LAND VALUE & SOIL HEALTH IN CROPLAND APPRAISALS

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EXECUTIVE SUMMARY

With data and technology improving, valuation in appraisals is becoming a potential driver for increasing adoption of soil health practices by mainstream farmers. As consumer demand for sustainably produced food grows, rural appraisers need to be prepared to value soil health and/or associated practices properly for both sale valuation and loan and investment underwriting. In order to uncover barriers to soil health integration that remain with respect to land valuation, we reviewed current appraisal guidelines and practices in several states, and discussed market barriers with appraisal professionals. In addition to farmland appraisals, we looked at appraisal practices in residential and commercial property with growing market penetration of energy efficiency and renewable energy to see if there were lessons learned in designing effective appraisal interventions.

From this work, we uncovered three potential opportunities to link soil health to land value. They include improving data and methodologies in valuation indices to modify new appraisals, providing education to appraisers and underwriters to adopt new valuation approaches, and shifting the culture of appraisers, investors, and lenders to include long term benefits in underwriting as opposed to just focusing on market turnover and commodity prices in valuation.

Figure 1. Cover crop on resting farm. USDA

Figure 2. Corn on Pennsylvania farm. USDA

Land Appraisal & Valuing Soil Health

As outlined in our Land Value publication[i], we identified nine strategies to better reflect soil health in the agricultural land valuation process. We have reviewed these strategies with appraisers and appraisal trade associations in order to determine their likelihood of adoption and identify further areas of engagement and action.

Current appraisal practices are constrained by rule of thumb valuations that are simple to use for commodity farming practices, but don't lend themselves well to conservation focused farming due to the issues we address below. Barriers include a lack of up to date and statistically valid data on soil health benefits that would be necessary to update indexes, adjustment factors, or comparable property sales used in appraisals, a cultural aversion to changing the status quo reliance on "typical operation" without strong market signals, and a lack industry accepted methods and associated education for appraisers and underwriters on how best to value soil health using existing models. Appraisal guidelines suggest appraisals use "highest and best use" as "the pivotal point upon which the entire valuation process rests."[ii] They also explicitly state that soil analysis be used as a primary component of valuation in cropland and hayland. However, productivity of commodity crops is usually used as shorthand for valuation of highest and best use. This is problematic, as research suggests that soil health practices improve crop production in many cases in addition to making land more resilient to drought and other conditions that affect productivity over time. This would suggest that healthy soil provides highest and best use and should be taken into account as part of the valuation process. A challenge is that current valuation practices measure only a particular point in time. Since soil health assumes benefits that are spread out over several years, their applicability to valuation can be fluid and may require an appraiser to make a judgement that is not based on direct market evidence, requiring expertise an appraiser may not have.

We see opportunity to shift appraisal approaches to take soil health into account as base-level valuation metrics are changed and indices updated, or used as adjustments to existing indexes. Doing so may prove more accessible to appraisers, and be easier to apply. This requires a different way of defining value on cropland than what is currently the status quo. We explore this approach below.

Productivity Indices and Their Use in Appraisals

When accounting for "highest and best use" in cropland, appraisers are required to describe the soil and evaluate it for potential productivity. An appraiser or a soil expert hired by the appraiser will generally describe the soil horizons and texture in an appraisal and use soil surveys to document the site conditions. All of these aspects of soil follow a standard classification system that depends on basic soil characteristics. The current indices do not reflect productivity changes in response to management that focuses on soil health and may cause a measurable change in productivity that could be documented on an appraisal. This intervention is one area that we are

exploring that may be able to increase soil health practices through direct valuation in indices.

Soils are mapped by the Natural Resources Conservation Service (NRCS), and their qualities are input parameters into calculating soil productivity indices that are used to determine the productivity of a particular parcel. Productivity indices vary by State, and they are also often used directly in property tax assessments. Appraisers use sales comparisons with other known property values to set prices, using productivity indices in the process to describe a parcel of land. Valuation is often set as productivity multiplied by a market based cost per acre per index value. Therefore, adjusting productivity indices based on soil health provides a method to directly influence valuation if soil health practices can be directly applied to productivity indices. We review indices in three States to demonstrate this approach in the Appendix.

