FINANCIAL IMPLICATIONS OF INTERGENERATIONAL FARM TRANSFERS

A Thesis

by

DEVIN RICHARD PETERSON

Submitted to the Office of Graduate and Professional Studies of
Texas A&M University
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

| | |
|---|---|
| Chair of Committee, | John L. Park |
| Committee Members, | David J. Leatham |
| | Lynn L. Rees |
| Head of Department, | C. Parr Rosson |

December 2013

Major Subject: Agricultural Economics

ABSTRACT

This study seeks to address the challenge of family farm succession. A recursive, stochastic, simulation model is employed to estimate the financial impacts and accompanying risk incurred through the intergenerational transfer of farm assets and management. The model assists in creating a before and after comparative analysis of succession for a large, medium, and small sized representative farm in Texas. Eight methods of farm transfer are analyzed: a will, trust, buy-sell and lease-to-buy agreements, the formation of business entities, life insurance, gifting, and selling farmland to outside investors. These methods are employed to help minimize estate taxes, create retirement income for the owner, or decrease general transfer costs such as probate fees.

The simulation model utilizes stochastic and control variables to create pro-forma financial statements that aid in determining net income, debt requirements, and debt outstanding each year for a ten year time period. Key output variables such as combined net present value (NPV) of the owner and successor and the debt to asset ratio are used to analyze financial performance and position. Combined NPV is also employed to rank risky alternatives from most to least preferred using the method of stochastic efficiency with respect to a function. Output variables of estate and gift taxes and debt capital volume are also examined to compare across methods of transfer and to view their effects upon NPV, debt levels, and cash flows. The study finds that the most preferred method varies by farm size, net worth, and the underlying goals of the farmer.

Overall, succession using any method is expected to increase debt capital and decrease liquidity in comparison to no succession. The “leakage factor” from off-farm heirs plays a significant role in which method is most preferred and the probability of success (ending net worth being greater than beginning net worth) for the farm business.

# DEDICATION

To my brother Jake and my Grandpa Peterson, and any other family out there that is trying to pass on the tradition of the family farm.

ACKNOWLEDGEMENTS

I would like to express gratitude in general to the many individuals who made this possible, namely the professors, fellow graduate student peers, the Department, and Texas A&M for their kindness, instruction, financial support, and for allowing me this opportunity.

The topic of my thesis was a passion, not just a passing interest, and I owe that to my Chair, Dr. John Park, for encouraging and even insisting I find a topic I was personally passionate about; one I would “wake up in the morning excited to work on”. Thank you, Dr. Park, for your endless patience, motivation, and assistance. I also would like to thank my other committee members, Dr. David Leatham and Dr. Lynn Rees, for their advice, edits, and assistance. Special thanks go to Dr. James Richardson and Dr. Clair Nixon for their answers to my numerous queries about simulation modeling and tax accounting, respectively.

No shortage of gratitude goes to Alex Hlavinka, a great friend, officemate, colleague, and outright genius, for his ideas, help, listening ear, and kindness. Furthermore, I would like to thank my brother Jake and my father, Monte Peterson, for being my sounding boards and providing pragmatic insights and thoughts. I would also like to thank my other family members for their encouragement and support in this pursuit, especially my mother who put so much emphasis on obtaining a higher education.

This thesis would never have been possible without my incredible wife, Camille. Her time spent editing, her thoughts, and her support have proven invaluable. Thank you, Camille, for supporting me in the pursuit of my dreams and aspirations.

Last, but far from the least, I need to thank my Creator for enabling me to create this thesis.

