IMPACTS OF PROPERTY TAX POLICY ON ILLINOIS FARMERS

by

WILLIAM D. BODINE

B.S., University of Illinois, 1996

A THESIS

Submitted in partial fulfillment of the requirements

for the degree

MASTER OF AGRIBUSINESS

Department of Agricultural Economics

College of Agriculture

KANSAS STATE UNIVERSITY

Manhattan, Kansas

2013

Approved by:

Major Professor
Allen M. Featherstone

ABSTRACT

Since 1977, the State of Illinois has used a use-value method of assessing farmland for property taxes. The method establishes farmland value by determining a five year average of net income from the land that is capitalized using a five year average interest rate. Other real estate in Illinois follows a different procedure for assessment. For example, residential property is assessed at one-third of its market value. The differences among the methods of assessment for farmland and other types of real estate, along with recent market increases in farmland values and a strong agriculture economy, have led some to question the current method of farmland assessment.

The objective of this thesis is to determine the financial impact to farmers resulting from changing from the current use-value assessment of farmland to market-value assessment. This is accomplished with two sub-objectives: determine the potential change in farmland values that could occur and to determine the impact on net farm income that could occur if property tax policy was changed to market-value assessment.

To accomplish the first sub-objective, a model was developed to estimate farmland values in Illinois based on the current use-value assessment property tax policy. This model was then adjusted to estimate farmland values under a market-value assessment property tax policy. The models demonstrated that farmland values could fall 53 percent, or an average of $2,548 per acre, in the year immediately following implementation of a tax policy change. Once farmland values stabilize after implementation of the tax policy change, farmland values would be 30 percent less, or an average of $1,875 per acre less, under market-value assessment than under use-value assessment.

A simulation of net farm income over a ten year time frame was then conducted to estimate the potential change in net farm income that could occur from a change to market-value assessment. Like farmland values, the greatest impact to net farm incomes occur in the first year market-value assessment is implemented. Farmland values and the resulting property taxes then stabilize during later years. The simulation of net farm income over a ten year time frame estimates that net farm income would be 8 percent lower per year, or a reduction in net farm incomes of an average of $12,721 per year, under market-value assessment. The analysis also showed the potential for an average of a 2 percent increase in the probability that net farm income would fall below zero over the simulation time frame.

The analysis demonstrates that a change from use-value assessment to market-value assessment of farmland could reduce farmland values and net farm incomes. Such a change in policy is not in the best interests of farmers or the agriculture industry in Illinois, as the reduced values and incomes would have wide reaching negative consequences that could reach beyond farmers and farmland owners.

TABLE OF CONTENTS

LIST OF TABLES

ACKNOWLEDGMENTS

The author wishes to thank those who advised and guided me through the process of completing this thesis, especially the staff members of the Masters in Agribusiness program. I would like to thank my colleagues at the Illinois Farm Bureau for their support of my effort to further my education. I would also like to thank my wife and two sons for the support, understanding, and sacrifices they made while I sought my degree.

CHAPTER I: INTRODUCTION

The Illinois Farm Bureau (IFB) is the largest agricultural membership organization in Illinois representing over 80,000 farmers. The mission of the IFB is to improve the economic well-being of agriculture and enrich the quality of farm family life. A key function of the organization in achieving this mission is to advocate for laws and policies that allow for farmers to be successful and profitable. One of the most important state tax policies involving farmers' financial well-being is the assessment of farmland for property taxes.

IFB policy, set by its members, supports the current use-value assessment of farmland. However, no recent data exists on the impact of this tax policy on farmers. By conducting an analysis of changing this tax policy, IFB would have a better understanding of the impact it has on the financial standing of its members.

The objective of the thesis is to determine the financial impact on farmers resulting from changing the current use-value assessment of farmland to market-value assessment. This is accomplished with two sub-objectives. The first sub-objective is to determine the impact this change in tax policy would have on the value of farmland. The second sub-objective is to determine the impact that this change in tax policy would have on net farm income. Both of these impacts would provide an understanding of the total financial impact resulting from the policy change.

1.1 Assessment of Farmland

Every state in the U.S. uses some method of preferential treatment for the assessment of farmland for property taxes. Generally, property tax assessment methods used for farmland are either a classified-use system or a use-value system. Classified use-systems apply different tax rates or specific exemptions to lands classified as farmland. Use-value systems create a taxable value for the property based upon the land's ability to produce income rather than based on its market value (Orr 2012).

Policies for assessing farmland differently from other property types were implemented for numerous reasons. The implementation of these policies in states first started in the 1960s, when significant pressure to convert farmland to other uses drove up property values and led to higher property tax expenses. These property tax expenses were growing faster than the income from the land, especially in more urbanized areas, creating a hardship for farmers. Preferential property tax policies for farmland were implemented to reduce this hardship and slow the conversion of farmland (Orr 2012). Use-value assessment policies were also implemented to provide a more equitable method of assessing farmland by using its ability to produce income. If market-value assessment were used, pressures outside of agriculture and local market dynamics could create situations where similar properties with similar productive capabilities are assessed for property taxes at very different values (Hendricks 1987). Using a use-value process of assessing farmland determines its value based on the land's ability to produce income, reducing the inequity in the values established under market-value assessment.

1.2 Property Taxes in Illinois

Illinois farmland is currently assessed for property taxes based upon its capitalized net income or "agricultural economic value". This policy was first passed by the Illinois General Assembly in 1977 and implemented in the 1978 tax year (Hendricks 1987). The agricultural economic value is determined by first establishing a productivity index for each soil type based on its ability to produce crops. An agricultural economic value is then determined for each productivity index by subtracting the five year rolling average of non-land expenses from gross income, arriving at a value for net land return. The resulting net land return is then capitalized by the five-year average Federal Land Bank Mortgage Interest Rate to arrive at an agricultural economic value. One-third of this agricultural economic value is then used to establish the certified value for the productivity index. However, annual increases or decreases in this certified value are limited to ten percent per year. Once the limitation imposed by the cap on annual changes is applied, this final certified value becomes the basis for property tax assessment for the various soil types.

To assess farmland for taxes, county assessors determine the distribution of each soil type and its associated productivity index for a parcel of farmland. The certified value for each productivity index is then multiplied by the number of acres of that soil type. The result for each soil type is then added together to arrive at a total value for the parcel. The property tax rate is then applied to this total value.

The determination of the certified value of farmland is obviously different from the market value used for the assessment of other types of real estate in Illinois. For example, most residential property in Illinois is assessed at one-third of its market value. Once this value is equalized for differences in assessment practices, it represents the equalized assessed value (EAV) of the property. The assessment of real property; whether farmland, residential, or commercial, represents the first step in the collection of property taxes in Illinois (Illinois Department of Revenue 2002).

The second step is for each unit of government that taxes real property to determine its tax levy for the coming year. The levy is the amount of revenue budgeted by that unit of government for its operation. Levies are then forwarded to the county assessment official so that they can be extended to the properties within the taxing jurisdiction of that unit of government.

However, the growth in a unit of local government's tax extension may be limited if voters in its respective county previously voted to implement property tax extension limitations via the Property Tax Extension Limitation Law (PTELL). PTELL limits extension growth to the lesser of five percent or the Consumer Price Index (CPI).

The final step is for the tax levy to be extended to the property in that taxing body's jurisdiction. Once the total extension has been determined and equally applied to the total EAV for an area, a property tax rate is calculated and applied to the EAV for a property. Tax rates for the various units of government extending property taxes may also be limited by statute. These limitations vary by the type of governmental unit and the type of fund where the taxes will be used (Illinois Department of Revenue 2002).

1.2 Thesis Objectives

As the market value of farmland has increased in recent years, and as the agriculture economy continued to thrive during the recent economic downturn, the process of assessing farmland for property taxes has received attention. There are some in Illinois who have felt the use-value assessment process for farmland should be changed because it doesn't reflect market values for farmland. There are also some local government officials that have questioned the procedures used.

