated by the Plains Cotton Cooperative Association (PCCA) of Lubbock, Texas. Tracing the evolution of the computerized market will aid in assessing the chances for other cotton producing regions (California and Delta) to join TELCOT or initiate a similar operation.¹

The operation of PCCA is characterized as a "buy-sell" type cooperative as compared to Staplcotn and Calcot, which are, at least optionally, "committed marketing" cooperatives.² Theoretically, the buy-sell cooperative can diminish spatial oligopsony or pricing-efficiency problems by being a competitive buyer trying to increase producer returns, and by widely disseminating market information. However, the cooperative, in order to survive in the long run, must return producer margins above cost.

During seasons when the spot market was soft, producers would tend to deliver more cotton to PCCA than during periods of firm markets. Of course, this is precisely the opposite timing desired for receipts of cotton from the cooperative's viewpoint, given the objective of trying to return patronage refunds to members. In addition, the price risk was substantial, since the cooperative could not forward sell based on known future deliveries by its members. This forced forward sales to be made on expectations of deliveries, or deliveries which were not forward sold, had to be at least partially hedged in the futures market. This latter option subjected PCCA to basis risk and margin calls.

Because PCCA was a "buy-sell" cooperative, the cooperative (prior to TELCOT) represented a single buyer to its members. In essence, PCCA was constantly forced to take market positions when members made deliveries. TELCOT alleviated the pressure on PCCA to take "involuntary" market positions by creating a market essentially allowing others to be buyers of members' deliveries. Through TELCOT, PCCA became one of several buyers (rather than the sole buyer), which changed their stance in the market from involuntary positions to voluntary positions.

Thus, the "buy-sell" characteristic of PCCA, combined with their motivation to minimize involuntary risks, prompted the initiation of a computerized spot market. An alternative solution to the involuntary market position posture of a buy-sell cooperative is a producer sales commitment through marketing agreements. This alternative also was offered to west Texas producers, in combination with forward ownership integration into textile milling, in the form of a new cooperative (American Cotton Growers) initiated by the managers of PCCA. This alternative was offered to producers at roughly the same time as TELCOT. However, the important fact remains that PCCA was highly motivated to shift to an alternative, such as TELCOT, because of their buy-sell structure. In addition, PCCA hoped that a computerized spot market would enhance competitive pricing of their member's cotton.

Other regional cotton marketing cooperatives have optional marketing agreements. For those producers who commit to a seasonal pool, a TELCOT type alternative is of little value. A seasonal pool allows the cooperative to forward sell based upon anticipated quantity and quality of the pool receipts. This is not to say, however, that computerized spot markets would or could not successfully operate in other cotton producing areas, such as California or the Delta. The seasonal pool is only available to producers who join a cooperative with that marketing program. In each of these areas, there probably is sufficient volume from independent producers to support a computerized spot market.

PRICING EFFICIENCY

When analyzing pricing efficiency, typically, the characteristics of timeliness and accuracy are considered. Timeliness refers to the time lag between when a price is discovered and when it is "received" by other marketing channel participants who may be interested in receiving that price message. In a paper on pricing efficiency, Sporleder and Chavas [8] suggest that accuracy has both an economic and statistical meaning. The economic meaning refers to price differentials attributable to location, quality, or form. If price differences are due to location, quality or form, then these differences are part of the market information necessary for price to be an unbiased indicator of supply and demand in competitive markets.

The statistical meaning of accuracy refers to the extent of statistical error in reporting prices. This has two aspects. One is the definition of the relevant universe to be sampled. Another is the well known concept of sampling error. The definition of the relevant universe to be sampled and reported is not always easy in some agricultural commodities. Formula-priced transactions or other contract sales are particularly bothersome—it's not always clear whether they should be included, or how to describe the prices and other terms of trade in those transactions.

Comparison of Two Price-Discovery Systems

The timeliness and accuracy of the current spot quotations committee (SQC) system and the current computerized spot market are compared below. You will observe that the comparisons reveal some significant differences.

Timeliness: The current SQC system generates daily price levels for products with the quality stipulated in cotton futures contracts, but normally changes differentials from this base quality to other qualities weekly. These quality differentials tend to be less volatile over time than price level. In contrast, the TELCOT price levels and quality differentials are changed throughout the day.

Accuracy: Pricing accuracy is more difficult to judge. Quality and form differentials reflect current supply and demand conditions, and these change over time. There does not appear to be any substantial difference between the SQC system and TELCOT, in terms of accuracy of quality or form price differentials.

