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A COMPARATIVE REGIONAL ANALYSIS OF THE WHOLESALE MARKETING MARGIN FOR CRUSHED COTTONSEED

M. Dean Ethridge

Economic events since the 1972-73 crop year have generated much interest in cottonseed prices. Cotton producers, observing a doubling of wholesale prices of cottonseed oil and meal during the last three years, have wondered whether they are getting an equitable share of this increased income. They have largely stopped thinking of their cottonseed as merely a means of payment for ginning charges and have begun to regard it as a potential source of supplementary income.

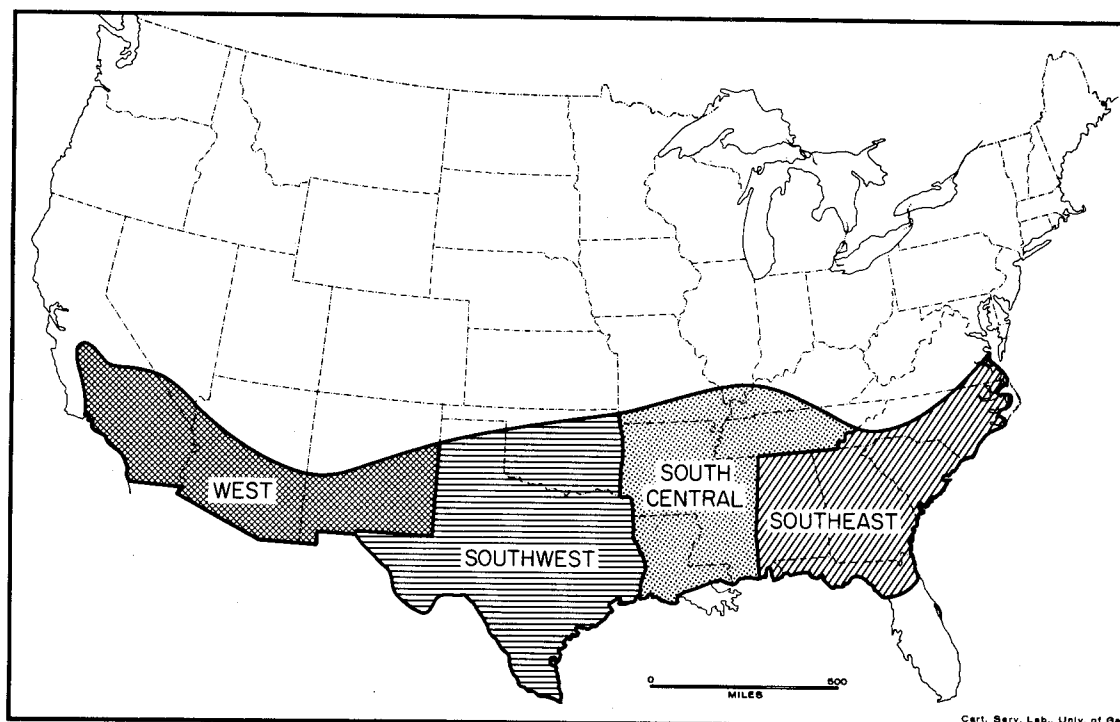
The limited objective of this paper is to examine, by regions, the wholesale marketing margin

for cottonseed during the crop years of 1958-1973 in order to (1) more clearly determine how the marketing margin has behaved and (2) discover differences, if any, among regional marketing margins.

REGIONAL BREAKDOWN

Cotton is produced in southern portions of the United States, generally south of the 36th parallel. Four major cotton producing regions can be delineated (Figure 1), each region containing all or

Figure 1. FOUR MAJOR COTTON PRODUCTION REGIONS IN THE UNITED STATES



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portions of the following states:

Southeast Region—Alabama, Florida, Georgia, North Carolina, South Carolina, and Virginia.

South Central Region—Arkansas, Louisiana, Mississippi, Missouri, Tennessee, Illinois, and Kentucky.

Southwest Region—Oklahoma and Texas.

West Region—Arizona, California, New Mexico, and Nevada.

This regional breakdown, often used by the U.S. Department of Agriculture [3, 13], provides production and marketing areas distinctive enough to warrant separate economic analysis. Northern and Southern boundaries of cotton production shown in Figure 1 were taken from [18, Figure 9].

MARKET VALUE OF COTTONSEED PRODUCTS

Cottonseed not kept for next season's planting is sent to crushing plants where four marketable products are normally obtained: cottonseed oil, meal, linters and hulls. Table 1 shows regional estimates of the yield of products from a ton of cottonseed during the years 1958-73, expressed in both pounds and percent. Yields of the various products differ among regions, with largest oil yields in the West, largest meal and linters yields in the Southeast, and largest yields of hulls in the Southwest. Average yields for all four regions are: oil—16.6%; meal—46.5%; linters—9.4%; and

Table 1. REGIONAL YIELDS OF COTTONSEED OIL, MEAL, LINTERS, HULLS AND WASTE PRODUCTS FROM CRUSHING A TON OF COTTONSEED, AVERAGE FOR 1958-73^a

| Region | Yield of Products Per Ton of Seed Crushed | | | | | | | | Waste ^b | |
|---------------|---|-----|-------|-----|---------|-----|-------|-----|--------------------|-----|
| | Oil | | Meal | | Linters | | Hulls | | | |
| | % | lb. | % | lb. | % | lb. | % | lb. | % | lb. |
| Southeast | 16.55 | 331 | 47.40 | 948 | 10.80 | 216 | 18.95 | 379 | 6.30 | 126 |
| South Central | 16.45 | 329 | 46.10 | 922 | 9.25 | 185 | 22.45 | 449 | 5.75 | 115 |
| Southeast | 16.10 | 322 | 46.25 | 925 | 7.90 | 158 | 25.90 | 518 | 3.85 | 77 |
| West | 17.35 | 347 | 46.15 | 923 | 9.50 | 190 | 22.45 | 449 | 4.55 | 91 |
| Average | 16.61 | 332 | 46.48 | 930 | 9.36 | 198 | 22.44 | 449 | 5.11 | 102 |

^a Regional yield data were available only for the 1965-72 crop years. For these 7 years, average regional yields were expressed as percentages of average U.S. yields. Then, assuming these percentages to be constant over the 1958-73 period, average U.S. yield data for the 16-year period was multiplied by regional percentages in order to derive the regional estimates shown.