Lessons from Energy Efficiency & Renewable Energy

We looked at changes in appraisals conducted during the energy efficiency and renewable energy revolution taking place in the United States to see where there were similarities that could be used to guide agricultural appraisal changes. Appraisal adjustments to account for assets with environmental and sustainability benefits are not a new concept. Attempts to use adjustments for energy efficiency retrofits and renewable energy installations to improve value or borrowing capacity by decreasing operating costs of a property have been in use for forty years, with policy developed to codify energy efficient mortgages starting in 1992[iii]. We review some of the efforts below and contrast them with appraisal practices in agricultural land.

Energy Efficient Mortgages

Energy Efficient Mortgages and Energy Improvement Mortgages (EEMs and EIMs) are available in all States from select lenders and are administered through the EnergyStar Program. These lending instruments provide an adjusted Loan to Value (LTV) ratio for home price to allow for an up to 5% increase in borrowing amounts when efficiency measures on a home are in place or will be made as part of the purchase. They are enabled through a special assessment called a Home Energy Rating, which gives a home an energy efficiency score on a scale of 1 to 100. If the home is deemed energy efficient, it can qualify a borrower for adjustments to the LTV as above, or improvements can be financed into the loan at closing.

Adoption has been low, accounting for less than 1% of loans since 1982, despite the fact that there is evidence that EEMs may reduce lender risk due to reduced utility expenses, as they are correlated with reduced foreclosures.[iv] One common reason cited is the lack of consumer and lender education. However, the program may have provided some of its intended effect, as many homes built now qualify for EnergyStar certification if Home Energy Ratings are conducted because of improved code standards, and its label is considered a premium in some new home markets. In this case, the "tide may raise all boats", as general awareness of the issue may be instrumental in changing behavior.

Green MLS

One way practitioners of EnergyStar certifications and EEM underwriting have attempted to increase consumer education is through the use of a "green" designation on the multiple listing service (MLS) since 2013. Early results show market penetration while also contending with erroneous data.[v] [vi] Of roughly 850 MLS services nationwide, approximately 41% of realtors in a recent survey reported using fields that show green attributes, which doesn't correlate with actual certified green homes.[vii] Data discrepancies may arise when builders follow certification requirements and stop short of officially achieving certification, or if brokers designate green features that are not certified. Where data is clear, a price premium of 1.3-8.0% with properties holding value through subsequent sales even during a downturn has shown that the designation moves the market. A majority of survey respondents in both commercial and residential brokerages reported that their clients asked about and valued green building features. The "green MLS" approach may be applicable to rural land valuation in conjunction with adjusted productivity indices (as explained below), or with a third party certification listed on an appraisal or sale document. As green MLS is still new, we suggest continuing to review its applicability to see how it may be used in rural land appraisal design and piloting this approach for a small set of practices.

Renewable Energy Valuation

Another related valuation adjustment with green buildings is onsite or distributed renewable energy, usually solar photovoltaic panels. As renewable energy such as photovoltaics (PV) have an easily modeled net present value, they are easy to value and therefore easy to allow adjustments in appraisals. The Appraisal Institute provides numerous advisory documents to allow appraisers to accurately identify the value of green features like PV.[viii]

Three approaches to valuation for an appraiser on commercial & residential property are available. They are comparable sales, cost, and income basis. Renewable energy appraisals absent reliable comparable properties in an emerging market can employ asset valuation and cost reduction methods.[ix] [x] In doing so, an appraiser can take into account the photovoltaic system's income and expense reduction as an operating benefit. This approach provides a functional example of how soil health practices may be valued on reported cropland net-operating-income.

Several aspects of photovoltaic system valuation are unique to the renewable energy sector. One significant aspect is the use of renewable energy credits (RECs) to improve system finances. RECs can reduce the first cost of a system by as much as 25%, shortening the payback period and increasing the net present value and internal rate of return. Another is renewable energy tax credits, which provide an additional 30% reduction. Comparable subsidies for soil health practices may be needed to increase market penetration in rural farm properties, which may take the form of USDA cost share programs. These early subsidized markets resulted in an increase in stricter building code adoption and associated training. In this case, increasing the validity of the method of appraisal led to an improvement in secondary adoption of the

practice.

One trend is clear. As market penetration of renewable energy continues to grow, valuations have been more consistent as buyers become more aware of the value of solar PV on homes and businesses. This is especially apparent in states with deep market penetration, such as California and Hawaii. In these states, photovoltaic systems have become obligatory. We see photovoltaic valuation as a good model to follow as we review valuation changes in rural appraisals, with mature markets providing beneficial information for program design.