## NOMENCLATURE

| | |
|---|---|
| AFR | Applicable Federal Rates |
| CUSD | Correlated Uniform Standard Deviates |
| CV | Coefficient of Variation |
| D/A | Debt to Asset Ratio |
| FMV | Fair Market Value |
| IRS | Internal Revenue Service |
| KOV | Key Output Variable |
| LLC | Limited Liability Company |
| LTB | Lease-to-Buy |
| MACRS | Modified Accelerated Cost Recovery System |
| NFIFO | Net Farm Income from Operations |
| ROA | Return on Assets |
| RRAC | Relative Risk Aversion Coefficient |
| SCIN | Self-Canceling Installment Note |
| SDRF | Stochastic Dominance with Respect to a Function |
| SERF | Stochastic Efficiency with Respect to a Function |
| TDCR | Term Debt Coverage Ratio |
| USD | Uniform Standard Deviate |

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Page

CHAPTER I

# INTRODUCTION*

In this paper, the owner will be defined as the primary owner and operator of the firm, as well as parent or grandparent. The successor will be the family member that is in position to inherit or takeover the farm and intends to operate the farm as their primary means of income (child or grandchild). An off-farm inheritor is a family member who stands to potentially receive assets from a progenitor by legal succession or will, but does not plan to personally operate the farm.

Ownership of farming operations is achieved in several different ways, including partnerships, corporations, and entrepreneurships. The transfer of that ownership is important for an owner seeking to capture wealth or preserve the integrity of the business for a future generation. This is a greater challenge than ever before due to changes in farm demographics, the nature of modern farm economics, and the state of the current economy and business environment. The evidence is plain. Nearly a third of the current U.S. farm owner-operators are age 65 or older (an age to consider retirement) (U.S. Department of Agriculture, 2013), and 88% of family firms plan to keep their business within the family (Laird Norton Tyee Northwest Family Business Survey, 2008). Currently in the U.S., farm real estate alone is worth over $1.85 trillion dollars (Nickersen, 2012). Individuals age 65 and older own 29% of that agricultural land, and

---

*Parts of this thesis are reprinted with permission from "A Stochastic Simulation of Intergenerational Farm Transfers" by Devin R. Peterson, John L. Park, David J. Leatham, and Camille G. Peterson, 2013, Farm Credit System Coordinating Committee. Copyright 2013 by the Farm Credit System.

another 28% owned by those ages 55-64. In contrast, farmers under 34 years of age own a mere 4% of agricultural land (Peel, 2013). Given these facts, there could be over a half trillion dollars in total farm assets at stake over the next decade. It is evident that family farm succession planning is rapidly becoming a critical issue in the United States farm sector.

There are significant challenges to the transfers of farm ownership, including: "death taxes", which are currently 40% on any estate value over $5.25 million for individuals or $10.5 million for married couples (Hoeven, 2013), multiple potential successors or inheritors, the need of a pension for the farm owner, and the relatively illiquid and indivisible assets of a farm (Mishra, El-Osta, and Shaik, 2010). In response to retirement intentions, in addition to Social Security, many farmers look for the majority of retirement income to come from "continued operation or sale of the farm" (Baker, Duffy and Lamberti, 2001). Farmers are often land rich and cash poor, and thus their reluctance to transfer land to successors may be due to the anxiety of giving up their potential means to fund future medical costs and retirement, especially given recent downturns in the stock market (Inwood, 2013). This can create strategic conflicts within the farm organization. Assets may be sold to improve cash flow that can be used to fund retirement. Alternatively, transfer and business strategies may be used, including replacing depreciated assets, paying off debt, or improving technology on the farm. Thus, to exit the industry, farm owners face a choice to either sell the company to someone outside the family or arrange for an interfamily succession (Bjuggren and Sund, 2001). Furthermore, for an intergenerational transition to take place, large sums of debt or equity capital are often required from the successor's standpoint to pay taxes, probate fees, or buy out current owners or off-farm heirs. If the heir is wealthy, they may purchase the farm assets from the parents or grandparents. More likely though, the heir lacks sufficient funds to buy the farm assets and must borrow capital. This may lead to risks associated with a highly leveraged operation, such as decreases in management flexibility, and earnings being used to service debt instead of building equity, replacing depreciated assets, or financing growth (Kohl and Wilson, 2004). Given the potentially higher risk of default, loans may be subject to higher interest rates, higher required collateral, and other risk mitigating requirements by the lender (Kauffman, 2013). This risk, due to lower equity to debt level, is a significant issue to beginning farmers who often lack strong financial positions, collateral, and performance history (Koenig and Johansen, 2013). With land and equipment prices increasing, the capital requirement to transfer a farm may be so high the successor cannot obtain sufficient equity and debt capital to purchase the farm assets under certain transfer plans, thus creating a significant barrier to entry (Franzen, 2013). If full or partial business liquidation must occur to fund the transfer, the chance of insolvency increases for many reasons including deferred federal and state taxes and a decrease in potential revenue from reduced farm size (Kohl and Wilson, 2004). These risks are compounded by the increasing volatility of agricultural commodity markets over the past seven years (Kauffman, 2013).