^b Includes motes, grabbots, and hullfibers.

SOURCE: U.S. Department of Agriculture (15, Tables 14 and 20), with data for 1971-73 furnished directly by the Commodity Economics Division.

hulls—22.4%. The remaining 5.1% of average volume of a ton of cottonseed is waste material with no market value.

Annual estimates of regional wholesale market prices for each cottonseed product (Table 2, first four columns) provide fairly good indicators of regional prices, although two qualifications should be emphasized. First, oil prices in the West Region were obtained by adjusting wholesale prices for crude soybean oil. Conversations with industry personnel in California revealed that, due to the vertically integrated structure of crushing and refining firms, very little crude cottonseed oil is

wholesaled in the West Region. Whenever it is, however, the rule-of-thumb used in setting price is to increase the Decatur, Illinois crude soybean price by 15 to 20 percent. Based on this, the Decatur price was increased by 17.5 percent to obtain cottonseed oil prices for the West Region.

The second qualification concerns hull prices, for which data prior to 1969 are available only for the Southeast Region. Assuming these prices to be fairly stable and comparable among regions during the period 1958-68, Southeast prices were used for all regions up to 1969 and available regional data thereafter.

Table 2. COTTONSEED BY REGIONS: WHOLESALE MARKET VALUE, FARM PRICE, MARKET MARGIN, AND FARMERS' SHARE OF INCOME, PER TON BASIS, 1958-73

SOUTHEAST

| Year beginning August | (A) Wholesale market prices of products | | | | (B) | (C) | (D) | (E) |
|-----------------------------|--|-------------------|----------------------|--------------------|--|--|------------------------------|----------------------------|
| | Oil ^a | Meal ^b | Linters ^c | Hulls ^d | Wholesale value of products ^e | Farm price for cottonseed ^f | Marketing margin (B-C) | Farmers' share (C+B) |
| | | | | | | | | |
| | | | | Dollars per ton | | | | Percent |
| 1958 | 234.00 | 65.08 | 121.60 | 7.00 | 84.03 | 47.10 | 36.93 | 56.0 |
| 1959 | 200.00 | 60.56 | 121.20 | 7.00 | 76.22 | 35.10 | 41.12 | 46.0 |
| 1960 | 236.00 | 60.07 | 124.80 | 7.00 | 82.34 | 36.20 | 46.14 | 44.0 |
| 1961 | 250.00 | 64.99 | 147.40 | 10.00 | 89.99 | 45.70 | 44.29 | 50.8 |
| 1962 | 210.00 | 70.81 | 135.80 | 15.00 | 85.83 | 45.60 | 40.23 | 53.1 |
| 1963 | 200.00 | 67.75 | 135.40 | 15.00 | 82.68 | 47.30 | 35.38 | 57.2 |
| 1964 | 232.00 | 63.69 | 124.80 | 15.00 | 84.91 | 44.00 | 40.91 | 51.8 |
| 1965 | 260.00 | 73.25 | 128.00 | 18.00 | 94.99 | 44.30 | 50.69 | 46.6 |
| 1966 | 260.00 | 83.67 | 167.60 | 22.00 | 104.96 | 63.80 | 41.16 | 60.8 |
| 1967 | 256.00 | 80.27 | 154.60 | 22.00 | 101.28 | 51.90 | 49.38 | 51.2 |
| 1968 | 232.00 | 69.08 | 128.20 | 11.00 | 87.07 | 49.10 | 37.97 | 56.4 |
| 1969 | 244.00 | 74.85 | 100.80 | 29.60 | 92.36 | 40.00 | 52.36 | 43.3 |
| 1970 | 294.00 | 78.46 | 108.00 | 23.00 | 101.87 | 50.20 | 51.67 | 49.3 |
| 1971 | 272.00 | 79.28 | 133.80 | 26.00 | 101.97 | 50.80 | 51.17 | 49.8 |
| 1972 | 330.00 | 152.53 | 105.40 | 21.00 | 142.28 | 45.20 | 97.08 | 31.8 |
| 1973 | 620.00 | 142.20 | 186.80 | 21.00 | 194.17 | 93.80 | 100.37 | 48.3 |
| 1958-73 Average | 270.62 | 80.41 | 132.76 | 16.85 | 100.43 | 49.38 | 51.05 | 49.8 |
| 1958-71 Average | 241.43 | 70.84 | 130.86 | 16.26 | 90.75 | 46.51 | 44.24 | 51.2 |

SOUTH CENTRAL

| Year beginning August | (A) Wholesale market prices of products | | | | (B) Wholesale value of products ^e | (C) Farm price for cottonseed ^f | (D) Marketing margin (B-C) | (E) Farmers' share (C+B) |
|-----------------------------|--|-------------------|----------------------|--------------------|---|---|-------------------------------------|-----------------------------------|
| | Oil ^a | Meal ^b | Linters ^c | Hulls ^d | Dollars per ton | Percent | | |
| | | | | | | | | |
| 1958 | 230.40 | 60.55 | 118.20 | 7.00 | 78.32 | 45.20 | 33.12 | 57.7 |
| 1959 | 199.20 | 55.65 | 120.60 | 7.00 | 71.15 | 38.00 | 33.15 | 53.4 |
| 1960 | 232.80 | 55.10 | 130.00 | 7.00 | 77.29 | 41.10 | 36.19 | 53.2 |
| 1961 | 247.80 | 59.25 | 149.60 | 10.00 | 84.16 | 50.40 | 33.76 | 59.9 |
| 1962 | 207.40 | 65.60 | 141.60 | 15.00 | 80.82 | 47.70 | 33.12 | 59.0 |
| 1963 | 197.40 | 63.35 | 144.80 | 15.00 | 78.44 | 51.90 | 26.54 | 66.2 |
| 1964 | 230.40 | 59.90 | 134.40 | 15.00 | 81.31 | 47.90 | 33.41 | 58.9 |
| 1965 | 256.60 | 68.80 | 129.00 | 18.00 | 89.90 | 47.30 | 42.60 | 52.6 |
| 1966 | 257.80 | 78.55 | 173.80 | 22.00 | 99.64 | 67.90 | 31.74 | 68.1 |
| 1967 | 253.40 | 77.40 | 166.80 | 22.00 | 97.73 | 56.70 | 41.03 | 58.0 |
| 1968 | 231.20 | 66.70 | 136.00 | 11.00 | 83.83 | 50.80 | 33.03 | 60.6 |
| 1969 | 241.00 | 71.00 | 110.60 | 19.06 | 86.88 | 41.80 | 45.08 | 48.1 |
| 1970 | 294.20 | 73.50 | 113.80 | 19.72 | 97.23 | 55.50 | 41.73 | 57.1 |
| 1971 | 264.60 | 73.90 | 141.80 | 14.41 | 93.95 | 56.60 | 37.35 | 60.2 |
| 1972 | 274.40 | 144.80 | 100.60 | 17.46 | 125.12 | 48.30 | 76.82 | 38.6 |
| 1973 | 614.20 | 138.00 | 186.40 | 27.42 | 188.05 | 99.50 | 88.55 | 52.9 |
| 1958-73 Average | 264.55 | 75.75 | 137.37 | 15.44 | 94.61 | 52.91 | 41.70 | 56.5 |
| 1958-71 Average | 238.87 | 66.37 | 136.50 | 14.44 | 85.76 | 49.91 | 35.85 | 58.1 |