Opportunities in Rural Appraisal Valuation

We conducted interviews with agricultural land appraisal practitioners to determine similarities with energy and renewable energy appraisals and found the following barriers to consideration of appraisal guidelines that operate within the Uniform Standard of Professional Appraisal Practice and properly value soil health. We also found several actions and opportunities that could be taken to address one or more of the existing market barriers.

Short Term Strategies

Creating Adjustment Tables and Shifting Appraiser Prerogative

In speaking with the appraisal community, one theme that came up often was the need to have statistically valid methods for adjustments, as many appraisers rely on their own experience to add and value adjustments, or they may ignore adjustments they don't agree with if they are not well supported. Where comparable properties are available, appraisers may be inclined to use them "as-is" without adjustments, due to the lack of straightforward approach to adjust based on soil health improving practices. Providing updated models for soil health practices would provide appraisers with additional means of adjusting from the "typical operation" effectively remaining within the appraisal guidelines they are required to follow. Using the USDA's Good Farming Practices can strengthen the case for an adjustment rationale and provide an additional foundation for adjustments to productivity indices.[xi]

This approach has precedence. Updates have happened to change valuation in the past, though for a period of time have caused some confusion as new indices were adopted. In Iowa, the CSR2 adopted in 2013 assumes natural rainfall (no irrigation) with artificial drainage (tiles) on the soil type profiled. Where the previous CSR had a built in rainfall correction factor adjuster for drought conditions before 1960, this factor was removed in the latest update. This affected soil moisture regime scores in certain areas and increased scores in CSR2 that were lower because of dryer than normal rainfall.[xii]

We recognize that these local differences need to be reviewed and addressed. Direct adjustments to productivity index data tables may be appropriate for some States, where adjustments to other metrics such as net operating income may make more sense in others. While the mechanism is clear, more work needs to be done to identify the best approach to providing a simple method for appraisers to adjust existing

valuation to account for soil health practices. Developing new adjustment guidelines for soil health makes training a necessary aspect of changing the way appraisals value soil health.

Lender & Investing Underwriting Guidelines and Education

Appraisals or valuations are generally sought as part of lending and investing underwriting even if an auction has been conducted to determine the market value of the land. Soil series descriptions published by the USDA are updated periodically, but the current data gaps prevent developing a new set of productivity indices.[xiii] Even with additional adjustments look up tables, appraisers will need education to properly follow and apply soil health related adjustments. Working with lenders and investors to educate them about the relationship of soil health to risk mitigation and identifying levers in the lending process that can incorporate soil health related factors may provide a market driver alongside appraiser education. Additional training on how to apply adjustments along with adjusting productivity indices directly to account for soil health provides a clear path to changing existing valuation practices.

Long Term Strategies

Changing Rule of Thumb Approaches & Growing Market Demand

Appraisers use "typical operation" in appraising land parcels for highest and best use, and in the Midwest this is characterized by commodity row-crop production. The "typical operation" definitions are driven by demand and are used to generate a list of comparable properties used in appraisals. Addressing this rule of thumb barrier requires a different understanding of "highest and best use" to include soil health factors. Appraisers could begin to apply new adjustment factors to encourage soil health practices.

USDA National Organic Program certification provides an acceptable proxy for non-certified soil health practices in assessing market penetration as a driver for changes in appraisal guidance, and it has similarities to green building certifications. Though organic sales have doubled since 2010, they still account for less than 5% of food, mostly milk, eggs, and chickens, sold in the United States (acknowledging that many organic crops are imported). The 2016 Organic Survey, latest available data on organic farming, showed that there are about 14,000 out of two million farms in operation are organic, covering approximately 5M acres in the US (205 operations, 39,000 acres in Illinois). Market penetration as a driver would need to grow significantly to change appraisal guidelines by changing the definition of "typical operation". Regulations, such as California's Cage-Free Egg law, which encourage more humane poultry farming practices, can show a path to requiring certain practices for an entire market segment. Expert adjustments provide a way to bridge the gap.[xiv]

Ensuring Longevity of Soil Health

It may take at least three years to transition conventional farmland to land that with improved soil health. Soil health benefits, however, can be destroyed in three days. With no market driver to retain the premium of farmland under soil health focused

management, appraisers may have difficulty making adjustments on land that may lose this value immediately upon sale. Anecdotally, some organic land may currently be more difficult to sell due to the fact that for conventional farming, the operator may have to spend more on herbicide application in the short term to reduce weed growth. This perception was reported as being common from appraisers. Therefore, in order to provide an incentive to retain land with soil health practices as it is sold, it may be necessary to have subsidized incentives and/or requirements for retaining land practices for a minimum number of years as a condition of sale to build market penetration of soil health practices.