The deliverable for this thesis is the information it contains demonstrating the impact of a change in tax policy on farmers. The basis for advocating for any policy is a clear understanding of that policy's impact. As has been mentioned, there is no recent information that IFB is aware of demonstrating the impact of changing the property tax policy for Illinois farmers. By doing this analysis, Illinois' current tax policy and its impact on Illinois farmers will be better understood.

Data used for the thesis include market values for farmland, cash rental rates for farmland, property tax information, and financial information for Illinois farmers. Data on the market value of farmland and on cash rents were sourced from the United States Department of Agriculture National Agriculture Statistics Service (NASS). NASS collects data on statewide average farmland values and statewide average farmland cash rents annually. These data were used to determine the average farmland values, average cash rents, and the growth trend in these values over time.

Data on productivity indices and their certified values were sourced from the Illinois Department of Revenue (IDOR). IDOR publishes this data annually prior to the assessment process. On its website, IDOR also publishes tax extension and equalized assessed property value information that was used to calculate average property tax rates.

Financial information for Illinois farmers was sourced from the Illinois Farm Business Farm Management Association (FBFM). FBFM works directly with farmers assisting them with financial record keeping and management. They provide aggregate data based on farmers participating in their program. These data include farm sizes, incomes, and expenses and were used to determine the impact of a change in tax policy on farm incomes.

CHAPTER II: LITERATURE REVIEW

There has been extensive research conducted regarding the determination of farmland values and the impact of property tax policy on income and land values. The previous work associated with the topic can be categorized in three different ways: research on models for farmland valuation, research of the capitalization of property tax relief into farmland prices, and research on the financial condition of farmers resulting from property tax relief for farmland.

2.1 Models for Farmland Valuation

Vantrees, Skees, and Reed (1986) developed a discounted earnings model using growth in rents, discount rates, inflation rates, and specific characteristics of land parcels to value farmland in Clark County, Kentucky. Their model estimated land rents as a function of specific farm characteristics, such as proximity to the market for purchasing of inputs and sales of commodities, the size of the parcel, and the percentage of the parcel in cropland or pasture land. They found that the discounted earnings model they developed that included specific parcel characteristics provided an effective way of understanding farmland values.

Featherstone and Baker (1987) developed a model to analyze the response of farmland valuation to shocks in interest rates and real returns. Their analysis showed impacts to farmland values resulting from changes to farmland returns. A similar response was also estimated from a shock to interest rates. Their analysis showed that the farmland market is subject to overreactions in farmland prices that can continue for years resulting from one-time shocks in returns to farmland or interest rates.

Painter (2002) applied the theory of discounted earnings to land values in Saskatchewan, Canada. Painter analyzed farmland prices in Saskatchewan between the years of 1979 and 1999. His model assumed that commodity yields and prices would not change much in the future. Over this 20 year period, he determined that the discounted earnings model provided a sufficient model for determining farmland values. This was especially true when the actual results were lagged one year, so that they occurred in the same year as the predicted results. He theorized that the improvement in the lagged model demonstrated that there are situations where farmers know their yield, incomes, and interest rates for the current year, most likely following fall harvest, and include those factors into their bid price for land in that year.

Tsoodle, Golden, and Featherstone (2003) researched the factors impacting the value of farmland in Kansas. The research focused on four types of characteristics impacting farmland values: productive characteristics, consumptive characteristics, speculative characteristics, and transactional characteristics. They developed both a statewide model for farmland values and regional models for the nine crop reporting districts in the state of Kansas. Their analysis showed that factors such as the productivity of the land, size of the parcel, and regional demand impacts the price of land. Their analysis also provided support for the theory that land prices are being established based on the present value of future earnings from the land.

Moss and Katchova (2005) provided a review of research conducted on the performance of farmland as an asset and on the models for valuing farmland in the United States. Their review of the research showed criticisms of the use of the asset capitalization model for the valuation of farmland, including the idea that the significant inflation occurring during the 1970s may have led to an underestimation of the future returns of farmland. This resulted in land prices that were much higher than what the models would have indicated. They explained that research conducted since the 1980s has shown farmland values have increased proportionally to increases in returns from the land, which is consistent with capitalization theory. However, farmland seems to be consistently overpriced based on the results of the asset capitalization model. While their research did not demonstrate it, they theorize that this may be a result of government program payments being bid into farmland prices.

2.2 Capitalization of Property Tax Relief Into Property Values

Research conducted by Pasour (1975) demonstrated that changes in property taxes are largely capitalized into farm property values. Pasour developed an economic model that was used to determine the impact of property taxes on farmland values for data from the forty-eight contiguous states in 1969. The results were then used in a capitalization formula to estimate the magnitude that property tax changes are capitalized into farmland values. The research showed that, based on data from 1969, an increase in property taxes of $0.10 per $100 of farmland value resulted in a reduction in farmland values of approximately $6.37 per acre. Pasour then developed a model to determine the change in farmland values when a change in property taxes is fully capitalized into farmland values. His model determined that full capitalization of an increase in property taxes of $0.10 per $100 of farmland value resulted in a reduction in farmland values of $6.81 per acre. This result demonstrated that changes in property tax values were largely capitalized into the value of farmland.

Anderson and Bunch (1989) analyzed the property tax relief programs in Michigan and their impacts on farmland values. They found that the circuit-breaker type relief programs offered to Michigan farmers had an impact on farmland values. The regression model they developed estimated that the combined property tax credits received by farmers were responsible for 8.33 percent of farmland values. Their analysis also showed that the property tax relief programs were reducing farmers' property taxes between 80 to 90 percent, while increasing farmland values by slightly less than 10 percent.

Boldt (2002) analyzed the effects of use-valuation for property taxes on Wisconsin farmland. The analysis conducted showed that the lower property taxes faced by farmland owners as a result of use-value property tax assessment were capitalized into higher prices for farmland. The analysis conducted for the years of 1996 to 2002 showed that if Wisconsin were to shift from use-value assessment to market-value assessment, property taxes in rural areas would increase $14.76 per acre. This increase resulted in a possible reduction in farmland values in rural areas of $156 per acre, or 10.08 percent. In urban areas, the increase in property taxes resulting from a shift in property tax policy was $42.79. The resulting decrease in farmland values was found to be $495, a similar 10 percent reduction. Lower property taxes also resulted in some evidence of farmland preservation in rural areas of Wisconsin. However, the analysis implied that use-value assessment did not contribute to farmland preservation in more urbanized areas of the state.

2.3 Impact of Property Tax Policies on the Financial Condition of Farmers

Research conducted in Illinois by Chicoine, Sonka and Doty (1982) analyzed the impact of various types of farmland property tax relief programs on the financial condition of farmers. They used a simulation approach to analyze circuit breaker type property relief programs and use-value assessment programs against market-value tax assessment. Based on their simulation, they found that circuit breaker type property tax relief programs provided little impact on farmer financial condition. However, they found that use-value assessment of farmland did reduce the total property tax burden for farmers by $3,913, resulting in improved financial conditions for the farmer. This improved financial condition resulted in the ability of farmers to bid higher for farmland, increasing maximum farmland bid prices approximately $1,000. This would result in not only an increase in the financial condition of the farmer, but also of the farmland owner if that owner was not operating the farm. Their simulation also showed that property tax relief programs did not sufficiently improve the financial condition of farmers on the urban fringe, resulting in likely liquidation of farmland. Boldt's research supports this by demonstrating that use-value assessment of farmland does little to preserve farmland on the urban fringe.

Klose, Outlaw, and Anderson (2004) conducted a simulation to determine the impacts of property tax policy on the financial condition of farmers in Texas. They included an additional simulation of a change in sales tax policy on farmers by eliminating the sales tax exemption that farmers receive for inputs purchased for their farm. Their five year simulation was based on actual farmer financial records from Texas. The simulation showed that eliminating the use-value assessment of farmland would increase farmer expenses an average of $21,000. This resulted in a 17 percent reduction in net farm cash income. At the end of the five year simulation, farmers' financial condition was reduced by $76,000 as a result of the change in property tax policy. Elimination of the use value assessment of farmland also resulted in a 7 percent increase in the probability that farmers' cash receipts would fall below zero, demonstrating an increased probability that farmers would earn no profit if the property tax policy were changed.