These issues emphasize how the methods chosen for intergenerational transfers could impact capital needs, long term viability of the resulting firm, and residual value of the estate. This study will examine methods of intergenerational transfer from multiple viewpoints, including that of the lender, owner-operator, and successor.

*Objectives*

The objective of this study is to evaluate eight methods of succession and their ensuing capital requirements under risk and uncertainty in order to execute an intergenerational transfer of farm ownership. This study will allow those involved in intergenerational transfers to plan more effectively for future capital needs, examine the level of risk inherent in the decision, and compare the feasibility of various transfer methods.

# CHAPTER II

# LITERATURE REVIEW

### *Previous Studies*

Much of the literature regarding intergenerational transfer takes a qualitative approach to examine methods that improve the chance of successful transfers. These studies discuss consistent and open communication between successor and owner, choice of successor, best management practices, and managing relationships within the family just as one would treat a relationship in a merger, acquisition, or with another business entity such as a supplier (Dana and Smyrnios, 2010; Kimhi, 1995; Morris, Williams, Allen and Avila, 1997). Others have examined the social and psychological aspects of intergenerational transfers on sibling relationships, the idea of fairness, and conflict over transfer of the farm (Taylor and Norris, 2000; Barnes and Hershon, 1994; Haberman and Danes, 2007). Disagreement is common among potential heirs in deciding upon either an equal or equitable division of the estate (Taylor and Norris, 2000). For example, the estate could be divided into equal shares, or divided equitably by the amount of personal human capital invested in the operation (majority given to the successor working on the farm). The goal or objective of the farm owner and operator will be the key in deciding between an equitable or equal transfer, which may have sizeable effects upon the economic long-term viability of the farm (Boehlje, 1973; Roush, 1978). Hence, a sensitivity analysis of the transfer objective is performed in this study.

Inheritance, succession, and retirement will be used in the context Gasson and Errington (1993) define them. Inheritance is the transfer of legal ownership of assets in conjunction with a shift in managerial control. Succession is the transfer of management control of business assets, but not necessarily of the assets themselves. Retirement is when the current owner/manager departs from active management and labor roles within the business. Thus, movements into succession and out of management should have a corresponding relationship; i.e. as the successor begins to on larger management roles, the owner should be exiting those same roles at an equal rate (Lange et al., 2011). If this does not occur, there may begin to be conflict between the owner and successor, and confusion for any hired help as to who is boss and from whom orders to be taken, etc.

In a survey conducted in Iowa of 418 farmers, Baker, Duffy and Lamberti (2001), found that three-fourths of the farmers were sole proprietors. Others have found this number to be even higher, up to 87% as sole proprietorships, with less than 8% being partnerships and only 4% corporations (of which 90% are family corporations with less than 10 stockholders) (Peel, 2013); thus, in this study the successor and owner are assumed to be sole proprietors unless otherwise stated. Farmers are often land rich and cash poor and plan on selling assets to fund retirement. Thus, reluctance to transfer land to successors may be in large part due to the anxiety of giving up potential means to pay for future medical costs and retirement, especially since the downturns in recent years of the stock market (Inwood, 2013). This can create strategic conflicts within the farm organization. Selling off of assets or any free cash flow may be used to fund retirement versus transfer and business strategies such as replacing depreciated assets, paying off debt, and improving technology on the farm. Baker et al. also found that more than half of all planned successors were currently employed off-farm. Using this finding, the model assumes a small off-farm income for the successor ($15,000).