SOUTHWEST

| Year beginning August | (A) | | | | (B) | (C) | (D) | (E) |
|-----------------------------|-------------------------------------|-------------------|----------------------|--------------------|--|--|------------------------------|----------------------------|
| | Wholesale market prices of products | | | | Wholesale value of products ^e | Farm price for cottonseed ^f | Marketing margin (B-C) | Farmers' share (C+B) |
| | Oil ^a | Meal ^b | Linters ^c | Hulls ^d | | | | |
| | Dollars per ton | | | | | | | Percent |
| 1958 | 225.20 | 59.39 | 117.60 | 7.00 | 74.83 | 42.30 | 32.53 | 56.5 |
| 1959 | 194.60 | 59.01 | 123.40 | 7.00 | 70.18 | 38.20 | 31.98 | 54.4 |
| 1960 | 232.40 | 52.81 | 130.00 | 7.00 | 73.92 | 41.30 | 32.62 | 55.9 |
| 1961 | 244.00 | 58.88 | 135.40 | 10.00 | 79.80 | 51.30 | 28.50 | 64.3 |
| 1962 | 203.40 | 64.15 | 138.60 | 15.00 | 77.25 | 47.70 | 29.55 | 61.7 |
| 1963 | 197.00 | 64.60 | 134.20 | 15.00 | 76.08 | 52.60 | 23.48 | 69.1 |
| 1964 | 232.40 | 59.27 | 130.40 | 15.00 | 79.02 | 47.30 | 31.72 | 59.9 |
| 1965 | 255.40 | 66.15 | 125.80 | 18.00 | 86.31 | 46.80 | 39.51 | 54.3 |
| 1966 | 258.00 | 81.79 | 170.80 | 22.00 | 98.56 | 67.30 | 31.26 | 68.3 |
| 1967 | 249.40 | 75.13 | 159.20 | 22.00 | 93.18 | 55.90 | 37.28 | 60.0 |
| 1968 | 227.40 | 65.65 | 126.40 | 11.00 | 79.81 | 50.40 | 29.41 | 63.2 |
| 1969 | 237.60 | 74.59 | 98.20 | 24.94 | 86.97 | 42.10 | 44.87 | 48.4 |
| 1970 | 290.80 | 81.06 | 110.60 | 28.94 | 100.54 | 55.20 | 45.34 | 54.9 |
| 1971 | 261.00 | 79.22 | 140.60 | 28.29 | 97.09 | 56.50 | 40.59 | 58.2 |
| 1972 | 223.40 | 144.78 | 99.40 | 25.22 | 117.31 | 48.80 | 68.51 | 41.6 |
| 1973 | 610.00 | 143.45 | 187.60 | 35.33 | 188.53 | 94.50 | 94.03 | 50.1 |
| 1958-73 Average | 258.87 | 76.87 | 133.01 | 18.23 | 92.46 | 52.39 | 40.07 | 57.5 |
| 1958-71 Average | 236.33 | 67.26 | 131.51 | 16.51 | 83.82 | 49.64 | 34.19 | 59.2 |

WEST

| Year beginning August | (A) Wholesale market prices of products | | | | (B) Wholesale value of products ^e | (C) Farm Price for cottonseed ^f | (D) Marketing margin (B-C) | (E) Farmers' share (C+B) |
|-----------------------------|--|-------------------|----------------------|--------------------|---|---|-------------------------------------|-----------------------------------|
| | Oil ^a | Meal ^b | Linters ^c | Hulls ^d | | | | |
| | Dollars per ton | | | | Percent | | | |
| 1958 | 226.00 | 60.70 | 131.20 | 7.00 | 81.26 | 43.30 | 37.96 | 53.3 |
| 1959 | 196.00 | 61.20 | 153.40 | 7.00 | 78.39 | 43.50 | 34.89 | 55.5 |
| 1960 | 260.00 | 54.35 | 130.40 | 7.00 | 84.15 | 50.40 | 33.75 | 59.9 |
| 1961 | 232.00 | 62.52 | 145.20 | 10.00 | 85.14 | 55.40 | 29.74 | 65.1 |
| 1962 | 206.00 | 72.54 | 131.40 | 15.00 | 85.07 | 50.00 | 35.07 | 58.8 |
| 1963 | 198.00 | 70.62 | 128.00 | 15.00 | 82.47 | 48.10 | 34.37 | 58.3 |
| 1964 | 258.00 | 63.17 | 137.60 | 15.00 | 90.36 | 48.30 | 42.06 | 53.5 |
| 1965 | 268.00 | 70.70 | 133.00 | 18.00 | 95.80 | 47.30 | 48.50 | 49.4 |
| 1966 | 254.00 | 76.78 | 172.40 | 22.00 | 100.82 | 61.50 | 39.32 | 61.0 |
| 1967 | 204.00 | 74.28 | 149.00 | 22.00 | 88.77 | 53.60 | 35.17 | 60.4 |
| 1968 | 190.00 | 68.52 | 133.80 | 11.00 | 79.77 | 50.90 | 28.87 | 63.8 |
| 1969 | 254.00 | 72.42 | 96.20 | 19.91 | 91.10 | 38.90 | 52.20 | 42.7 |
| 1970 | 294.00 | 87.25 | 119.00 | 24.30 | 108.04 | 64.60 | 43.44 | 59.8 |
| 1971 | 280.00 | 86.70 | 119.40 | 26.58 | 105.90 | 62.10 | 43.80 | 58.6 |
| 1972 | 312.00 | 147.53 | 105.60 | 23.46 | 137.52 | 55.10 | 82.42 | 40.1 |
| 1973 | 688.00 | 148.54 | 223.80 | 40.29 | 218.23 | 114.40 | 103.83 | 52.4 |
| 1958-73 Average | 270.00 | 79.86 | 138.09 | 17.72 | 100.80 | 55.46 | 45.34 | 55.8 |
| 1958-71 Average | 237.14 | 70.12 | 134.29 | 15.70 | 89.79 | 51.28 | 38.51 | 57.1 |

See footnotes on following page.