However, there are major differences between SQC and TELCOT in geographic pricing accuracy. To the extent the spatially dispersed, small-volume (thin) markets contribute to inaccurate price discovery, TELCOT would be a significant factor in improving spatial price accuracy. For similar products, industry sources suggest that price differences among gins have narrowed after TELCOT was introduced. Clearly, the impact of TELCOT is to equalize information between buyer and seller, provide more timely information, and expand the relevant geographic area within which market arbitrage and price discovery occur. The current SQC system is localized geographically. Traders serving on SQC are from the local area, and may not buy cotton (or be knowledgeable about prices) from other major producing regions. One would expect location differentials from computerized spot markets to be closer to those expected in competitive markets, which in turn may impact on the price level received by producers. In short, spatial oligopsony would be alleviated.

The statistical accuracy of the SQC system and TELCOT is another dimension of their pricing efficiency. The universe sampled by the market news reporter for SQC is spot transactions in the immediate geographic area of the SQC, exclusive of contracting. The sampled trades of cooperating merchants become observations on price which the quotation committee considers. The sampling procedure may miss actual trades of certain qualities. Thus, even though trades might occur, they would not necessarily form an observation on which the SQC could base their collective judgement regarding price differentials. But, shouldn't cooperative or contract transactions be considered in establishing spot market quotations? How extensive a geographic market area should be considered by local spot market committees in determining their quotations? These are two areas of controversy which relate directly to the statistical accuracy of current spot market quotations.

The extent of sampling error inherent in the SQC system is unknown. There may be important transactions in qualities thinly traded which are not sampled. The extent of coverage and representativeness of sampled transactions mostly depends on procedures followed by the market news reporter in each market. In contrast, TELCOT reports differentials on every transaction made over the system. Given this capability, the representatives of TELCOT transactions is directly related to the proportion of total spot cotton traded over the system. For the 1977-78 season, nearly 844,000 bales were sold over TELCOT.³ This represents roughly 19 percent of Texas production which was not forward contracted, and about 22 percent of west Texas production which was not forward contracted. A significantly larger share is expected for the 1978-79 season.

The Lubbock SQC now uses recaps from TELCOT in their deliberations. In addition, summary recaps of TELCOT activity are made available to other market committees. The extent to which the other committees use this expanded sample is not known.

Implications For Pricing Efficiency

The comparison between the current SQC system and TELCOT brings out two quite different aspects of pricing efficiency. They are price differentials over space and timeliness. Clearly, timeliness is superior with TELCOT, and price differentials over space are probably more accurate and reflective of supply and demand conditions. The impact of TELCOT (compared to price discovery at the gin level before TELCOT) has been to narrow spatial price differentials among gins, but intra-day price variability for a particular quality at a particular location has also increased. Obvious ancillary benefits exist from computerized recapitulation of all the transactions made over the electronic marketing system.

CONCLUDING REMARKS

Price discovery for upland cotton lint at the producer-first handler level in the marketing channel takes place in a structural environment of many relatively small buyers and sellers. However, price-discovery problems exist due to spatial oligopsony, which persists due to lack of timely and accurate market information. The institutional arrangement for spot cotton price collection and dissemination is a major question mark and has some shortcomings. The lack of centralized public market information and price reporting on contracts remains a significant problem. Of course, since contracting activity is quite variable from season to season, the importance of not having timely public market information on contracts varies accordingly.

Questions regarding the operation and composition of the spot market quotation committees, such as producer representation, have been partially resolved. Cooperatives and producers have been represented on the Fresno and Greenwood committees, for example, for several years. However, the larger question that remains concerns the role that such institutional arrangements should play in an electronic age. Fine tuning the committee system does not appear to be a laudable public policy stance in light of alternatives such as computerized spot markets.

Market information and price reporting could be substantially improved over the current committee system by wide acceptance of computerized spot markets, either nationally or regionally. In combination with a computerized spot market, a forward deliverable contract market, such as currently offered by TELCOT, could improve market information on contracts as well.

Initiation of computerized spot markets in the major production areas of California and the Delta through producer cooperatives does not appear likely because of internal structural differences, primarily their use of marketing agreements. As a consequence, private firm or government initiation probably would be necessary. If private firms operate computerized spot markets for profit, welfare questions concerning information flows among non-users and users become an important policy consideration. Clearly, the desirable impact of the pricing efficiency of computerized spot markets would be blunted if market information were not made available to the public.

Computerized spot markets do not represent a solution for the long-run problems facing the cotton producer. Computerized spot markets will not assist producers in maintaining or slowing the decline in cotton's share of the total fiber market. In the long run, alternatives such as forward ownership integration by producers for market protection purposes may be more important. But, computerized spot markets can offer some help in solving the short-term price-discovery problems of many market participants, and help ensure a more equitable and efficient price structure.

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FOOTNOTES

- ¹ Details of the TELCOT operation may be found in Sporleder et al, (pp. 16-19) and Ethridge.
- ² See Knutson (p. 301) for a definition of each type of cooperative.
- ³ Ethridge (p. 179) indicates that TELCOT volume essentially has doubled each season since the 1975-76 season.