Preparation Of The 1998 Minnesota Agricultural Land Valuation Schedule

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November, 1997

The Minnesota Department of Revenue has overseen the preparation of the Agricultural Land Valuation Schedule for assessor use since 1988. The task has been performed under contract to the University of Minnesota's Department of Applied Economics since 1993. The basic valuation procedure, summarized in this document, is essentially a suite of computer programs that perform the major tasks described herein. These programs, originally prepared by Matt Smith, have been modified by the present authors each year, as circumstances have dictated. Details are availble from the second author. Complete township-level estimates are available from the Department of Revenue.

The schedule is required under Minnesota Statutes 273.11, subdivision 10:

> *(VALUATION OF AGRICULTURAL LAND.) Annually on November 15, beginning in 1988 and each year thereafter, the commissioner of revenue shall provide county assessors with a land valuation schedule showing a range of values to be used in the valuation of agricultural lands for the succeeding year's assessment. The land valuation schedule shall be developed matching the sales data obtained on the certificates of real estate value filed in the 12-month period between October 1 or the year immediately preceding to September 30 of the current year with information obtained from soil surveys. A range of values for each major soil type by region will be provided. Counties having similar soil types, number of degree days, and other similar characteristics will be grouped into regions for purposes of the valuation schedule. The department of revenue, in consultation with the county assessors, shall develop the land valuation schedule.*

Under this legislation, farmland market prices and their relationship to soil productivity are to be analyzed across regions defined not simply by political boundaries, but also by similarity of soils, climate, and other natural features. The task is to use observed prices from farmland sales over the previous year to estimate for each township in the state a range of expected prices (which we call "value" here) for the coming year. While the statute does not require assessors to set individual properties' values within the ranges provided, it clearly signals the Legislature's intent that the Valuation Schedule should serve as a general framework under which assessors can estimate specific farmland market values within their jurisdictions and attempt to reduce estimated value differences across jurisdiction boundaries.

The Valuation Schedule is based on two kinds of data. The first consists of measured soil productivity, landscape, and climate information for each of the state's agricultural regions. This basic foundation is assumed to remain constant from one year to the next. For the present analysis, we divide the state into 52 agricultural land valuation regions, groupings of townships based on similarity of soils and major landscape features. (Non-agricultural portions of the state are not included in this subdivision of the state.) The region boundaries were derived from a combination of several sources: The Minnesota Soil Atlas; a joint University of Minnesota, Natural Resource Conservation Service, and Minnesota Geological Survey study that identified major regions of similar topography and soils; a statewide soil association map produced by the University and NRCS showing major groupings of related soil types; and periodic adjustments by county assessors.

Because these regions are defined by similarities in soil productivity and climate, they are presumed to also exhibit certain similarities in agricultural land values. These regions are the basis of the pooling of land sales data, described below. Within each region, each township is assigned an average crop equivalent rating (CER), a measure of the relative productivity of its cropland. Average CERs were obtained from data supplied by the counties themselves where available, and measured by University soil scientists from available soils maps in other cases. These figures, too, are assumed to not vary from year to year, although they are occasionally modified by county assessors.

Crop equivalent ratings measure the relative net economic productivity of a particular soil type under typical management, yields, and prices and a given set of climate conditions. Soil ratings are developed by soil scientists using data on typical yields, production costs, and crop prices based on test plots, surveys of farm production methods and costs, and measures of the acreage of each soil type devoted to production of various crops. These data are combined to measure the typical net income to be expected from crop production on that particular soil type in its "reference" county, or the geographic center of its range within the state. The net returns computed for all of the soil types are then ranked, with the soil(s) with the highest net returns assigned a score of 100, and other soils rated by their net returns relative to those from the most productive soils. (For details, see *Productivity Factors and Crop Equivalent Ratings for Soils of Minnesota*, by James L. Anderson, Pierre C. Robert, and Richard H. Rust (AG-BU-2199-F, Minnesota Extension Service, University of Minnesota, 1992 (revised)).

When averaged together for all the soils in a given township, the resulting average CER gives a consistent measure of the relative quality of the cropland there compared with neighboring townships. When combined according to the valuations regions described above, it allows identification both of other townships sharing generally similar soils and topography as well as its particular standing (in terms of soil productivity) within that group.

The second part of the value estimation process assembles into the appropriate analysis regions all agricultural land sales considered "good" in the most recent Minnesota Sales Ratio Study (conducted by the Department of Revenue to measure assessment levels). There are a few significant exceptions. First, due to problems involved in accurately measuring soil productivity under irrigation and because the land Valuation Schedule is designed for dry land only, no sales

involving irrigated farmland are used. Second, because non-agricultural factors that influence land prices within the seven county Twin Cities metropolitan are virtually impossible to isolate, no sales from those metropolitan counties are used. (We do, however, estimate agricultural land values for these counties by using sales from nearby, agronomically similar, valuation regions. These values are used by metropolitan area assessors to set agricultural land values for parcels enrolled either in the Green Acres or in the Metropolitan Agricultural Preserves programs.) Third, only sales of 35 acres or more (of which at least 20 must be tillable) are included in this analysis.

With these exceptions, the Valuation Schedule is calculated using characteristics of the same farmland sales that assessors themselves will be using for their individual estimated market value work. The relevant agricultural land sales data become available in early November, for the previous October 1-September 30 "record year." The Valuation Schedule is ready for distribution to assessors within one week of receipt of the sales data by the analysts.

