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# A SPATIAL ANALYSIS OF WESTERN NEW YORK CORN PRICES

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## ABSTRACT

This paper develops the methodology used to investigate the pricing efficiency of farm level corn prices in a minor surplus production area (Western New York) located within a much larger regionally deficit, producing area. The results indicate that from January 1975-June 1976, farm level corn prices in Western New York were not competitively efficient. However, Western New York corn prices were competitively efficient after mid June 1976. A conclusion is that Western New York corn prices became competitively efficient after two new relatively large buyers located in the area.

Several authors, among them, Bressler and King, Shepherd, Tomek and Robinson, and Leath have written concerning the modifications of prices in perfect markets due to time, form and space. Many of the studies concerning prices thorough space have been cast in the general equilibrium mold set by Judge and Wallace. Only a few studies have examined the magnitude of competitive prices that may exist in spatially distinct pockets of surplus production located within geographically deficit producing regions. One of these is a study by Phillips and King of spatial and seasonal corn prices in North Carolina.

## THEORETICAL GUIDELINES

The model proposed by Phillips and King indicated that a competitive price range would exist in these surplus production pockets. The upper limit of this range would be equal to the delivered price of corn from the midwest, as users could always obtain all of the corn they desired at this price. The lower limit would be equal to the highest net price that could be obtained by always selling to the "best" nearby deficit market using the lowest cost transportation. Further, Phillips and King argued that as the marketing year progressed the pockets of surplus production would approach or perhaps reach a deficit status. As this change in the level of marketable corn occurred the local price would rise from the lower to the upper limit.

Using this reasoning Phillips and King constructed theoretical upper and lower price limits and analyzed the pricing efficiency of North Carolina country elevators' buying prices. As Phillips and King had access to a series of market generated prices in the nearby deficit regions served by the North Carolina surplus producing pockets, it was a simple matter to deduct the transportation costs and shippers' margin to arrive at the theoretical minimum farm price in the surplus pockets.

This paper extends the above analysis to include the determination of theoretical minimum farm prices when market determined prices are not available in the deficit regions served by the small surplus pockets.

The discussion and data will pertain to Western New York, as the small pocket of surplus corn production, Toledo, Ohio, as representing Midwestern cash corn prices, and the Northeast, as the deficit region served by Western New York and Toledo. However, the generality of the discussion could be applied to other areas and/or commodities.

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## THEORETICAL PRICE LIMITS IN WESTERN NEW YORK

As discussed above the theoretical minimum farm price of corn in the surplus Western New York market is simply the price in the receiving (deficit) region minus all transportation costs and minus the shippers' margin. Thus the first data required to determine the theoretical minimum Western New York farm price are a series of prices in the major market areas where Western New York corn is sold. However, there are no central markets or any other usable sources of corn price data in the Northeastern markets served by Western New York corn buyers. An alternative method exists which can be used to arrive at the price of corn in deficit Northeastern markets. The majority of the corn requirements in the Northeast are supplied by Toledo, Ohio shippers. Therefore, the price corn users in the deficit area would pay should be equal to the delivered costs of corn from the Toledo market. The in-hopper cash price of corn in Toledo is published weekly by the U.S.D.A. in a bulletin titled "Grain Market News". The next item required to construct the delivered price in a deficit Northeastern market is the cost of freight from Toledo to the destination. The Toledo cash price is an "in-hopper price," meaning it is F.O.B. rail car Toledo. The rail costs data from Toledo to points in the Northeast buying Western New York corn were obtained from three sources. Two of these sources are firms located in Western New York and the third source was one of the major grain merchandising firms located in Toledo, Ohio. As all three sources provided identical rail freight cost data, it was assumed to be accurate.