2.4 Summary of Literature Review

The literature reviewed on this topic shows there are multiple models that have been used to predict farmland values over time. The literature also shows that there are potential economic impacts resulting from property tax relief programs provided for agricultural land. These economic impacts come in the form of changes in the value of farmland resulting from the capitalization of reduced property taxes and changes to the financial conditions of farmers resulting from lower costs and improved returns from farmland. While the literature showed recent activity specific to the impacts of use-value assessment for farmers in other areas of the United States, no recent research has been conducted on the economic impacts of property tax policy specific to Illinois farmers.

CHAPTER III: THEORETICAL MODELS

To address the objectives of this analysis, two theoretical approaches are used. To determine the impact on farmland values resulting from a change from use- value assessment of farmland for property taxes to market-value assessmen, a model of farmland valuation in Illinois will be developed. To determine the financial impacts of the change in property tax policy on farmers' net farm income, a simulation of farmers' net farm income will be conducted.

3.1 Farmland Valuation Model

The review of the literature shows that it is possible to determine a maximum value of farmland based upon the discounted future earnings received from the land. This model, called the Gordon model, is used for determining the present value of growing annuities. The Gordon model values a growing annuity into perpetuity using the following formula (Brealey, Myers and Allen 2011):

1) $PV = \frac{C_0(1+g)}{(r-g)}$

In this equation, C_0 is the cash flow at period 0, r is the discount rate or the cost of capital and g is the expected growth rate for the cash flow.

In the case of valuing farmland, the Gordon model determines the value of farmland based upon the discounted future earnings from cash rent that represents returns from the land. Present Value (PV) becomes the current per acre value of the land, C_0 is the current cash rent from the land, r is the discount rate, and g is the expected growth rate in cash rent over time.

From the literature review, it is also clear that cash rents are not the only factor influencing farmland values. Farmland values may also be a function of the demand to convert farmland to other uses, especially in more urban areas. For example, research conducted by Boldt (2002) and Chicoine, Sonka, and Doty (1982) showed that urban pressure to convert farmland impacted farmland values. To reflect this influence, a factor is added to the theoretical model for farmland valuation. Because the growth in pressure to develop farmland is not associated with agricultural use, the growth in the value of this pressure is likely to grow at a different rate than the growth in cash rent for farmland. Therefore, it is represented by g_2. The inclusion of non-agricultural growth also requires that the holding period of the land before conversion is incorporated into the formula. In formula 2, it is represented by T. To represent the growth in cash rent, g_1 is now used. The resulting equation is as follows.

2) $PV = \sum_{t=1}^{T} C_0(1+g_1)^t(1+r)^{-t} + PV(1+g_1)^T(1+g_2)^T(1+r)^{-T}$

This equation can then be rearranged to solve for PV as follows:

3) $PV - PV(1+g_1)^T(1+g_2)^T(1+r)^{-T} = \sum_{t=1}^{T} C_0(1+g_1)^t(1+r)^{-t}$

4) $PV = \dfrac{\sum_{t=1}^{T} C_0(1+g_1)^t(1+r)^{-t}}{1-(1+g_1)^T(1+g_2)^T(1+r)^{-T}}$

Finally, using the model to discount the cash rent, C_0, and solving for PV results in:

5) $PV = \dfrac{C_0(1-(1+r)^{-T}(1+g_1)^T)}{\left[\frac{r-g1}{1+g1}\right](1-(1+r)^{-T}(1+g_1)^T(1+g_2)^T)}$

This equation is similar to that developed by Featherstone, Kastens, and Dhuyvetter (2002) in their work on the topic.

To determine the impact of property tax policy, property taxes must be included in the theoretical model. Illinois' current property tax policy is to tax farmland based on its use-value. However, due to the process of used to determine the certified economic value of farmland and the imposition of a 10 percent limit on annual changes in the certified economic value, the value for assessment purposes is not necessarily connected to the cash rent value. The certified economic value also has a different rate of growth than either the agricultural or non-agricultural growth rates for farmland.

To determine the impact of current use-value property taxes, current per acre property taxes, PT_1, must be discounted and subtracted from the model result. As mentioned, the growth rate for property taxes is different than either the agricultural or non-agricultural growth rates and is represented as g_3. This value is also discounted and subtracted from the value determined in Equation 5. Therefore, the equation for farmland values under the current use-value assessment process would be as follows:

$$6)\quad PV = \sum_{t=1}^{T} C_0(1+g_1)^T(1+r)^{-T} + PV(1+g_1)^T(1+g_2)^T(1+r)^{-T} - PT_1(1+g_3)^T(1+r)^{-T}$$

Rearranging the equation and solving for PV results in:

$$7)\quad PV + PV(1+g_1)^T(1+g_2)^T(1+r)^{-T} = \sum_{t=1}^{T} C_0(1+g_1)^T(1+r)^{-T} - PT_1(1+g_3)^T(1+r)^{-T}$$

$$8)\quad PV = \frac{\sum_{t=1}^{T} C_0(1+g_1)^T(1+r)^{-T}}{1-(1+g_1)^T(1+g_2)^T(1+r)^{-T}} - (P_1{*}CV)(1+g_3)^T(1+r)^{-T}$$

$$9)\quad PV = \frac{C_0(1-(1+r)^{-T}(1+g_1)^T)}{\left[\frac{r-g1}{1+g1}\right](1-(1+r)^{-T}(1+g_1)^T(1+g_2)^T)} - \frac{PT_1(1+g_3)}{(r-g_3)}$$

This equation represents the model for pricing farmland under Illinois' current property tax policy.

If Illinois' property tax policy were to be changed to assess property taxes based on the market value of land, a change to the equation is needed. The change from a use-value property tax policy to a market-value property tax policy would directly tie property taxes to farmland values. Property taxes would be expected to grow at the same rate as the value of farmland. Therefore, the value of property taxes per acre, represented as PT_2 in the model, can be simply subtracted from cash rent, and then the result is discounted based on the theoretical model. The calculation of the future value of property taxes included in Equation 9 is no longer needed because the value of property taxes is subtracted from cash rents.

The equation for including property taxes assessed based on market value of the land would be:

10) $PV = \sum_{t=1}^{T} (C_0\text{-}PT_2)(1+g_1)^T(1+r)^{-T} + PV(1+g_1)^T(1+g_2)^T(1+r)^{-T}$

Solving for PV results in the following theoretical model:

11) $PV\text{-}PV(1+g_1)^T(1+g_2)^T(1+r)^{-T} = \sum_{t=1}^{T} (C_0\text{-}PT_2)(1+g_1)^T(1+r)^{-T}$

12) $PV = \dfrac{\sum_{t=1}^{T} (C_0\text{-}PT_2)(1+g_1)^T(1+r)^{-T}}{1-(1+g_1)^T(1+g_2)^T(1+r)^{-T}}$

13) $PV = \dfrac{(C_0\text{-}PT_2)(\ 1-(1+r)^{-T}(1+g_1)^T)}{\left[\frac{r-g1}{1+g1}\right](1-(1+r)^{-T}(1+g_1)^T(1+g_2)^T)}$

Changing to market value assessment of farmland would increase the total property taxes paid. In Equation 9 and Equation 13, property taxes paid reduce the returns from farmland and therefore, its present value. The property taxes paid under a market-value assessment policy would be greater than the current use-value property tax policy resulting in lower returns from farmland. It is theorized that the lower returns from farmland resulting from the tax policy change would result in lower farmland values.

3.2 Net Farm Income Simulation

To achieve the second objective of this analysis, a simulation is conducted on the impact of a change in property tax policy on Illinois farmers' net farm income. A simulation is a sampling experiment that includes variables that are unknown, but can be sampled from a distribution. These variables are then used to calculate the potential outcomes that may result (Seila 2002).