(Table 2, continued)

^a Season average price of crude cottonseed oil in tank cars, f.o.b., at the following regional market points: Southeast—all Southeastern mills; South Central—all Mississippi Valley points; Southwest—Waco, Texas; and West—estimated by increasing the crude soybean oil price at Decatur, Illinois by 17.5%.

SOURCE: U.S. Department of Agriculture [14, 15].

^b Season average price of bulk cottonseed meal, 41% protein, at the following regional market points: Southeast—Atlanta; South Central—Memphis; Southwest—Lubbock, Texas; and West—California mills.

SOURCE: U.S. Department of Agriculture [10].

^c Season weighted average price of grade 4, staple 4 linters, at the following regional market points: Southeast—Atlanta; South Central—Memphis; Southwest—Dallas; and West—Los Angeles.

SOURCE: U.S. Department of Agriculture [11]. Years prior to 1963 were obtained from unpublished work sheets.

^d Season average price of cottonseed hulls in carload lots, at the following regional market points: Southeast—Atlanta; South Central—for 1958-68, Atlanta prices; for 1969-73, Mississippi Valley points; Southwest—for 1958-68, Atlanta prices; for 1969-73, Texas and Oklahoma market points; and West—for 1958-68, Atlanta prices; for 1969-73, California market points.

SOURCE: U.S. Deptment of Agriculture [14] and ARS working papers.

^e Weighted average of the four product prices, the weights being proportionate yields in Table 1.

^f Weighted average of state prices.

SOURCE: U.S. Department of Agriculture [16, 17].

Inspection of the wholesale product prices in Table 2 reveals some notable differences among regions. Average oil price over the 16-year period, for example, varies from a low of \$258.88 per ton (about 12.9¢ per pound) in the Southwest Region to a high of \$270.88 per ton (about 13.5¢ per pound) in the Southeast Region. Divergence among regional prices has tended to increase in recent years; thus, in 1972, wholesale price of oil was almost 48 percent higher in the Southeast than in the Southwest.

Table 2 also shows data averages over the 14-year period prior to the 1972 and 1973 crop years. This facilitates assessments of price alterations during these last two years. Average oil price over the 14-year period was \$241.43 per ton in the Southeast. In 1972 it was \$330 per ton (an increase of 37 percent over the 14-year average) and in 1973 it rose to \$620 per ton (an increase of 15 percent over the 14-year average). Increases in cottonseed meal prices were also quite large during 1972 and 1973, generally increasing 100 percent or more over the average price of the previous 14 years (Table 2).

Column B of Table 2 gives annual regional wholesale values of products obtained from cottonseed. This column is derived by multiplying each product price by appropriate regional yield coefficients (i.e., the percentages in Table 1) and summing the weighted prices for each year. The 16-year averages for these wholesale values vary from \$92.46 per ton of cottonseed in the Southwest to \$100.80 per ton in the West. Differences between regions in individual years are often substantial, although regional values rarely move in opposite directions from year to year. Large increases in wholesale values in 1972 and 1973 are observed for all regions (Table 2, Column B).

Such dramatic wholesale price changes—both within and among regions—during the 1972 and 1973 crop years could severely challenge the marketing system to make adequate adjustments. In particular, if time lags of a few months' length between purchasing cottonseed and selling the products are common, the wholesaler may find the value of cottonseed products has increased much more than he anticipated, thus making his marketing margin larger than planned. Such large price

changes are usually accompanied by increased price uncertainty in the market. This may compel wholesalers to hold a higher share of the wholesale value as payment for bearing greater risk and uncertainty.

MARKETING MARGIN AND FARMERS' SHARE

Column C of Table 2 contains regional farm prices for cottonseed. These were subtracted from wholesale product values to obtain the marketing margin (Column D) and divided by wholesale product values to obtain the farmers' share of wholesale income from cottonseed products (Column E).

On average, marketing margins have been lowest, and farmers' shares highest, in the Southwest Region. Conversely, marketing margins have been highest and farmers' shares lowest in the Southeast Region. Actually, the farmers' shares tend to be quite similar among all regions except the Southeast, which has averaged 10-14 percent below that of other regions during the 16-year period. This pattern is further demonstrated by dividing the sixteen years into four successive 4-year periods and averaging farmers' shares during each sub-period. It is apparent that average farmers' shares declined in all regions during 1970-73 (Table 3).

Table 3. REGIONAL AVERAGES OF FARMERS' SHARE OF WHOLESALE COTTONSEED VALUE DURING SUCCESSIVE FOUR-YEAR PERIODS, 1958-1973 ^a

| Crop Years | Regions | | | |
|---------------|-------------------|---------------|-----------|------|
| | Southeast | South Central | Southwest | West |
| | -----Percent----- | | | |
| 1958-61 | 49.2 | 56.0 | 57.8 | 58.4 |
| 1962-65 | 52.2 | 59.2 | 61.2 | 55.0 |
| 1966-69 | 52.9 | 58.7 | 60.0 | 57.0 |
| 1970-73 | 44.8 | 52.2 | 51.2 | 52.7 |

^a Average of annual figures in Table 2, Column E.

Monthly data for August, 1974 through January, 1975 indicate that wholesale values and market margins have continued to increase. Farmers' shares have also increased somewhat. The marketing system may be "catching up" with economic events and adjusting pricing policies to be more in line with historical criteria. Conclusions will have to wait for additional data and analysis.