The rail cost, plus the in-hopper Toledo price determine the delivered price in deficit Northeastern markets. In addition, the delivered Toledo price is the theoretical maximum Western New York farm price of corn. Calculation of the theoretical minimum farm price in the surplus Western New York corn market is somewhat more involved. The minimum competitive farm price in Western New York should be equal to the delivered Ohio price in deficit Northeast markets minus the transportation costs from Western New York to the deficit market and minus the shippers' margin. However Western New York firms regularly sell corn to 18-20 different locations in the Northeast via rail and/or truck, whichever is cheaper (Riggins). Subtracting the freight and the shippers' margin from each of the delivered Toledo prices in the 18-20 receiving areas yields 18-20 different theoretical minimum farm prices of corn in Western New York. Western New York shippers indicated that they derived the farm price based on their judgments as to where they would be shipping most of their corn in the immediate future. As the direction of their major outlets changed they would shift the base on which they determined the Western New York farm price of corn. For clarification an example follows: a Western shipper anticipates moving most of his sales to the general area of point A. If the delivered Toledo price is, for example, \$2.50 per bushel and the minimum transportation cost (either rail or truck) from Western New York points is 30 cents per bushel and the shippers' margin is 20 cents per bushel the Western New York farm price would be \$2.00 per bushel. With the farm price established in this manner, the shipper's actual margin depends

on how much corn he sells at Point A prices relative to how much corn he sells at other destination prices. Thus if a shipper's margin were changing unfavorably due to incorrectly anticipating his major outlets, he would readjust his farm price quotes accordingly.

The price "spread," due to the multiple destinations and subsequent transportation costs differentials, for the Western New York shippers in this study was 10 cents per bushel. This was computed by subtracting the cheaper of rail freight or commercial truck freight, Western New York origins to destinations, from the delivered Toledo price at each destination.

As the firms did not provide data on the exact timing and volumes of all shipments it was impossible to calculate the exact theoretical minimum price weighted by destination. However, an absolute theoretical minimum farm price was derived by assuming that each firm sold all of its corn to the lowest priced destination to which it shipped. In reality the firm's theoretical minimum farm price could have been as much as 10 cents per bushel greater, but there was no way to determine exactly where the minimum price should be in the 10 cent range.

The sources of the rail freight data have already been indicated. The costs of trucking Western New York corn does not enter into the analysis because none of the eight destinations that could be served more cheaply by truck than by rail was the lowest priced outlet for any of the Western shippers in this study.

Only six of the 43 corn buyers located in Western New York provided data on prices paid to farmers (Riggins). Four provided data for two calendar years, 1975 and 1976, one provided data from January 1975 to September 1976 and the sixth firm only had price data from October 1975 to February 1976. More years of farm price data simply could not be obtained. The analysis is conducted using weekly data. The difficulty of constructing an accurately weighted price series precluded the use of bi-weekly or monthly data. In addition, the analysis is performed on standard number two yellow corn prices to avoid problems due to form differences.

The data do cover parts of two crop years and one complete crop year. Thus by using the theoretical minimum farm price as developed above it is possible to test the hypothesis that the Western New York farm price of corn is consistent with the competitive theoretical price model. To conserve space only the price data from Firm A will be presented and analyzed. The results of the analysis for the remaining firms are consistent with the findings reported on Firm A.

One last item in the calculation of the theoretical minimum price requires further discussion. The shipper's margin is subtracted from the destination price, along with transportation costs, to determine the farm price of corn in Western New York. The procedure adopted was to subtract the average margin reported by the six shippers during the time period in question. The margin averaged 16 cents per bushel with a low range of 14 cents and an upper range of 17 cents per bushel. No attempt was made to determine if this margin represented any degree of monopsonistic profits, i.e., profits above the returns required to keep the factors employed in the corn merchandising business. If they did the theoretical minimum will be understated by that amount.

Previous studies containing information on elevator margins include Phillips and King (1962) and Hill (1966). Phillips and

King used 1959 data to analyze the efficiency of corn prices in North Carolina. They reported elevator margins of five cents per bushel. The most recent study of elevator margins for merchandising corn is the study by Hill, of Illinois grain elevators. Hill's data, for the 1964-65 marketing year, indicated Illinois elevators had margins ranging from one to eight cents per bushel, with five cents per bushel the most common margin reported. These margins are much lower than the 16 cents per bushel reported by Western New York shippers. However, both of the above studies are over ten years old. In the past ten years prices, costs and the technology of corn marketing have changed. In addition, the costs of merchandising corn in New York may be different than in Illinois.