In many other land value reports, sales prices are reported on an unadjusted basis. In the Minnesota Agricultural Land Valuation Study, however, we adjust the reported prices to provide more meaningful comparisons. First, as is common practice among assessors, property sales financed through contracts for deed or through assumption of existing mortgages are adjusted to account for the effects that below-market financing terms typically have on sale prices. Second, a number of adjustments are made to estimate the implicit price paid for only the tillable land included in each sale, separate from buildings and nontillable land.

For land adjustments, we initially subtract the assessor's estimated market value (EMV) for all the nontillable land included in the parcel. For building adjustments, it is not so simple. Levels of assessment on farm buildings tend to vary from county to county, so merely subtracting the estimated market values of buildings from all sale prices may not give consistent results. We employ a building EMV adjustment factor that measures differences in farm building assessment levels and then adjusts building EMVs up or down before subtracting them from the reported sale price. The factor is based on a comparison of the median sales ratios for improved versus unimproved farmland in each county. If the ratio in improved sales is higher than for bare land sales, building EMVs are adjusted downward. If the ratio in sales is lower than for bare land, building EMVs are adjusted upward. The resulting EMV is then subtracted from the adjusted sales price to give an estimate of the price paid for tillable land alone. Estimated values that exceed $5,000 per acre were excluded from further analysis.

From these sales prices (adjusted, if necessary, as discussed above), we construct "CER multipliers" that link prices and underlying soil productivity. Within each valuation region, these multipliers are computed for each reported farm sale by dividing the sale price per acre by the average CER for the parcel, as reported on the official Certificate of Real Estate Value. If the parcel CER is unavailable, the township average CER is used. A regional average CER multiplier is then derived from all of the sales in the valuation region by appropriate weighting techniques.

The Valuation Schedule reports estimates of the values of tillable cropland, not of all ("deeded") farmland. Accordingly, we want a CER measure that distinguishes the two types of farmland measures. Deeded Average CER, which is sometimes reported by assessors, reflects the productivity of land included in a given parcel--including waste, woodlots, and permanent pasture

that are not used for crop production. Buyers, however, are assumed to purchase land on the basis of the acreage that can be farmed (the tillable acres), not the total (deeded) size of the tract. Therefore, the average CER of the land that can be used for crop production--Tillable CER--is a better basis for measuring the CER multipliers for cropland.

Because CERs of nontillable land tend to be lower than for tillable land, use of deeded CERs as a basis for assessment tends to undervalue the best cropland and to overvalue nontillable land. This effect will be especially apparent in areas with a high proportion of woodlands, pasture, and other nontillable land. In areas where virtually all the land is tillable, on the other hand, differences from using deeded or tillable CER as the basis for assessment may be barely noticeable.

For these reasons, county assessors and recorders are encouraged to record the tillable average CER in farmland sales. While in some cases this requires extra work in isolating the tillable acreage included in each parcel and measuring the average CER there, the benefits in terms of more accurate cropland assessment can be significant. In cases where township average CERs had to be estimated by soil scientists from the best available soil information, efforts were made to focus on the kinds of soils actually used for crop production.

Because the Valuation Schedule is designed to provide a range of values rather an exact point estimate, we report a confidence interval, bounded by the high- and low-end values of the range in which the average CER multiplier most likely falls. The range, as defined for present purposes, is plus or minus two standard deviations from the mean. (Standard deviation is a measure of how much variability exists in a set of numbers: a large standard deviation means that the CER multipliers on individual sales within an area varied greatly one from another, while a small standard deviation means that the individual CER multipliers were all close to the overall average.) Any calculated CER multiplier that happens to fall below $3 or exceed $99 is adjusted to these bounds.

Once the range of CER multipliers has been established for each region, land value ranges are estimated for each township within the region. The low end of the range is computed as the low-end CER multiplier times the township average CER, and the high end is the high-end CER multiplier multiplied by the township average CER. Users should note two things about this value range. First, because it is based on the township average CER, it is a range for the average value of cropland in the township--some individual parcels may have values well above or below this range. Second, the width of the range depends directly on how "spread out" the reported sales prices were in the region and on how many sales there were. More variability in the CER multipliers observed in individual sales results in a wider spread in the range around the regional average multiplier; less variability results in a narrower range.

The range of values provided for a given township depends on the level of soil productivity as measured by average CER and on the overall pattern of sales in the region of which it is a part. They tend to be reasonably bounded in those parts of the state that have high numbers of sales of land for purely agricultural purposes. The estimated ranges are less useful (because of wide value bounds) in those parts of the state where sales prices reflect other than the productive component of land value, where the number of parcel sold is small, where assessor estimated values prove far

from the mark when compared to actual sales prices, or where the proportion of tillable land compared to the entire parcel are small.

In an attempt to make the CER multiplier ranges for neighboring regions consistent, cases where the multiplier ranges as computed above fail to match up along borders could be adjusted by splitting the difference in the ranges and resetting the multipliers accordingly. In this way, the Valuation Schedule would always provide CER multipliers that could be used to equalize average tillable value for adjacent townships with comparable soil productivity. In past years, such adjustments proved necessary in only a few cases--the CER multipliers found from sales usually overlapped very well by themselves. In the past few years, however, a great many region boundaries show inconsistencies. Adjusting across region boundaries would only make matters worse, so great is the disparity. With Department of Revenue concurrence, therefore, we have adjusted none of the cross-boundary differences since the 1995 study. Assessors working through equalization disputes are best advised to examine in detail those sales that occur near the boundary in question--not all sales in the relevant regions.