The simulation of net farm income used in this analysis is a similar approach to that used by Chicoine, Sonka, and Doty and Klose, Outlaw, and Anderson. Chicoine, Sonka, and Doty used a simulation to analyze the impacts of various property tax policies on a hypothetical cash grain farming operation located in east central Illinois. They used a budgeting model that simulated expected crop yields, crop prices, and property taxes. They then incorporated these factors into year-end financial statements over a ten year period. Their results showed the average net farm income over the ten year period for each property tax policy and the number of negative cash situations that occurred in the model (Chicoine, Sonka and Doty 1982).

Klose, Outlaw, and Anderson also used a simulation approach to analyze the impact of increased property taxes on farmers in Texas. Their simulation was conducted for 183 farms over a five year period. The results included changes in net farm income, the probability that net farm income was less than zero, changes in ending cash balance at the end of five years, and the probability that ending cash was less than zero (Klose, Outlaw and Anderson 2004).

Higher property taxes increase costs for landowners and farmers. It is theorized that these increased costs will reduce the net farm income for Illinois farmers.

CHAPTER IV: METHODS

To determine the impact of changing property tax policy on farmland values, empirical data were used with the theoretical models in the previous chapter. Farmland values were modeled under existing use-value tax policy and compared with those under the changed market-value tax policy. A simulation model was also constructed to analyze the potential impacts to net farm income resulting from a change in tax policy.

4.1 Data

The expected response of farmland values to a change in property tax policy can be modeled by using empirical data and the theoretical models from the previous chapter. Due to data availability, this analysis assumes that a change to farmland property tax policy from use-value assessment to market-value assessment was implemented in 2010, with the first collection of market-value property taxes in 2011.

Information on the average cash rent price for Illinois was collected from the USDA National Agriculture Statistics Service (NASS). The NASS data include statewide average cash rent information for the years 1997 to 2010. The 2010 average cash rent for Illinois reported by NASS is $169.00 (United States Department of Agriculture National Agricultural Statistics Service 2013).

To determine the trend in cash rent values that represent the agricultural growth rate in the theoretical models, the NASS cash rent data were used. The growth in cash rent values as a percent was calculated and is reported in Table 4.1.1. The statewide growth in cash rents, used as a proxy for agricultural growth, averaged 3.51 percent per year during this period.

Table 4.1.1: Average Statewide Illinois Cash Rent and Percent Change, 1997-2010

Year	Average Cash Rent	Annual Change
1997	$109.00	
1998	$111.00	1.83%
1999	$111.00	0.00%
2000	$119.00	7.21%
2001	$119.00	0.00%
2002	$122.00	2.52%
2003	$123.00	0.82%
2004	$126.00	2.44%
2005	$129.00	2.38%
2006	$132.00	2.33%
2007	$141.00	6.82%
2008	$163.00	15.60%
2009	$163.00	0.00%
2010	$169.00	3.68%
Average Growth		3.51%

To calculate non-agricultural growth rates, actual farmland value growth rates and the actual growth rate in cash rents are used. As shown in previous research, growth in property values can be influenced by factors other than cash rents. Data on statewide average farmland values were also collected from NASS for the period of 1997 to 2010 (United States Department of Agriculture National Agricultural Statistics Service 2013). The increase in average values was calculated as a percent change, and then these values were averaged for the period. The average statewide farmland values and growth in values are reported in Table 4.1.2.

Table 4.1.2: Average Illinois Statewide Farmland Value and Percent Change, 1997-2010

Year	Average Farmland Value	Annual Change
1997	$2,070.00	
1998	$2,240.00	8.21%
1999	$2,320.00	3.57%
2000	$2,350.00	1.29%
2001	$2,370.00	0.85%
2002	$2,430.00	2.53%
2003	$2,500.00	2.88%
2004	$2,650.00	6.00%
2005	$3,250.00	22.64%
2006	$3,640.00	12.00%
2007	$4,150.00	14.01%
2008	$4,850.00	16.87%
2009	$4,670.00	-3.71%
2010	$4,900.00	4.93%
Average Growth		7.08%

With the average growth rate for cash rent and the average growth rate for farmland known, it is possible to calculate the implied non-agricultural growth rate. The theoretical formulas use $(1+g_1)$ times $(1+g_2)$ to represent the total growth rate plus 1 $(1+g)$ for farmland values. Therefore, the non-agricultural growth rate, g_2, can be calculated using the following formula: $(1+g)/(1+g_1)-1$. The result of this calculation is an estimated non-agricultural growth rate of 3.45 percent. A summary of actual agricultural growth rates, farmland value growth rates, and non-agricultural growth rates is included in Table 4.1.3.

Table 4.1.3: Average Illinois Agricultural, Farmland Value, and Non-Agricultural Growth Rates, 1997-2010

Average Agricultural Growth	Average Farmland Value Growth	Average Non-Agricultural Growth
3.51%	7.08%	3.45%

A third rate for the growth in use-value property taxes for farmland was also calculated. Data for equalized assessed values (EAVs) and property taxes extended to farmland from 2006 to 2010 were collected from the IDOR website (Illinois Department of Revenue 2013). Illinois changed the way it calculated productivity indices (PIs) for the various soil types in 2006. This change created a new PI range for all soils. The difficulty in establishing a relationship between PIs previous to 2006 and those after 2006 and the lack of data on average PIs prior to 2006 necessitated the use of the 2006 to 2010 time frame for these data. The average property tax rate for farmland was calculated by dividing the total tax extensions to farmland as reported by IDOR by the total EAV for farmland for the same year. This tax rate was then applied to the certified value for PI 111, the average PI. The change in the resulting property taxes per acre was then used to establish a growth rate in property taxes for farmland. Cook County is the only county in Illinois that does not follow the same farmland property tax assessment process. For this reason, the extension value and EAV for Cook County were eliminated from the data. The average annual growth in property taxes for farmland during the period 2006 to 2010 is 5.38 percent and is reported in Table 4.1.4.

The average property tax value per acre for 2010 is also another input needed. The average property tax per acre under use-value assessment for 2010 is $10.42. This value is inserted into the theoretical models as PT_1 and is reported in Table 4.1.4.

Table 4.1.4: Annual Change in Illinois Farmland Property Taxes, 2006-2010

Year	Average Farmland Property Tax Rate	Average Productivity Index	Certified Value	Average Property Taxes Per Acre	Percent Change
2006	7.42%	111	$115.92	$8.61	
2007	7.31%	111	$104.33	$7.63	-11.33%
2008	7.33%	111	$114.76	$8.41	10.27%
2009	7.35%	111	$126.24	$9.27	10.23%
2010	7.50%	111	$138.86	$10.42	12.33%
Average	Annual Change				5.38%

Property tax rates under market-value assessment must also be calculated. Due to the way property tax rates are determined in Illinois, an adjustment to the statewide total EAV was required as a result of the potential change to market-value assessment of farmland. The total farmland EAV statewide, as reported by IDOR, was adjusted by the difference between the certified value of the statewide average productivity index and one-third of the average value of farmland in 2010. The average productivity index in Illinois is 111, which had a certified value of $138.86 in 2010. The total EAV for farmland in Illinois was divided by the average certified value of $138.86. The result was then multiplied by one-third of the 2010 market value of farmland, or $1,633.33, the average assessed value under market-value assessment. The adjusted total farmland EAV was added back into the EAV's for other property types to arrive at a statewide total EAV. The total statewide tax extension was then divided by this adjusted total EAV to arrive at an average property tax rate under market-value assessment for farmland.

The property tax rate for use-value assessment differs from the rate for market-value assessment because of the way the rates are determined and the fact that they are applied to different farmland values. The market-value rate is multiplied by one-third of the average farmland value for 2010 for inclusion in the model. A summary of property tax rates for farmland under use-value assessment and under market-value assessment is included in Table 4.1.5.