Due to the paucity of recent research on grain elevator margins University of Illinois grain marketing economists were contacted to obtain their estimate of current Illinois elevator margins. Their estimates were five to ten cents per bushel on corn and ten cents, or more, per bushel on soybeans. These margins pertain to elevators annually merchandising 10 million bushels of corn and several million bushels of soybeans and wheat. The 10 counties in this study produced only slightly more than twice the volume merchandised by a typical Illinois elevator. Further, the single largest firm in this study purchased only 800,000 bushels of corn during the entire 1975-76 corn marketing year.

#### COMPARISON OF ACTUAL PRICES TO THEORETICAL PRICE LIMITS

Firm A's farm price during the first marketing year (January 1975-September 1975) was less than the calculated minimum price 37 weeks of the 38 week period (Figure 1). The one week that farm price conformed to theoretical expectations occurred in April and not in July, August, or September when Western New York supplies were fairly low.

However, Firm A's pricing strategy underwent an apparent change during the period October 1975-September 1976. Firm A had posted farm prices for corn consistently below the minimum until the week of June 14-18, 1976 (Figure 2). From then on, Firm A's prices always exceeded the theoretical minimum prices. In fact, Firm A's posted prices approached the maximum limit and actually exceeded it for one week (August 23-27). For that week the theoretical maximum price was \$3.04 per bushel and the actual posted paying price of Firm A was \$3.05 per bushel.

Firm A also provided posted farm prices of corn for the 1976 crop year up to the end of December 1976. Although Firm A's prices conformed to the theoretical temporal price limits model of pure competition during the summer of 1976, it would not have been too surprising to observe prices returning to their earlier patterns with the advent of a new marketing year. This would be especially true during the peak harvest period (in 1975 and 1976 there were successive record grain corn crops) when the opportunity costs of a farmer's time undoubtedly creates some spatial monopsony for corn buyers. However, for the last 13 weeks of the 1976 New York corn marketing year Firm A had prices below the theoretical minimum only 3 times (Figure 3).

#### SUMMARY AND CONCLUSIONS

A model was developed that depicts the magnitude of competitive prices that may exist at the farm level within minor surplus production areas for a given commodity. This