As previously mentioned, farmers have traditionally viewed income from cottonseed primarily as a means of paying ginning charges. This is understandable, given the fact that most of the revenue from cottonseed has historically paid for ginning charges. This suggests that lower cottonseed prices in some regions may be accompanied

by relatively lower ginning charges—implying that the management of cotton gins subsidize their ginning costs by paying less for cottonseed or, conversely, partially offset higher prices paid for cottonseed by higher ginning charges. Not separating these distinct enterprises in accounting records would, of course, be unacceptable accounting procedure.¹ Nevertheless, an inverse relationship between ginning charges and cottonseed prices would be an interesting phenomenon to economists and farmers.

Regional ginning charges per bale of cotton during 1958-73 may be expressed as charges per ton of cottonseed (Table 4). These charges can then be used to obtain estimates from farm cotton-

¹ Even ginning operations that pertain to both cottonseed and cotton fiber should have cost allocated between the two on a prorata basis.

Table 4. REGIONAL GINNING CHARGES PER TON OF COTTONSEED, 1958-73 ^a

| Year Beginning August | Southeast | South Central | Southwest | West |
|---------------------------|-----------|------------------|-----------|-------|
| -----Dollars per Ton----- | | | | |
| 1958 | 27.33 | 35.99 | 37.29 | 37.45 |
| 1959 | 28.59 | 36.73 | 38.50 | 38.76 |
| 1960 | 30.23 | 37.14 | 39.37 | 39.85 |
| 1961 | 32.25 | 39.79 | 43.75 | 43.45 |
| 1962 | 32.55 | 40.28 | 44.43 | 44.76 |
| 1963 | 32.96 | 39.37 | 44.02 | 45.56 |
| 1964 | 33.41 | 39.52 | 43.80 | 44.27 |
| 1965 | 34.34 | 40.11 | 45.64 | 45.90 |
| 1966 | 34.83 | 42.31 | 47.72 | 48.19 |
| 1967 | 34.81 | 41.82 | 47.09 | 51.01 |
| 1968 | 37.88 | 42.43 | 46.85 | 50.86 |
| 1969 | 37.17 | 44.15 | 48.45 | 53.36 |
| 1970 | 39.70 | 45.37 | 48.33 | 54.50 |
| 1971 | 41.35 | 45.77 | 55.88 | 56.11 |
| 1972 | 44.43 | 47.19 | 55.59 | 54.75 |
| 1973 | 52.23 | 55.25 | 61.37 | 57.37 |
| <hr/> | | | | |
| 1958-73 Average | 35.90 | 42.08 | 46.75 | 47.88 |
| <hr/> | | | | |
| 1958-71 Average | 34.10 | 40.77 | 45.08 | 46.72 |

^a Derived by multiplying average regional ginning charges per bale by average regional ratio of cotton bales to one ton of cottonseed. These ratios were: Southeast—2.46; South Central—2.45; Southwest—2.42; and West—2.43.

SOURCE: For ginning charges, Ghetti and Looney (3, Table 1) and U.S. Department of Agriculture [12]. For cotton and cottonseed production, U.S. Department of Agriculture [17].

seed prices, wholesale marketing margins and farmers' shares after allowance is made for ginning charges (Table 5). Cottonseed price and farmers' shares are greatly reduced when expressed net of ginning charges. In fact, they are occasionally negative, if total ginning charges are larger than cottonseed price. Marketing margins are increased by the amount of ginning charges (Table 5).

Comparisons among regions after allowance

is made for ginning charges (Table 5) must be altered from those made without adjustments for ginning charges (Table 2). The Southeast, then, has the highest average cottonseed "price" and "farmer's share" over the 16-year period. The margin-plus-ginning-charges indicate much more equality among the four regions than do unadjusted marketing margins.

These observations are not conclusive. It can

Table 5. COTTONSEED BY REGIONS: WHOLESALE MARKET VALUE, FARM PRICE, MARKETING MARGIN AND FARMERS' SHARE AFTER ALLOWANCE IS MADE FOR GINNING CHARGES, PER TON BASIS, 1958-73 ^a

| SOUTHEAST | | | | |
|-----------------------|-----------------------------|--|---------------------------------------|--------------------------------------|
| Year Beginning August | Wholesale Value of Products | Farm Cottonseed Price Less Ginning Charges | Marketing Margin Plus Ginning Charges | Farmers' Share After Ginning Charges |
| | | Dollars per Ton | | Percent |
| 1958 | 84.03 | 19.77 | 64.26 | 23.5 |
| 1959 | 76.22 | 6.51 | 69.71 | 8.5 |
| 1960 | 82.34 | 5.97 | 76.37 | 7.3 |
| 1961 | 89.99 | 13.45 | 76.54 | 14.9 |
| 1962 | 85.83 | 13.05 | 72.78 | 15.2 |
| 1963 | 82.68 | 14.34 | 68.34 | 17.3 |
| 1964 | 84.91 | 10.59 | 74.32 | 12.5 |
| 1965 | 94.99 | 9.96 | 85.03 | 10.5 |
| 1966 | 104.96 | 28.97 | 75.99 | 27.6 |
| 1967 | 101.28 | 17.09 | 84.19 | 16.9 |
| 1968 | 87.07 | 11.22 | 75.85 | 12.9 |
| 1969 | 92.36 | 2.83 | 89.53 | 3.1 |
| 1970 | 101.87 | 10.50 | 91.37 | 10.3 |
| 1971 | 101.97 | 9.45 | 92.52 | 9.3 |
| 1972 | 142.28 | .77 | 141.51 | .5 |
| 1973 | 194.17 | 41.57 | 152.60 | 21.4 |
| 1958-73 Average | 100.43 | 13.48 | 86.95 | 13.4 |
| 1958-71 Average | 90.75 | 12.41 | 78.34 | 13.6 |