Federal cost-share programs administered by USDA support practices such as cover crops, but participation rates remain low.[xv] As appraisers, farm managers, lenders, as well as other agricultural professionals begin to apply new approaches, offer more technical assistance, and as more data is generated to demonstrate environmental and economic benefits of soil health practices, we will begin to see a culture shift in the agricultural sector away from high input/yield production systems to regenerative agriculture that focuses on long term productivity and profitability of the farm.

Conclusion

Soil health practices may become more common through increased consumer education and demand, but we see a concurrent effort necessary to encourage these practices through better appraisal guidelines, and through updates to underlying productivity index data and methodologies. Providing statistically valid adjustment methods to the productivity indices used for conventional commodity farming and educating appraisers on the process will allow soil health practices to be valued properly. However, this effort needs to be reviewed and developed with additional appraiser input. There are multiple methods that need to be evaluated. These include: using an adjustment process in accordance with State index guidance; a change in the underlying soil data sets used in productivity indices to account for soil health on certain soil types; clarifying guidelines that already allow for expert valuation adjustments; and demonstrating how changes in how net-operating-income can account for cost reductions from soil health practices with case studies. Additional methods may be employed as practices start to gain market penetration and consumers begin to value soil health practices, or as they are employed alongside other market trending practices such as organic farming and traceability certifications.

Appraisers use “typical operation” as a rule of thumb in appraising land parcels for highest and best use, and in the Midwest this is characterized by commodity row-crop production. Based on the review of how productivity indices are used to value property, the activity that will produce an outcome that accurately values soil health would be to provide appraisers with a methodology to make a direct adjustments to productivity indices, with supporting data that demonstrates the increasing in profitability that such practices provide over a course of several years. Similar approaches have been used in other sectors, such as energy efficiency and renewable energy

valuations. We will conduct additional user research with appraisers, brokers and underwriters, and develop a method to test on farms in Illinois. We intend to review pending renewal legislation in Illinois. We will share our work with additional stakeholders, and in the process determine a path for using appraisals to add soil health to the valuation of cropland in the Midwest.

Appendix

Several states with cropland have developed indices that model cropland productivity. We review these indices and how they may be modified to account for soil health in three states.

Illinois

Illinois uses the Soil Productivity Index (PI), which runs from 0 to 147. A higher score directly indicates more productive soil. The index further splits the continuum into three classifications: A (PI scores of 133-147), B (PI scores of 117-132), and C (PI scores below 116). There is variability in price among these classifications, but generally land turnover is highest in Class A land.

The PI is derived from productivity data provided by the University of Illinois and was last updated in 2000, with soil data amended in 2012.[xvi] PIs are then applied using tables in Bulletin 810, which provides soil types with slight erosion and slope under average management for growing conditions between 2000 and 2009, and Bulletin 811, which provides crop yields and productivity indices of the top 16% of farmers in Illinois in the 1990s (updated with 2000-2009 growing conditions).

Pricing of land is directly based on the PI on a $/PI/acre method. The Sterling Land Company tracks sales data in Illinois and reported $264 million in volume of Class A real estate with an average PI score of 138.7 at $78.92 / PI Point. The report for 2019, consisting of 138 sales in 35 counties, suggests that land valuation in Illinois is consistent, that the differences between regions are slight with price per acre differences modest among counties, with prices +/- 6%.[xvii] This indicates that PI is the strongest indicator of value.

In Illinois, there isn't an obvious direct adjustment that can be made, as the PI is based on productivity per acre and classified by soil type. The soil type classifications make no quality predictions on the soil type with respect to water holding capacity, low erosion, or other benefits of soil health that might figure into a formula. The only way to differentiate a farm with soil health under current guidelines would be to assume that farms that use soil health practices are under optimum management. For example, a farm that is primarily of type Cisne silt loam is expected to yield 149 bushels per acre of corn under optimum management and have a productivity index of 109 according to Bulletin 811 Table 2.[xviii] The same farm under average management would provide 132 bushels of corn with a productivity index of 97 according to Bulletin 810 Table 2. Using this information with the above pricing information provides a difference in value for a farm sold in 2019 to be as much as $947 per acre. Therefore, demonstrating the improved productivity value of soil health practices in Illinois may provide a means of directly increasing the value of a property for the purpose of investment and refinance.