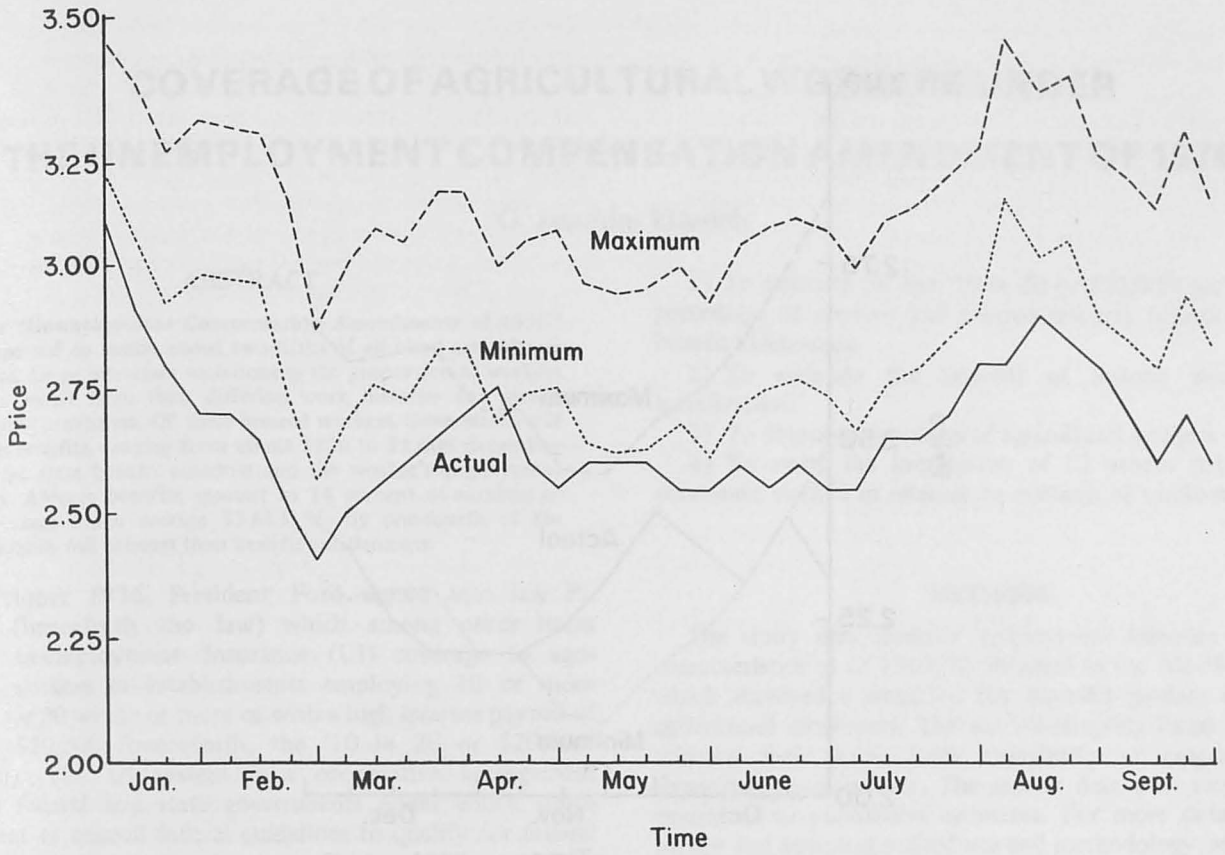


FIGURE 1. Firm A. Theoretical Maximum, Minimum and Actual Weekly Farm Price of Corn January 1975-September 1975.