Table 4.1.5: Summary of Illinois Farmland Property Tax Rates Under Use-Value and Market-Value Assessment

Average Use-Value Farmland Property Tax Rate*	Average Market-Value Farmland Property Tax Rate**
7.90%	5.79%

*Applied to the agricultural certified value for farmland.
**Applied to one-third of the market value of farmland.

An additional input for the theoretical models is the holding period for farmland. The University of Illinois has reported that farmland turnover rates in Illinois between 2000 and 2011 have averaged 2.04 percent per year (Sherrick 2012). This turnover percentage results in a holding period of 49 years.

A final input needed for the theoretical model is the discount rate, represented as r in the equations. Because the results of the model are sensitive to changes in the discount rate, more than one discount rate was used for this analysis. The discount rate is the expected rate of return from an asset or assets of similar risk (Brealey, Myers and Allen 2011). The discount rate should be higher than than the cost of debt for a firm using debt (Gloy, et al. 2011). The average rates charged for long term farm real estate loans, reported by the Chicago Federal Reserve in 2010, were used as a representation of the cost of debt. The long term interest rate for farm real estate loans averaged 5.875 percent for 2010 (Kansas City Federal Reserve 2011). The capitalization rate of Illinois farmland can help determine an appropriate discount rate for this analysis. Traditional capitalization rates for Illinois farmland range between 3 percent to 5 percent (Illinois Society of Professional Farm Managers and Rural Appraisers 2012). The capitalization rate can be added to the cost of debt to estimate an appropriate range for the discount rate. An analysis of past farmland values was conducted to test the model and determine an appropriate discount rate. Discount rates ranging from 8.75 to 9.25 percent were analyzed. The data from previous years showed that a discount rate of 9.0 percent was most accurate, with an average error of negative 2 percent. The discount rates analyzed also fall within a range of values theorized by the cost of debt and capitalization rate and were used for the analysis.

The data were inserted into the theoretical models for the current property tax system and the model for the market-value assessment of farmland. Model results were then compared to determine the potential response of farmland values to a change in property tax policy.

4.2 Simulation of Impacts to Net Farm Income

To understand the impact of the tax policy change on net farm income, a simulation was conducted on actual financial data from Illinois farms. Data for the simulation were collected from the Illinois Farm Business Farm Management Association (FBFM). FBFM is a cooperative that provides Illinois farmers assistance with farm record keeping and financial decision making.

FBFM provided financial characteristics for farms involved in their record keeping program for the years 2003 to 2010. The data set is very diverse and includes 21,129 records from farmers throughout Illinois. Full-time and part-time grain farms, full-time and part-time grain and livestock farms, and livestock farms are all represented in the data set. Descriptive statistics for the data set are included in Table 4.2.1.

Table 4.2.1: Descriptive Statistics of Illinois Farm Financial Data

		Mean	Maximum	Minimum	Standard Deviation
Count	21,129				
Farm Size (Acres)		964.83	8201	1	691.94
Owned Acres		170.40	3057	0	224.14
Gross Returns		$465,295	$7,725,541	$0	$434,067
Expenses		$340,170	$5,878,522	$516	$334,117

Net farm income in this data is a function of gross returns minus expenses. Net farm income also represents income before the payment of taxes and principal on debt and does not include costs of unpaid labor, interest on non-farm assets, or interest on land assets. Gross returns for farmers are a function of production and commodity prices that vary significantly based on uncontrollable weather and market dynamics. To reflect this variability and potential market dynamics, the simulation randomly samples the data from within the distribution for gross revenues in the data set.

Expenses are also influenced by uncontrollable market dynamics. Therefore, expenses were also simulated based on the distribution in the data set. Expenses may be driven by the same factors impacting gross returns, so a correlation analysis between gross returns and expenses was conducted. This analysis, reported in Table 4.2.2, shows strong correlation between gross farm revenues and expenses.

Table 4.2.2: Correlation Between Gross Returns and Expenses

	Gross Returns	Expenses
Gross Returns	1	0.913
Expenses	0.913	1

To compare the effects of a change in property tax policy, a simulation based on the current use-value property tax policy was conducted. The @Risk software program was used to conduct the simulation. The simulation ran one thousand iterations sampling the gross returns and expenses based on the distribution and correlation of the data from within the data set. Gross returns and expenses followed the same agricultural growth, 3.51 percent as used for the farmland value models through the entire ten year time horizon analyzed. Expenses were subtracted from gross returns to arrive at a simulated net farm income for each year of the analysis. The @Risk software provided a distribution for the potential outcomes for net farm income and the probability that net farm income would fall below zero for each year analyzed. The results were used as the baseline for analysis of the impact of a change in property tax policy.

To determine the impacts of a change to market-value assessment, the increase in property taxes expected based on the average farmland value in Illinois was added to the expenses for the farmer. The analysis assumes that the property tax policy was implemented in 2010. Because property taxes are collected in the year following assessment, this increase in property taxes was applied to the expenses in the following year of 2011.

Once the impact of the change to market-value assessment is realized, it is theorized that a reduction in farmland values would occur. For the analysis of impacts to net farm income, the largest reduction in farmland values occurs in the first year of implementation of the new property tax policy. Therefore, farmland values are expected to fall during 2011, resulting in a reduction in farmland property tax assessments when compared to 2010, as the property tax rate is applied to reduced farmland values. This readjustment of farmland values and resulting property taxes is first applied to expenses in 2012, the year following this market adjustment. The farmland models then show that farmland values stabilize and resulting property taxes stabilize in the later years of the simulation.

The increase in property tax expenses estimated for the entire simulation period were also applied only to the average number of owned acres for the average farmer in the data set. Those acres not owned were assumed to be rented by the farmer and therefore not subject to increased property tax expenses.

The results of these projections over the ten year period analyzed were compared to determine the impact of the change. The differences between average annual net farm income and the probability that net farm income would fall below zero were used to describe the impact on a farmers' financial condition as a result of the change in property tax policy in Illinois.

CHAPTER V: RESULTS

It was theorized that the increased cost of property taxes resulting from a change from use-value to market-value assessment of farmland would result in decreased farmland values. The models developed demonstrate that decreases are likely to occur. It was also theorized that the increased costs and decreased farmland values would negatively impact net farm income for Illinois farmers. The results demonstrate that a reduction in income is also likely.

5.1 Results of Models for Farmland Values

The data collected for the farmland value models was inserted into Equation 9 to gauge the accuracy of the model. The model determined farmland values that are near actual values for 2010. The accuracy of the results when compared to actual farmland values for 2010 varied based upon the discount rate used. An 8.75 percent discount rate overestimated the farmland value, while a discount rate of 9.25 percent underestimated the farmland value. A discount rate of 9.0 percent resulted in farmland values that nearly matched the reported value for 2010.

To further gauge the accuracy of the model, a comparison between model results and historical average farmland values was conducted. Data for the years between 2006 and 2010 were compared. Due to the application of a change in the way that productivity indices (PIs) were calculated and the availability of average PI values for the entire state of Illinois prior to 2006, it was not possible to conduct an analysis for years prior to 2006. When the results of the model are compared to actual average farmland values, the results slightly underestimate actual values but are relatively accurate, especially at the 9.0 percent discount rate. The results demonstrate the model's sensitivity to the discount rate, small changes in discount rate have an impact on the results. The results also assume that the discount rate remains constant over the time period analyzed, which may explain the estimated errors as years move away from 2010. The actual average farmland values for the years 2006 to 2010 and the results of the model for valuing farmland under the current use-value tax assessment process are included in Table 5.1.1.