Iowa

Iowa uses the Corn Suitability Rating (CSR), which was updated in 2013 with the CSR2.[xix] Similar to Illinois, it is used almost exclusively as a proxy for productivity to determine the value of a cropland property. However, the CSR2 includes an expert evaluation modifier among other values that may directly increase or decrease a CSR2 score. Identifying how expert evaluations can be used to make adjustments to the CSR2 rating might be useful in the existing paradigm until there is broader acceptance that a "typical operation" is the one that is managed for soil health. The CSR was updated to the CSR2 to address rainfall changes on a number of soil types, but the soil data is from the 1990s.[xx] Continuing to use data back to 1990, or earlier assumes that the management used has maintained (or improved) soil quality. In many cases, management practices exceed T, the soil loss tolerance, and introduce other degrading factors. Soil health practices may provide direct adjustments that impact the total number reported as the CSR2. The CSR2 is a calculation, starting at 100, that is adjusted by the subgroup class of a soil series in a soil map unit (S), the soil family particle size (M), the available water holding capacity (W), the field condition for a particular map unit (F), the soil depth and erosion rate (D), and an expert judgement correction factor (EJ). Written as a formula, CSR2 = 100-S-M-W-F-D ± EJ.

An example of this approach would be to adjust the CSR2 by increasing the water holding capacity reported of a soil series by a valid modeled value based on a soil health practice, or potentially providing guidance for an Expert Judgement correction that increases the score. This could increase the CSR2 score reported on a sale or appraisal and directly influence the value.[xxi] For example, using tables provided by the USDA, a site with Tama silty clay loam, two to five percent slope gradient with slight erosion (soil map symbol 120B) and Sparta loamy fine sand, nine to 14 slope gradient, moderately eroded (soil map symbol 41D2), would have a CSR2 of 95. If the available water holding capacity of the site because of its use of cover crops demonstrates a decrease in the W component by 2, the final score would be 97.

Ohio

Ohio uses the Current Agricultural Use Value (CAUV) program.[xxii] CAUV is calculated by dividing net operating income by the capitalization rate for a particular commodity on a particular soil type. Net operating income is assumed to be directly related to productivity for each of three rotated crops: corn, soy, and wheat. Each commodity has a base cost assigned each year for the CAUV, and each base cost assumes an expected yield per acre by soil type. Each soil type has an associated base-yield that is derived from soil survey data from 1984. In 2006, adjustments were made based on 7 year average crop yields. CAUV values are therefore directly applied by soil type as net commodity yield prices on a scale of 0 - 100. Adjusting the net operating cost of a site by increasing the crop yield price for a commodity or decreasing operating expenses is the most likely approach to modifying

the CAUV to account for soil health.

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[i] https://delta-institute.org/delta/wp-content/uploads/Land-Value.pdf
[ii] The Appraisal of Rural Property, 2nd Edition. 2000. American Society of Farm Managers & Rural Appraisers
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[xii] https://crops.extension.iastate.edu/cropnews/2015/04/corn-suitability-rating-2-equation-updated
[xiii] https://websoilsurvey.nrcs.usda.gov/app/
[xiv] https://www.universityofcalifornia.edu/news/how-californias-chicken-industry-rapidly-changing
[xv] 2017 Census of Agriculture
[xvi] http://soilproductivity.nres.illinois.edu/tableS2revB811kro2012.pdf
[xvii] https://myemail.constantcontact.com/Sterling-Land-Company--Special-Report-January-14--2020.html?soid=1114607306836&aid=cwQ5CXQXRfg
[xviii] Based on Bulletin 811, Table S2. http://soilproductivity.nres.illinois.edu/tableS2revB811kro2012.pdf
[xix] The Corn Suitability Rating, updated in 2013, is a 5-100 scale that uses soil type, particle size, water holding capacity, field condition, soil depth, and an expert adjustment factor to determine the suitability of soil to growing corn. This is used to determine $/acre in a typical appraisal.
[xx] https://www.extension.iastate.edu/soils/suitabilities-interpretations
[xxi] https://crops.extension.iastate.edu/cropnews/2015/04/corn-suitability-rating-2-equation-updated
[xxii] The CAUV provides a comparable independent assessment of valuation using soil quality, commodity prices, operational costs, and capitalization rate. https://aede.osu.edu/sites/aede/files/publication_files/2018CAUVProjectionsReport.pdf