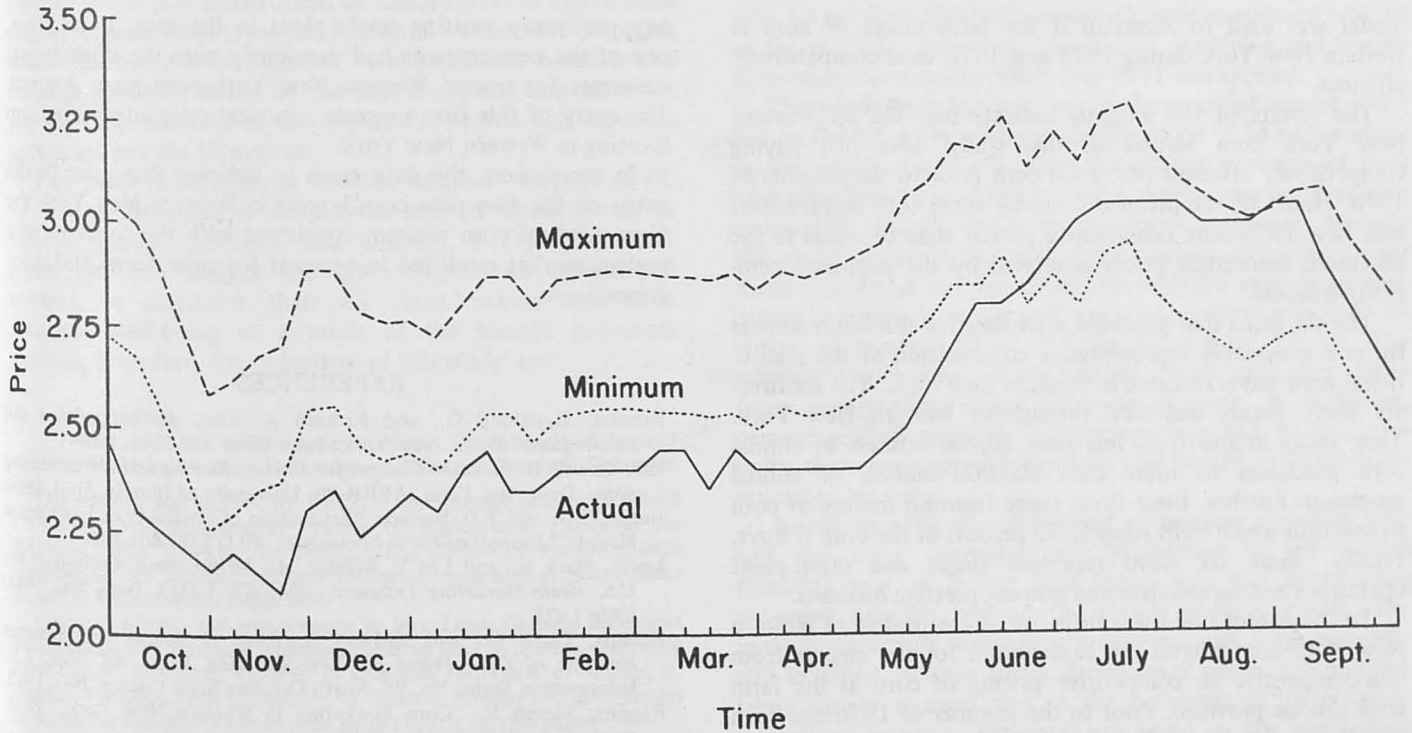


FIGURE 2. Firm A, Theoretical Maximum, Minimum and Actual Weekly Farm Price of Corn October 1975-September 1976.

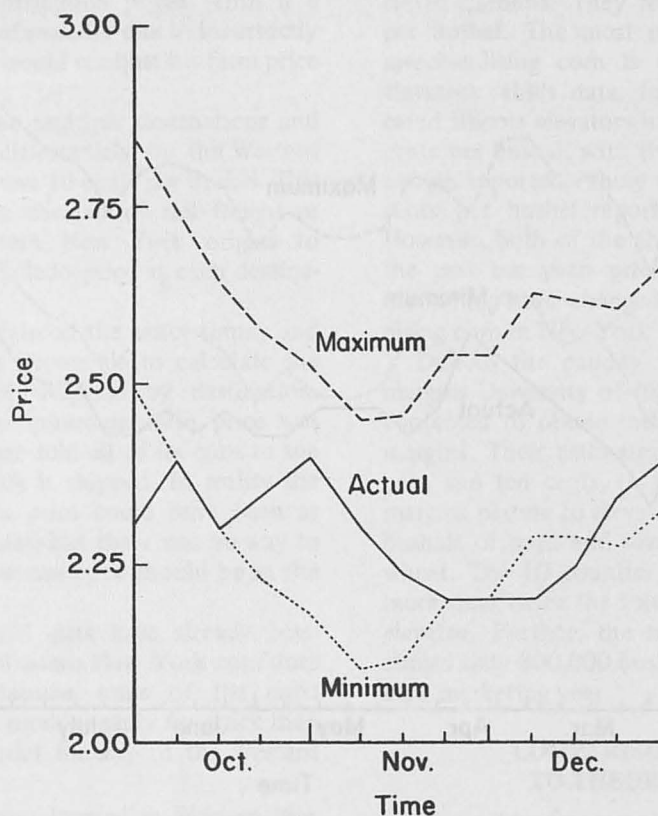


FIGURE 3. Firm A, Theoretical Maximum, Minimum and Actual Weekly Farm Price of Corn October 1976-December 1976.

model was used to ascertain if the farm prices of corn in Western New York during 1975 and 1976 were competitively efficient.

The results of the analysis indicate that the six Western New York corn buyers in this study were not paying competitively efficient prices for corn prior to the summer of 1976. However, the prices offered by these corn buyers after mid June 1976 were consistently greater than or equal to the minimum theoretical prices generated by the proposed competitive model.

The six firms that provided price data for this study appear to be a reasonably representative cross-section of the institutional corn buyers located in Western New York. The six firms are fairly evenly dispersed throughout Western New York. They range in size from less than 50,000 bushels of annual corn purchases to more than 800,000 bushels of annual purchases. Further, these firms range from no milling of corn to one firm which mills roughly 90 percent of the corn it buys. Finally, these six firms represent single and multi-plant operations and cooperative and non-cooperative business.

To the extent that these firms are representative of Western New York corn buyers, an explanation for the change from non-competitive to competitive pricing of corn at the farm level can be provided. Prior to the summer of 1976 one firm was clearly the acknowledged price leader, accounting for over half of the corn purchased by county elevators in Western New York. However, in 1976 two major corn buyers located in Western New York, each with greater handling capacity than

any previously existing single plant in the area. In addition, one of the new entrants had previously been the single largest customer for several Western New York corn grain shippers. The entry of this firm suggests a modest price advantage from locating in Western New York.

In conclusion, the data seem to indicate that prior to the entry of the two new corn buyers in Western New York the farm price of corn was not consistent with the concepts of a perfect market modified to account for time, form, and space dimensions.

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