| SOUTH CENTRAL | | | | |
|-----------------------|-----------------------------|--|---------------------------------------|--------------------------------------|
| Year Beginning August | Wholesale Value of Products | Farm Cottonseed Price Less Ginning Charges | Marketing Margin Plus Ginning Charges | Farmers' Share After Ginning Charges |
| | | Dollars per Ton | | Percent |
| 1958 | 78.32 | 9.21 | 69.11 | 11.8 |
| 1959 | 71.15 | 1.27 | 69.88 | 1.8 |
| 1960 | 77.29 | 3.96 | 73.33 | 5.1 |
| 1961 | 84.16 | 10.61 | 73.55 | 12.6 |
| 1962 | 80.82 | 7.42 | 73.40 | 9.2 |
| 1963 | 78.44 | 12.53 | 65.91 | 16.0 |
| 1964 | 81.31 | 8.38 | 72.93 | 10.3 |
| 1965 | 89.90 | 7.19 | 82.71 | 8.0 |
| 1966 | 99.64 | 25.59 | 74.05 | 25.7 |
| 1967 | 97.73 | 14.88 | 82.85 | 15.2 |
| 1968 | 83.83 | 8.37 | 75.46 | 10.0 |
| 1969 | 86.88 | -2.35 | 89.23 | -2.7 |
| 1970 | 97.23 | 10.13 | 87.10 | 10.4 |
| 1971 | 93.95 | 10.83 | 83.12 | 11.5 |
| 1972 | 125.12 | 1.11 | 124.01 | .9 |
| 1973 | 188.05 | 44.25 | 143.80 | 23.5 |
| 1958-73 Average | 94.61 | 10.84 | 83.78 | 10.6 |
| 1958-71 Average | 85.76 | 9.14 | 76.62 | 10.4 |

| SOUTHWEST | | | | |
|-----------------------|-----------------------------|--|---------------------------------------|--------------------------------------|
| Year Beginning August | Wholesale Value of Products | Farm Cottonseed Price Less Ginning Charges | Marketing Margin Plus Ginning Charges | Farmers' Share After Ginning Charges |
| | | Dollars per Ton | | Percent |
| 1958 | 74.83 | 5.01 | 69.82 | 6.7 |
| 1959 | 70.18 | -.30 | 70.48 | -.4 |
| 1960 | 73.92 | 1.93 | 71.99 | 2.6 |
| 1961 | 79.80 | 7.55 | 72.25 | 9.5 |
| 1962 | 77.25 | 3.27 | 73.98 | 4.2 |
| 1963 | 76.08 | 8.58 | 67.50 | 11.3 |
| 1964 | 79.02 | 3.50 | 75.52 | 4.4 |
| 1965 | 86.31 | 1.16 | 85.15 | 1.3 |
| 1966 | 98.56 | 19.58 | 78.98 | 19.9 |
| 1967 | 93.18 | 8.81 | 84.37 | 9.5 |
| 1968 | 79.81 | 3.55 | 76.26 | 4.4 |
| 1969 | 86.97 | -6.35 | 93.32 | -7.3 |
| 1970 | 100.54 | 6.87 | 93.67 | 6.8 |
| 1971 | 97.09 | .62 | 96.47 | .6 |
| 1972 | 117.31 | -7.19 | 124.50 | -6.1 |
| 1973 | 188.53 | 33.13 | 155.40 | 17.6 |
| 1958-73 Average | 92.46 | 5.63 | 86.84 | 6.1 |
| 1958-71 Average | 83.82 | 4.56 | 79.27 | 5.4 |

| WEST | | | | |
|-----------------------|-----------------------------|--|---------------------------------------|--------------------------------------|
| Year Beginning August | Wholesale Value of Products | Farm Cottonseed Price Less Ginning Charges | Marketing Margin Plus Ginning Charges | Farmers' Share After Ginning Charges |
| | | Dollars per Ton | | Percent |
| 1958 | 81.26 | 5.85 | 75.41 | 7.2 |
| 1959 | 78.39 | 4.74 | 73.65 | 6.0 |
| 1960 | 84.15 | 10.55 | 73.60 | 12.5 |
| 1961 | 85.14 | 11.95 | 73.19 | 14.0 |
| 1962 | 85.07 | 5.24 | 79.83 | 6.2 |
| 1963 | 82.47 | 2.54 | 79.93 | 3.1 |
| 1964 | 90.36 | 4.03 | 86.33 | 4.5 |
| 1965 | 95.80 | 1.40 | 94.40 | 1.5 |
| 1966 | 100.82 | 13.31 | 87.51 | 13.2 |
| 1967 | 88.77 | 2.59 | 86.18 | 2.9 |
| 1968 | 79.77 | .04 | 79.73 | .1 |
| 1969 | 91.10 | -14.46 | 105.56 | -15.9 |
| 1970 | 108.04 | 10.10 | 97.94 | 9.3 |
| 1971 | 105.90 | 5.99 | 99.91 | 5.7 |
| 1972 | 137.52 | .35 | 137.17 | .3 |
| 1973 | 218.23 | 57.03 | 161.20 | 26.1 |
| 1958-73 Average | 100.80 | 7.58 | 93.22 | 7.5 |
| 1958-71 Average | 89.79 | 4.56 | 85.23 | 5.1 |

^a Contents derived from data in Tables 2 and 3.

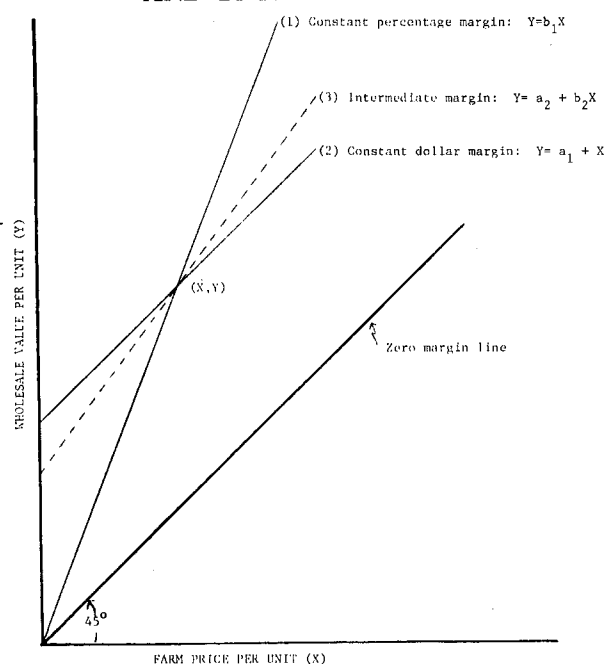
only be said that pricing policies which tie cottonseed prices to ginning charges are consistent with these results. To the extent that such practices are different among regions, interregional comparisons are made more difficult. Furthermore, to the extent that such pricing policies are unsystematic from year-to-year within a region, intertemporal comparisons are made more difficult.