Table 5.1.1: Equation 9 Model Results: Farmland Values Under Use-Value Assessment, 2006-2010

	Reported	8.75% Discount Rate			9.0% Discount Rate			9.25% Discount Rate		
	Farmland	Model	Value	Percent	Model	Value	Percent	Model	Value	Percent
Year	Value	Result	Error	Error	Result	Error	Error	Result	Error	Error
2006	$3,640	$4,200	$560	15%	$3,690	$50	1%	$3,299	-$341	-9%
2007	$4,150	$4,535	$385	9%	$3,987	-$163	-4%	$3,566	-$584	-14%
2008	$4,850	$5,256	$406	8%	$4,621	-$229	-5%	$4,134	-$716	-15%
2009	$4,670	$5,229	$559	12%	$4,596	-$74	-2%	$4,111	-$559	-12%
2010	$4,900	$5,396	$496	10%	$4,742	-$158	-3%	$4,240	-$660	-13%
Average	Error		$481	11%		-$115	-2%		-$572	-13%

To understand the impacts of changing to market-value assessment of farmland, data for the property taxes per acre estimated for market-value assessment were first inserted into Equation 9. This was done to model the impacts using the same mathematical formula to compare those results with the results of Equation 13. Average per-acre property taxes are estimated to increase from $10.42 per acre to $94.57 per acre. Inserting market-value property taxes into Equation 9 would assume that the growth rate for property tax values, g3, would remain at the rate previously seen under use-value assessment. Farmland values were then projected forward from 2010 by assuming the same agricultural, non-agricultural, and property tax growth rates.

Comparing the results for Equation 9 under use-value assessment and market-value assessment demonstrates the potential for significant reductions in farmland values as a result of a change in property tax policy. The results of the Equation 9 model for farmland values under use-value assessment compared with the results under market-value assessment are included in Table 5.1.2.

Table 5.1.2: Comparison of Illinois Farmland Values Under Use-Value and Market-Value Assessment, 2010-2021

	Use-Value Assessment			Market-Value Assessment			Value Change			Percent Change		
Year	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate
2010	$5,396	$4,742	$4,240	$2,765	$2,292	$1,949	-$2,631	-$2,450	-$2,291	-49%	-52%	-54%
2011	$5,580	$4,903	$4,384	$4,514	$3,910	$3,455	-$1,066	-$992	-$928	-19%	-20%	-21%
2012	$5,769	$5,069	$4,532	$3,741	$3,181	$2,766	-$2,028	-$1,888	-$1,766	-35%	-37%	-39%
2013	$5,965	$5,240	$4,685	$4,397	$3,781	$3,320	-$1,568	-$1,459	-$1,365	-26%	-28%	-29%
2014	$6,167	$5,418	$4,843	$4,256	$3,638	$3,179	-$1,911	-$1,779	-$1,664	-31%	-33%	-34%
2015	$6,376	$5,601	$5,007	$4,572	$3,921	$3,436	-$1,804	-$1,680	-$1,571	-28%	-30%	-31%
2016	$6,592	$5,790	$5,175	$4,638	$3,971	$3,474	-$1,953	-$1,819	-$1,701	-30%	-31%	-33%
2017	$6,815	$5,985	$5,350	$4,854	$4,160	$3,642	-$1,961	-$1,825	-$1,707	-29%	-30%	-32%
2018	$7,045	$6,187	$5,530	$4,995	$4,278	$3,744	-$2,051	-$1,909	-$1,786	-29%	-31%	-32%
2019	$7,283	$6,396	$5,716	$5,187	$4,444	$3,890	-$2,097	-$1,952	-$1,826	-29%	-31%	-32%
2020	$7,529	$6,611	$5,908	$5,359	$4,591	$4,019	-$2,170	-$2,020	-$1,890	-29%	-31%	-32%
2021	$7,783	$6,834	$6,107	$5,553	$4,757	$4,164	-$2,230	-$2,076	-$1,942	-29%	-30%	-32%
Average							-$1,956	-$1,821	-$1,703	-30%	-32%	-33%

Potential changes in farmland values in 2010 resulting from a change in property tax policy range from a decrease of 54 percent to a decrease of 49 percent, depending on the discount rate used (Table 5.1.2). In the years following 2010, the model initially demonstrates fluctuating farmland values as property tax expenses adjust with the varying farmland values. The models then show more stability in farmland values by approximately 2015, with the change in farmland values under use-value assessment and values under market-value assessment averaging between a decrease of 30 and a decrease of 33 percent over the entire period analyzed.

The data for property taxes under market-value assessment were then entered into Equation 13, the theoretical model for farmland under market-value assessment. This model assumes that property taxes will continue to grow at the same rate as farmland values. This is done by subtracting the increased costs of property taxes from the cash rent, then discounting the result. The results of Equation 13 under market-value assessment were compared with the results of Equation 9 under use-value assessment and are reported in Table 5.1.3. This comparison provides another estimation of the potential impact to farmland values if property tax policy were to be changed. The results of this comparison show similar changes to those when the results of Equation 9 under market-value assessment and use-value assessment are compared. The Equation 13 comparison shows that farmland values in the first year of implementation decrease 53 percent for all discount rates. Similarly, the model demonstrates that farmland values will vary in the years immediately following implementation, finally stabilizing in 2015. The average reduction in farmland values as a result of changing to market-value assessment for the period analyzed range from negative 32 to negative 33 percent.

Table 5.1.3: Comparison of Illinois Farmland Values Under Use-Value and Market-Value Assessment, 2010-2021

	Formula 9 Use Value			Formula 13 Market Value			Value Change			Percent Change		
Year	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate	8.75% Discount Rate	9.00% Discount Rate	9.25% Discount Rate
2010	$5,396	$4,742	$4,240	$2,520	$2,222	$1,992	-$2,876	-$2,520	-$2,248	-53%	-53%	-53%
2011	$5,580	$4,903	$4,384	$4,456	$3,929	$3,523	-$1,124	-$974	-$861	-20%	-20%	-20%
2012	$5,769	$5,069	$4,532	$3,537	$3,119	$2,796	-$2,232	-$1,950	-$1,735	-39%	-38%	-38%
2013	$5,965	$5,240	$4,685	$4,287	$3,780	$3,389	-$1,678	-$1,460	-$1,296	-28%	-28%	-28%
2014	$6,167	$5,418	$4,843	$4,073	$3,591	$3,220	-$2,094	-$1,826	-$1,623	-34%	-34%	-34%
2015	$6,376	$5,601	$5,007	$4,428	$3,904	$3,501	-$1,948	-$1,696	-$1,506	-31%	-30%	-30%
2016	$6,592	$5,790	$5,175	$4,460	$3,933	$3,526	-$2,131	-$1,857	-$1,649	-32%	-32%	-32%
2017	$6,815	$5,985	$5,350	$4,689	$4,134	$3,707	-$2,126	-$1,851	-$1,643	-31%	-31%	-31%
2018	$7,045	$6,187	$5,530	$4,811	$4,242	$3,804	-$2,234	-$1,945	-$1,726	-32%	-31%	-31%
2019	$7,283	$6,396	$5,716	$5,005	$4,413	$3,957	-$2,279	-$1,983	-$1,759	-31%	-31%	-31%
2020	$7,529	$6,611	$5,908	$5,166	$4,555	$4,084	-$2,363	-$2,056	-$1,824	-31%	-31%	-31%
2021	$7,783	$6,834	$6,107	$5,356	$4,722	$4,234	-$2,427	-$2,112	-$1,872	-31%	-31%	-31%
Average							-$2,126	-$1,853	-$1,645	-33%	-33%	-32%

The results of the models demonstrate that farmland values in Illinois could fall should property tax policy change from use-value assessment to market-value assessment. The magnitude of the negative impact is directly related to the reduced returns to farmland as a result of higher taxes. For example, if landowners are unable to recapture higher cash rents, average per-acre property taxes could increase by $84.15. This value represents 50 percent of the $169 average cash rent received. This significant reduction in the net returns from farmland is reflected in the 53 percent reductions in farmland value reported by the models for the year immediately following implementation.

