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PROCEEDINGS
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A STATISTICAL APPROACH TO FARM LAND VALUE

SUMMARY

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The traditional approaches to real estate value, particularly farm land value, leave much to the personal judgement of the individual appraiser. Subjective judgement in appraisal practice is unreliable. Numerous examples of very different appraisal results for identical properties illustrate this lack of reliability. Records of condemnation trials of the California Division of Highways show differences in value estimates by appraisers of 500 per cent and more. Reports of the Appraisal Review Committee of the American Institute of Real Estate Appraisers show significant differences in opinions of value among Institute members.

The prevailing attitude among many appraisers and professional groups is that little can be done to eliminate the subjectivity of appraisal methods. It has not been considered economical or practical to reduce the appraisal process to a statistical formula.

Preliminary findings of a study in farm land valuation show promise of a feasible statistical method of improving upon the reliability of the traditional approaches. The study began with the preparation of a survey form which provides blanks for more than 200 items of individual farm information, including, basic property data, conditions of sale, location, soil, irrigation, climate, water supply, land use, improvements and characteristics of the farming community. The survey forms were developed for the dual purpose of serving as appraisal reports and as source documents providing 158 blanks for coded information.

A first pilot run using 110 completed survey forms has been programmed through the IBM 1620 Computer using a multiple linear regression system. The observations were made on farms which had records of sales in the Madera Irrigation District in Madera County. Complete information for each observation was available for 30 value-determining variables. First results using sale price per acre as the dependent variable show a standard error of the estimate of \$494 an acre and a coefficient of correlation of .82. The computational results show that about two-thirds of the variation in the price of land is accounted for by the 30 independent variables. The error is approximately 25 to 35 per cent at the 68 per cent level.

In the first test of the 30 variable regression equation, data from three farms were used to predict their land values. A recent appraisal made on each

1/ Copies of the Publication A Statistical Approach to Farm Land Value
Interim Report of Findings and Progress
Study No. 6, Bureau of Business Research
Division of Business, Fresno State College
Fresno, California, June 1963.

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farm served as the "true" value. The first example was a farm in Fresno. The computed value is \$1,675 an acre, the appraised value \$1,800, the "error" \$125.

The second example was a farm in Delano. The predicted value is \$1,567, the appraised value \$2,000 and the error \$433. The third example was a farm in the Madera Irrigation District. The estimated price is \$1,715, the appraised value \$2,000, the error \$285. For each example, the error was well within the interval defined at the 68 per cent level of confidence. Not enough tests have been made to draw any conclusions about market areas, although, it appears that errors are increased when predictions are made outside geographical areas of the regression analysis.

In order to reduce the regression equation to a practical size, seven of the most significant variables were selected and used to compute a new equation for the Madera Irrigation District market area. Results of the seven-variable regression equation show a standard error of the estimate of \$458 per acre and a regression coefficient of .80. The independent variables selected for the equation consist of: total acres in the farm, distance from the farm to the closest shipping point, percentage of permanent planting to total acres, distance in miles to the closest metropolitan area, percentage of irrigated land, pH factor of the soil, and improvement of the farm with a dwelling.

The reduction of the size of the estimating equation from 30 to 7 variables has not materially changed the standard error or the correlation coefficient. New predictions of land values were made for the same three farms. The results show that computed estimates differ from "true" values by \$23, \$299, and \$284 respectively. The errors in prediction are less than when the larger regression equation was used.

The first results of testing the statistical approach to land value demonstrate that value-determining variables when properly selected and weighted provide a reliable basis for estimation. Further refinement in choosing and combining variables and in the form of regression equation should result in a practical method of appraisal with promise of a satisfactory degree of reliability.