While there exists a wealth of literature of the more qualitative, strategic, and psychological aspects of family business transfers (all being significant and valid points of concern worthy of study), the current existing literature on the financial and economic impacts of intergenerational transfers is surprisingly limited, and specific methods or processes of family farm succession used by farmers are largely unknown (Keating and Munro, 1989; Lange et al., 2011). Of those that have focused more on the quantitative effects, many have examined the variables that affect the probability of having a successor appointed or a succession plan in place. For example, Mishra, El-Osta, and Shaik (2010) used a binomial logit model to determine the effects of variables on an operator's likelihood to have a succession plan. They found that the age and level of education of the farm operator, off-farm work by the operator, household wealth, and location of the farm were all significant indicators of the existence of a plan.

In a similar study, Glauben, Tietje, and Weiss (2004) examined farms in upper Austria and analyzed the probability of family succession, the likelihood of having a successor designated, and the timing of succession. They employed an econometric bivariate probit model to estimate the first two and a sample selection model to estimate the timing of succession. They found that the timing of the succession (or retirement process) is delayed as the age of the farm operator increases, meaning that if a successor has been appointed, then delay of a complete transfer occurs. This delay is likely due to the desire of the owner to retain a secure retirement and/or reluctance to release control. This finding will later be utilized in this paper as the author assumes that the owner will postpone retirement for five years. Timing was found to be a critical issue in the transition of the farm. If the successor must buy out off-farm inheritors, additional time may be needed to avoid excessive debt stress on farm assets, or if the intent is to provide a secure retirement (e.g. to avoid division of farm assets due to divorce of the successor (Gasson, and Errington, 1993), or other factors) a complete transfer of farm assets may be delayed until later. Thus, whether an inter-vivo transfer (during one's lifetime) or a bequest is chosen depends upon the objectives of the owner. Glauben et al. also determined that farm characteristics that significantly impact the value of the farm (i.e. larger and highly specialized farms) influence succession considerations for the potential successor. This finding is supported by Calus, Huylenbroeck, and Lierde (2008), who found that total farm assets is a good predictor of whether or not a farm has an appointed successor.

Glauben, Tietje, and Weiss showed that the number of household members living on the farm significantly influences the probability of having succession plans. Furthermore, they noted that, not surprisingly, the probability of succession first increases with the age of the farm operator and then declines again. Kimhi and Nachlieli (2001) had a similar finding when they studied intergenerational succession on Israeli family farms. Using a probit specification model they found the probability of having a successor increases with the age of the operator at a decreasing rate. In contrast to these studies, this paper will focus on analyzing the case in which the successor is already appointed. However, the other findings of factors that were determined to be significant influencers of succession in these studies will be utilized, including projections of the number of off-farm inheritors, age of farmers, and anticipated years until retirement.

In relation to models that analyzed the feasibility or methods of intergenerational transfers, Dobbins (1978) and Dobbins and Mapp (1982) used a recursive goal linear programming model that uses a deterministic objective function and solution. A linear programming model seeks to maximize an objective function, given various constraints. Thus, the results of the model were deterministic, such as maximizing profits by determining which crop mix was most beneficial in each year. The assumptions made were that the farm was a sole proprietorship with two objectives, firm growth and transfer to the next generation. The transfer occurred through two installment sales of the land and machinery. The model also had some other key points. First, it assumed reducing management from the father to zero by year ten (or year of complete retirement). Second, cash gifts were given in set years to examine their effect on reducing transfer costs. Dobbins found that goals of the owner affected what solutions or crop mixes were required to attain them, and whether or not they were attainable.