This is consistent with the theory on farmland values, as reduced net incomes from the land should result in lower values. While the results of this analysis have a greater negative magnitude than other research conducted on the topic, they are consistent with other findings that higher property taxes would result in lower farmland values. For example, Pasour's research on changes in property taxes and their impacts on farmland values showed that in 1969, a $0.28 increase in per acre property taxes resulted in a $6.37 reduction in farmland values (Pasour, Jr. 1975). Dividing $6.37 by $0.28 provides a multiple of the change in property tax per acre expenses to the change in farmland value of 22. Boldt's research on use-value versus market-value assessment in Wisconsin showed that market-value assessment would increase property taxes in rural areas by $14.76 per acre for the 2002 tax year. The data indicated this would reduce farmland values by $156, providing a multiple of 11. In urban areas, a tax increase of $42.79 resulted in a reduction in farmland values of $495, a multiple of 12 (Boldt 2002). The results of the farmland models used in this thesis show that, for 2010, an increase in property taxes of $84.15

results in farmland values falling an average $2,548, a multiple of 30. The models show that over the ten year timeframe analyzed an average increase in per acre property tax expenses of $61.71 results in average farmland value reductions of $1,875, also a multiple of 30. The multiples shown by the theoretical models in this research are greater than those of previous research. However, this is likely due to lower interest rates causing greater farmland values, and greater property tax increases creating a greater magnitude of negative response to higher property tax expenses.

5.2 Simulation of Impacts to Net Farm Income

The results from the simulation of impacts to net farm income also follow the theorized expectations. For this analysis, net farm income is returns before taxes and principal payments on debt. The increased costs associated with higher property taxes have a negative impact on net farm income over the ten year simulation timeframe.

To demonstrate the impacts to net farm income, total net farm income and per acre net farm income changes as a result of a change in property tax policy were compared. The results for total net farm income from 2011, the first year that higher property taxes resulting from market-value assessment are collected, are reported along with the simulated results through 2021, in Table 5.2.1. The average annual impact across the entire ten year timeframe is also included.

Table 5.2.1: Results of Simulation - Total Net Farm Income, 2011-2021 and Average Annual Net Farm Income

Year	Use-Value Assessment			Market-Value Assessment			Percent Change in Average Income
	Average Net Farm Income	Maximum Net Farm Income	Minimum Net Farm Income	Average Net Farm Income	Maximum Net Farm Income	Minimum Net Farm Income	
2011	$129,843	$1,037,513	-$469,473	$113,728	$1,021,398	-$485,588	-12%
2012	$134,387	$1,073,826	-$485,905	$127,005	$1,066,443	-$493,287	-5%
2013	$139,091	$1,111,410	-$502,912	$126,037	$1,098,356	-$515,965	-9%
2014	$143,959	$1,150,309	-$520,513	$133,597	$1,139,948	-$530,875	-7%
2015	$148,997	$1,190,570	-$538,731	$136,439	$1,178,011	-$551,290	-8%
2016	$154,212	$1,232,240	-$557,587	$142,280	$1,220,308	-$569,519	-8%
2017	$159,610	$1,275,368	-$577,103	$146,637	$1,262,396	-$590,075	-8%
2018	$165,196	$1,320,006	-$597,301	$152,130	$1,306,940	-$610,367	-8%
2019	$170,978	$1,366,206	-$618,207	$157,243	$1,352,471	-$631,942	-8%
2020	$176,962	$1,414,023	-$639,844	$162,867	$1,399,929	-$653,939	-8%
2021	$183,156	$1,463,514	-$662,238	$168,495	$1,448,854	-$676,899	-8%
Average	$155,126	$1,239,544	-$560,892	$142,405	$1,226,823	-$573,613	-8%

The results for net farm income per acre for the same years are reported in Table 5.2.2.

Table 5.2.2: Results of Simulation - Net Farm Income per Acre, 2011-2021 and Average Annual Net Farm Income per Acre

	Use-Value Assessment			Market-Value Assessment			Percent Change in Average Income
Year	Average Net Farm Income	Maximum Net Farm Income	Minimum Net Farm Income	Average Net Farm Income	Maximum Net Farm Income	Minimum Net Farm Income	
2011	$135	$1,075	-$487	$118	$1,059	-$503	-12%
2012	$139	$1,113	-$504	$132	$1,105	-$511	-5%
2013	$144	$1,152	-$521	$131	$1,138	-$535	-9%
2014	$149	$1,192	-$539	$138	$1,182	-$550	-7%
2015	$154	$1,234	-$558	$141	$1,221	-$571	-8%
2016	$160	$1,277	-$578	$147	$1,265	-$590	-8%
2017	$165	$1,322	-$598	$152	$1,308	-$612	-8%
2018	$171	$1,368	-$619	$158	$1,355	-$633	-8%
2019	$177	$1,416	-$641	$163	$1,402	-$655	-8%
2020	$183	$1,466	-$663	$169	$1,451	-$678	-8%
2021	$190	$1,517	-$686	$175	$1,502	-$702	-8%
Average	$161	$1,285	-$581	$148	$1,272	-$595	-8%

The results of the simulation demonstrate that negative impacts to net farm income that would result from a change in Illinois property tax policy (Table 5.2.2). The magnitude of the impact on the farmer is directly associated with the amount of land the farmer owns. The average farmer in the data used for this analysis farms 967 acres while owning 170 acres. Only the property taxes from acres owned by the farmer are assumed to increase as a result of the change in property tax policy. With the average farmer in the data set owning 17 percent of what he farms, the negative impacts are limited. The average annual change in net farm income over the entire ten year simulation timeline is negative eight percent. The average annual reduction in net farm income is $12,721. It is expected that these negative impacts would be higher for farmers who own a greater percentage of the land that they farm.

The year of greatest negative impact shown by the simulation is 2011. This is due to the fact that this is the first year when the increased property taxes resulting from the change in property tax policy would be paid by farmers and landowners. The simulation assumes a market adjustment to farmland values as the reduced returns from farmland ownership occurs, resulting in lower farmland values and lower property taxes that are applied to the expenses for 2012.

The change in tax policy also changes the minimum and maximum incomes possible for farmers in all years analyzed. The results show a lower minimum income in all years, making it more negative. The results also show a lowered maximum possible income for all years. This demonstrates the overall downward shift in potential income for farmers as a result of the change in property tax policy.

Another measure of the impact to net farm income is to determine changes in the likelihood that net farm income falls below zero. The data used for this analysis had numerous instances where net farm income was negative. This is a reflection of the risk of farming and the variation often seen in net farm incomes from year to year and farm to farm. The simulation indicates that changing to a market-value assessment tax system for farmland increases the risk that net farm income falls below zero. The results of this analysis are reported in Table 5.2.3.

Table 5.2.3: Probability Net Farm Income Falls Below Zero, 2011-2021 and Average Annual Probability

Year	Use-Value Assessment	Market-Value Assessment	Change
2011	25%	27%	3%
2012	25%	26%	1%
2013	25%	27%	2%
2014	25%	26%	1%
2015	25%	27%	2%
2016	25%	26%	1%
2017	25%	26%	2%
2018	25%	26%	2%
2019	25%	26%	2%
2020	25%	26%	2%
2021	25%	26%	2%
Average	25%	26%	2%

It is important to note that a change in property tax policy from use-value assessment to market-value assessment increases the risk of an already risky venture. The average probability that net farm income falls below zero under the current use-value assessment policy is 25 percent over the ten year simulation time frame (Table 5.2.3). The average probability that net farm income falls below zero increases under market-value assessment by 2 percent on average. This increased probability demonstrates a slight increase in the risk associated with farming as a result of a change in property tax policy in Illinois.

The results of the simulation match the expectation that changing from a use-value farmland assessment process to a market-value farmland assessment process would reduce net farm income. This is consistent with the research completed by Klose, Outlaw, and Anderson that found the five year impact of eliminating the use-value assessment process for farmland in Texas was an average annual reduction in net cash farm income of $20,731, a 17% reduction. Their research also demonstrated a 7 percent increase in the probability that ending cash balances fall below zero. (Klose, Outlaw and Anderson 2004).