FURTHER EXAMINATION OF MARKETING MARGIN BEHAVIOR

Further examination of marketing margin behavior was made using linear regression analysis. The primary purpose was to obtain evidence as to whether the marketing margin was "unusually" large during the 1972-73 and 1973-74 crop years—unusual in the sense that larger margins are not explained by causal factors expected to be systematically related to margin levels.

Two major types of systematic margins may be distinguished:² an absolute margin (fixed dollars-per-unit mark-up) and a percentage margin (fixed percentage of farm price). These two types of margins may be simply illustrated using a two-dimensional graph with farm price on the hori-

Figure 2. ILLUSTRATION OF ALTERNATIVE LINEAR RELATIONSHIPS BETWEEN WHOLESALE VALUE AND FARM PRICE



zontal axis and wholesale value on the vertical axis (Figure 2). The 45° line through the origin locates the zero margin line; therefore, a line relating wholesale value to farm price cannot fall below this line at any point.³ If the marketing margin is of the fixed percentage type, it will extend from the origin into the upper half of the quadrant, e.g., line (1) in Figure 2. The steeper the slope, the larger the percentage mark-up. If the margin is an absolute (or constant dollar) type, the relevant line will be parallel to the zero margin line, e.g., line (2) in Figure 2. The farther above the zero margin line, the larger the absolute mark-up. The marketing margin for any given commodity or group of commodities may exhibit intermediate behavior between a totally fixed percentage type and a totally fixed dollar type (line [3] in Figure 2). Each type of margin behavior has implications for farm price and income fluctuations, extensively developed in agricultural marketing literature [4, 7, 9].

Linear regression may be used to estimate marketing margin relationships like those in Figure 2. However, regressing wholesale value on farm price alone, using time-series data, would ignore the reality of increasing expenses all along the marketing chain, thereby introducing specification error. Thus, the spread between wholesale and farm values of cottonseed is expected to increase as processing and related marketing costs increase. In an attempt to allow for the effect of marketing costs, a representative cost index was derived using four major cost categories: labor, machinery, transportation, and fuel and electricity costs. While these costs are not exhaustive, they are dominant ones that are readily translated into higher wholesale prices. Based on previous studies [2, 6, 8] and on current contacts with cottonseed industry personnel, estimated relative cost shares are: labor costs—35 percent; machinery costs—25 percent; transportation costs—24 percent; and fuel and electricity costs—16 percent.

Cost indexes for each of the four categories were computed and, using above percentages, a weighted average index was derived for the years 1958-73 (Table 6).⁴ Lack of adequate data made derivation of a separate marketing cost index for each region impossible.

² This ignores "non-systematic" margins, which may result from oligopolistic or monopolistic competition types of pricing policies, such as "following the leader", "meeting or beating competition", and short-run profit maximization (4).

³ To do so would mean that wholesalers were paying for the privilege of handling the commodity! See (7, Ch. 19) for a similar presentation.

⁴ A similar marketing cost index was used by Ethridge and Brannen (1).

Table 6. DETERMINATION OF A WEIGHTED AVERAGE COST INDEX (1967 = 100) FOR WHOLESALE MARKETING OF COTTONSEED PRODUCTS, 1958-73

| Year | Labor Cost Index ^a | Machinery Cost Index ^b | Transportation Cost Index ^c | Fuel and Electricity Cost Index ^d | Weighted Average Cost Index ^e |
|------|-------------------------------------|---|--|---|---|
| | -----Percent----- | | | | |
| 1958 | 72.0 | 87.5 | 112.6 | 95.3 | 89.4 |
| 1959 | 74.7 | 90.4 | 97.7 | 95.3 | 87.5 |
| 1960 | 77.4 | 91.2 | 90.0 | 96.1 | 86.9 |
| 1961 | 80.2 | 90.5 | 98.7 | 97.2 | 89.9 |
| 1962 | 83.3 | 90.9 | 85.9 | 96.7 | 88.0 |
| 1963 | 86.0 | 91.4 | 84.6 | 96.3 | 88.7 |
| 1964 | 88.3 | 91.9 | 96.7 | 93.7 | 92.1 |
| 1965 | 90.7 | 92.5 | 98.0 | 95.5 | 93.7 |
| 1966 | 94.6 | 96.6 | 103.1 | 97.8 | 97.7 |
| 1967 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |
| 1968 | 107.0 | 103.3 | 108.4 | 98.9 | 105.1 |
| 1969 | 112.8 | 107.0 | 110.7 | 100.9 | 108.9 |
| 1970 | 119.8 | 113.7 | 115.1 | 105.9 | 114.9 |
| 1971 | 127.6 | 119.1 | 124.1 | 114.2 | 122.5 |
| 1972 | 137.4 | 122.4 | 132.5 | 118.6 | 129.5 |
| 1973 | 146.7 | 127.0 | 155.4 | 145.5 | 143.7 |

^a Index of average hourly earnings of U.S. production workers in the "miscellaneous food and kindred products industry."

SOURCE: U.S. Department of Labor [19].

^b Wholesale price index for "general purpose machinery and equipment" in the U.S.

SOURCE: U.S. Department of Labor [20, 21].

^c Index of weighted average freight revenue per ton of cottonseed products for Class I railroads in the U.S.

SOURCE: Interstate Commerce Commission [5].

^d Wholesale price index for "fuels and related products and power" in the U.S.

SOURCE: U.S. Department of Labor [20, 21].

^e Each index weighted as follows: labor—0.35; machinery—0.25; transportation—0.24; fuel and electricity—0.16.