CHAPTER VI: CONCLUSIONS

The analysis conducted on the impacts on Illinois farmland values and on net farm incomes that result from a change from use-value assessment to market-value assessment shows that this policy change would negatively impact farmers and landowners. These negative impacts could have significant consequences not only for farmers, but the Illinois agriculture industry as a whole. Changing to a market-value assessment process for Illinois farmland would not be favored by Illinois farmers or Illinois' agriculture industry.

The reduction in farmland values would have negative consequences for farmer and farmland owner financial conditions. The reductions in farmland values shown by the models would significantly reduce the equity in farmland. This reduction in equity could strain farmland owner balance sheets, potentially impacting financing. Lenders providing financing for farmland would also be impacted as reductions in landowner equity could increase the risk of outstanding loans for farmland. It may also cause lenders to reconsider or change lending conditions for farmland, further impacting the farmland market and increasing the negative impacts.

Farmland value changes, and the reduced income from owned farmland, may also change farmland ownership patterns. This analysis assumes that farmers pay the increased property taxes on the property they own, but not on the property they rent. This may cause farmers to seek less ownership of land, as the increased cost of property taxes would be borne by the farmland owner rather than the renter. While the reduction in farmland values may negate some of this negative impact for farmers, a change in the relationship between the profitability of owning farmland versus the profitability of renting could result in a potential change to farmland ownership patterns.

The reductions in net farm income shown by the analysis could also have negative consequences that reach beyond farmers. Lower incomes resulting from changes in property tax policy could affect farmer purchases of inputs for their farming operations. This could impact input suppliers such as feed, seed, and fertilizer suppliers; machinery manufacturers; and other farm supply companies. This would magnify the negative impacts by reducing economic activity for farm suppliers and spread impact beyond farmland and farmland owners.

The analysis shows that the potential magnitude of the negative impacts resulting from a change in property tax policy in Illinois could be significant. However, the results of the farmland value models are based on assumptions. The model assumes that the discount rate for farmland would not change over the length of the holding period. The discount rate may change as market conditions and interest rates change, ultimately impacting the value of farmland and the results estimated by the model.

The analysis also assumes that the greatest impact to farmland values occurs in the year immediately following the implementation of the market-value assessment policy. The models then demonstrate some fluctuation in farmland values before farmland values stabilize approximately three or four years following implementation. Research conducted by Featherstone and Baker (1987) showed that the farmland market is subject to overreactions to shocks from a reduction in income from farmland that may last for years. Since increased property taxes reduce the income from farmland, the analysis conducted in this thesis may understate the magnitude of the negative impacts. An overreaction may occur within Illinois' agriculture economy, creating greater negative impacts. It may also underestimate the time that it would take for farmland values to stabilize, lengthening the negative consequences and further negatively impacting farmers.

The analysis is also based on statewide average data. Illinois is an agriculturally diverse state with farmland productivity that varies widely based on location. Farmers in Illinois also face varying levels of pressure to convert farmland to other uses depending on the proximity of their location to Chicago, St. Louis, or other urban areas of the state. Additional research could be conducted on localized data that could provide a more precise estimate of the impacts of changing the property tax policy for farmland.

The analysis also assumes that farmland owners are unable to recapture higher property taxes by charging higher cash rents. If farmland owners were able to recapture a portion of the higher property taxes resulting from a change in property tax policy, it may reduce the negative impacts on farmland values. However, this would shift the burden of higher property tax expenses to tenant farmers, likely increasing negative consequences for net farm incomes. Additional research could be conducted on the likelihood that farmland owners could recapture a portion of the increased property taxes resulting from a change in property tax policy and the impacts it would have on farmland values and farmers' incomes.

Moving from the current use-value assessment of farmland for property taxes to market-value assessment is not in the best interests of Illinois farmers. The analysis conducted shows that such a change would reduce Illinois farmland values. It also would reduce net farm income over the ten year time frame analyzed. The negative impacts would likely not only be felt by farmers, but by the entire agriculture industry in Illinois.

REFERENCES

Anderson, John E., and Howard C. Bunch. "Agricultural Property Tax Relief: Tax Credits, Tax Rates, and Land Values." *Land Economics*, 1989: 13-22.

Boldt, Rebecca. "Impact of Use Valuation of Agricultural Land: Evidence from Wisconsin." *National Tax Association - Tax Institute of America. Proceedings of the Annual Conference on Taxation.* 2002. 165 -175.

Brealey, Richard A., Stewart C. Myers, and Allen Franklin. *Principles of Corporate Finance, Tenth Edition.* New York, NY: McGraw-Hill Irwin, 2011.

Chicoine, David L., Steven T. Sonka, and Robert D. Doty. "The Effects of Farm Property Tax Relief Programs on Farm Financial Conditions." *Land Economics*, 1982: 516-523.

Featherstone, Allen M., and Timothy G. Baker. "An Examination of Farm Sector Real Asset Dyanamics: 1910-1985." *American Journal of Agriculture Economics*, 1987: 532-546.

Featherstone, Allen M., Terry L. Kastens, and Kevin L. Dhuyvetter. *Working Paper: Western U.S. Farmland Markets: What Drives Price Differences.* Working Paper, Manhattan, KS: Department of Ag Economics, Kansas State University, 2002.

Gloy, Brent, Chris Hurt, Michael Boehlje, and Craig Dobbins. *Farmland Values: Current and Future Prospects.* West Lafayette, IN: Dept. of Agricultural Economics, Purdue University, 2011.

Hendricks, Arthur Donald. *The Illinois Farmland Assessment Laws: A Case Study of the Political Passage and Implementation.* PhD Thesis, Urbana, IL: University of Illinois, 1987.

Illinois Department of Revenue. *Tax Statistics.* 2013. http://www.revenue.state.il.us/AboutIdor/TaxStats/ (accessed September 4, 2013).

Illinois Department of Revenue. *The Illinois Property Tax System.* Springfield, IL: State of Illinois, 2002.

Illinois Society of Professional Farm Managers and Rural Appraisers. *Illinois Farmland Values and Lease Trends.* Illinois Farmland Values and Lease Trends Report, Menomonee Falls, WI: Illinois Soceity of Professional Farm Managers and Rural Appraisers, 2012.

Kansas City Federal Reserve. *Agricultural Finance Databook.* Kansas City, MO: Kansas City Federal Reserve, 2011.

Klose, Steven L., Joe L. Outlaw, and David P. Anderson. *Analysis of State Agricultural Tax Policy on Farms and Ranches in Texas.* Briefing Paper, College Station, Texas: Agriculture Food and Policy Center, Texas A&M University, 2004.

Moss, Charles B., and Katchova L. Ani. "Farmland Valuation and Asset Performance." *Agricultural Finance Review*, 2005: 119-130.

Orr, Carolyn. "The Hows and Whys of Taxing Farmland." *Stateline Midwest*, October 2012: 1, 6-7.

Painter, Marvin J. "Declining farmland values: The impact of low earnings growth." *The Journal of the ASFMRA*, 2002: 99-106.

Pasour, Jr., E.C. "The Capitalization of Real Property Taxes Levied on Farm Real Estate." *American Journal of Agricultural Economics*, 1975: 539-548.

Seila, Andrew F. "Spreasheet Simulation." *Proceedings of the 2002 Winter Simulation Conference.* 2002. 17-22.

Sherrick, Bruce. *farmdocDaily*. November 29, 2012. http://farmdocdaily.illinois.edu/2012/11/farmland-turnover-in-illinois.html (accessed January 27, 2013).

Tsoodle, Leah, Bill Golden, and Allen Featherstone. "Determinants of Kansas Agricultural Land Values." Selected Paper prepared for presentation at the Southern Agricultural Economics Association Annual Meeting, Mobile, AL, 2003.

United States Department of Agriculture National Agricultural Statistics Service. *Quick Stats.* August 30, 2013. http://quickstats.nass.usda.gov/ (accessed August 30, 2013).

Vantreese, Valerie L., Jerry R. Skees, and Michael R. Reed. "Using Capitalization Theory to Model Farmland Prices." *North Central Journal of Agricultural Economics*, 1986: 135-142.