Wholesale market value of cottonseed in each region was regressed on its farm price of cottonseed, the marketing cost index, and a shift (dummy) variable for the last two years of the period (Table 7). To allow comparisons, two sets of re-

gression results were obtained: one using unadjusted farm cottonseed prices (Table 7, first part) and one using farm price with ginning charges subtracted (Table 7, second part). Use of unadjusted farm price assumes that cotton gins set

Table 7. RESULTS OF REGRESSING WHOLESALE MARKET VALUE OF COTTONSEED ON FARM PRICE OF COTTONSEED, A MARKETING COST INDEX, AND A SHIFT VARIABLE FOR THE LAST TWO YEARS, WITH AND WITHOUT ALLOWANCE FOR GINNING CHARGES, BY REGIONS, 1958-73 ^a

| WITHOUT ALLOWANCE FOR GINNING CHARGES | | | | | | |
|---------------------------------------|------------------------------|--|-----------------------------|------------------------------|----------------|----------------------------|
| Region | Constant Term | Farm Price | Marketing Cost Index | 1972-73 Shift Variable | R ² | Durbin-Watson Statistic |
| -----Dollars per Ton----- | | | | | | |
| Southeast | 14.02 (1.28) | 0.88* (7.38) | 0.37* (3.03) | 42.90* (7.58) | 0.98 | 2.46 |
| South Central | 10.09 (0.89) | 1.01* (8.57) | 0.26 ^Δ (2.01) | 36.44* (6.22) | 0.98 | 2.65 |
| Southwest | -13.68 (-0.99) | 1.14* (7.32) | 0.42* (2.69) | 27.61* (3.88) | 0.97 | 2.35 |
| West | 4.95 (0.30) | 1.11* (7.01) | 0.28 ^θ (1.51) | 39.71* (4.61) | 0.97 | 2.09 |
| WITH ALLOWANCE FOR GINNING CHARGES | | | | | | |
| Region | Constant Term | Farm Price Less Ginning Charges | Marketing Cost Index | 1972-73 Shift Variable | R ² | Durbin-Watson Statistic |
| -----Dollars per Ton----- | | | | | | |
| Southeast | 15.13 (1.27) | 0.91* (6.63) | 0.66* (5.42) | 43.71* (7.10) | 0.98 | 2.09 |
| South Central | 26.26 ^Δ (2.08) | 1.09* (7.62) | 0.51* (3.89) | 36.15* (5.59) | 0.97 | 2.58 |
| Southwest | -2.24 (0.18) | 1.24* (8.06) | 0.82* (6.32) | 26.42* (4.01) | 0.97 | 2.83 |
| West | 7.24 (0.43) | 1.04* (6.75) | 0.80* (4.62) | 31.77* (3.45) | 0.97 | 1.94 |

^a Number in parentheses below each coefficient is the Student's t-ratio for the coefficient.

* Significant at the 99% confidence level.

Δ Significant at the 99% confidence level.

θ Significant at the 90% confidence level.

charges and cottonseed prices to the farmer independently of each other, while use of farm price less ginning charges assumes these dollar values are determined in a completely simultaneous manner. The actual situation may be in between the two considered; however, more detailed data are required to draw a conclusion.⁵

The shift variable (equal to zero during 1958-71 and equal to one during 1972-73) may be used to test the hypothesis that the spread between wholesale and farm values has been "unusually" large during the last two years, i.e., that increases in wholesale value were significantly larger than can be accounted for by increased farm prices and marketing costs. This hypothesis is supported if the estimated coefficient of the shift variable is positive and significantly different from zero.

Several conclusions may be drawn from results in Table 7. Using alternative specifications for farm cottonseed price did not alter regression estimates as much as one might have expected. In particular, estimated farm price coefficients were not altered enough to change general conclusions about relationships between wholesale and farm prices. Likewise for the 1972-73 shift variable. However, magnitudes and significance levels of the marketing cost index coefficients were altered somewhat, with estimated coefficients being consistently larger and having larger t-ratios when adjusted farm cottonseed price is used.⁶ Constant (or intercept) terms are all insignificantly different from zero when unadjusted farm price is used; only one constant term (for the South Central region) exhibits significance when adjusted farm price is used. Coefficients of determination (R^2) are uniformly high and all Durbin-Watson d-statistics indicate no significant autocorrelation of residuals.

Consider, for example, results for the Southeast region using unadjusted farm prices (Table 7, part 1, line 1). The constant term is insignificantly different from zero, indicating the marketing margin behavior closely approximates that of a percentage margin. The farm price coefficient indicates that an increase in farm cottonseed price of \$1.00 per ton is associated with an increase in

wholesale value of \$0.88 per ton. Thus, increases in the wholesale marketing margin, *after* effects of the marketing cost index and of the "unusual" circumstances in 1972-73 are included, have tended to be less than proportional to farm price increases during the period 1958-73.⁷ (The Southeast is the only region exhibiting this result. All other regional price coefficients are larger than one.) The coefficient for the marketing cost index indicates that a one percentage-point increase in this index is associated with an increase in wholesale value of \$0.37 per ton. Finally, the 1972-73 shift-variable coefficient indicates that wholesale values of cottonseed averaged \$42.90 per ton higher in the last two years than can be accounted for by farm price and marketing cost index increases.

All shift variable coefficients in Table 7 are positive and significant at the 99 percent confidence level. These results support the hypothesis that the marketing margin was "unusually" large in the 1972-73 and 1973-74 crop years; however, they should not be interpreted as meaning that cottonseed processors have adopted a pricing policy aimed at keeping a larger share of the marketing margin.⁸ Oligopolistic pricing behavior is a possible cause; but, as mentioned previously, unusually great increases in wholesale product prices and attendant price uncertainty are other obvious possibilities. This analysis gives solid evidence that the wholesale marketing margin has increased during recent years. More detailed analysis and additional data will be required to determine whether increases were due to an altered pricing policy or were primarily the result of rapidly changing market conditions.

CONCLUSION

This analysis has documented regional differences in annual wholesale marketing margins for crushed cottonseed during the period 1958-73. It has provided evidence that margins in all regions were unusually large during the 1972 and 1973 crop years. These findings suggest the desirability of more detailed market research to explain this margin behavior, both among regions and for all

⁵ Two distinct factors are involved: (1) the proportion of cotton ginning costs attributable to the handling of cottonseed and (2) the extent to which pricing policies of the cotton gins are predicated upon actual costs incurred.

⁶ This may be a "mechanical" type of result. Since ginning charges and the marketing cost index have both tended to inflate over time (compare Tables 4 and 6), adjusting farm price with ginning charges may force the marketing cost index to "explain" more of the variation in wholesale values.

⁷ Of course a "two-dimensional" regression of wholesale value on farm price (making the situation correspond to Figure 2) would result in a farm price coefficient and/or an intercept term large enough to keep the regression line above the zero-margin line.

⁸ Thanks are due the JOURNAL reviewers for emphasizing this point.

regions over time. Further research is currently in progress to better identify (using monthly data)

existing time lags in the market between wholesale product prices and cottonseed prices.

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