In a similar situation, Roush, Mapp, and Maynard (1979) built a dynamic deterministic model to simulate effects of the 1976 Tax Reform Act on intergenerational farm ownership transfers. They suggest that tax policies have a significant impact upon the economic viability of a farm transfer (Gasson and Errington (1993) suggest the same). Roush (1979) et al. specified the timing of the death of the farm owners fixed at age 72 for men and 78 for women, and used two methods of transfer; a will and lifetime gifts with respect to the 1976 Tax Reform Act laws. Results from the model showed that the new tax law enabled the case study farm to decrease federal taxes paid and other transfer costs, as well as increase present value of the equity transferred to the children, under the two different will strategies. The lifetime gifts did reduce estate transfer costs and increase value of transfers to the heirs, but the market value of the farmland was still high enough to allow for maximum deductions after the time of death of the parents. If a farm was not as large as the sample case farm, they stated that the lifetime gifts may actually result in a higher transfer cost in comparison to making the transfers all at the death of the parents. Roush, Mapp, and Maynard (1979) specifically state that the inherent weakness of their study is their assumptions of the specific family situation and farm, and the deterministic assumptions made about the future economic environment and the timing of death events.

In Roush's 1978 study, he suggests that a farm family utility function includes goal variables of financial security for the parents during retirement (being the dominant goal), a desired distribution of farm assets and wealth among potential inheritors, farm growth and development for the continuity of family ownership of the farm, and a net value of equity transferred to the heirs during the planning horizon. Roush further states that the "timing of the deaths of the [owners] is one of the most important uncontrollable variables that must be considered by the planner" (Roush, 1978 p. 32).

Richardson, Lemieux, and Nixon (1983) built a farm level simulation model to assess the effects of debt financing versus leasing as methods of entry into farming. They found that leasing increases the chance of survival and requires less than one-third of initial capital outlay than debt financing both land and machinery. “Investing limited capital in land did not increase the chances of survival of the operation because principal and interest payments exceeded the returns (Richardson et al., 1983).”

Knight and Richardson (1985) studied the effect of including a child returning to a farming operation using a recursive simulation model. Their study used moderate, large, and very large commercial representative farms. They reported two key output variables (KOVs); probability of survival (the probability of remaining solvent over the 10 year planning horizon) and average annual net farm income. They found that beginning debt greatly influenced the KOVs. The impact of the inclusion of another child on the farm depended upon assumptions regarding increased efficiency from the child, and the amount of the child’s family living expenses; in other words, if the child worked hard and was frugal or not.

Boehlje and Eisgruber (1972) used a simulation optimization model to analyze intergenerational transfers under varying circumstances and goal objectives. They also examined sensitivity of the outcome (or best option) to different beginning ages, sequences of deaths of husband and wife, different production practices, various will plans, and gifting strategies. They analyzed a case farm and reported the best and worst scenarios across large, medium, and small estates over ten years and varying practices. The authors state the importance of including the date of death of the owner, not as a known fact (as it is a “severe abstraction from reality”), but as a probabilistic occurrence that changes over time. The method they used to overcome that abstraction was by applying a deterministic probability of death based on mortality charts in each time period multiplied by the probabilities of death in previous periods in order to discount each strategy. They stress the importance of including dimensions of time, risk, and uncertainty in a simulation model. In addition, the importance of estate management, versus estate planning is emphasized; the former is a comprehensive strategic plan during and after the lifetime of the estate owner, while the latter is a plan for a one-time event. Boehlje and Eisgruber state outside investment (such as a mutual fund) is consistently a part of the best estate management strategy in their model because it allows for a return with no labor required, and compensates an off-farm inheritor to pay death taxes, or to cover administration and closing costs at death. Thus, estate management could reduce the risk of asset liquidation and asset splitting to appease off-farm inheritors. Furthermore, they state that large amounts of taxable gifts, usually in the form of farm real estate, were found to reduce the total value of taxes paid, which is contrary to traditional estate planning practices, which recommends only the use of tax-exempt gifts (typically relatively small cash amounts). They state in their conclusions and need for further research that little is known about the process or methods, let alone how to coordinate the entry/exit process. Also, they state the need to examine the retirement requirements of farmers, the magnitude of the equity outflow to nonfarm heirs and their corresponding effects, and the effect of new tax laws on farm firms.

Ferrell and Jones (2013) suggest four general categories of transition methods: estate tools, property ownership forms, business entities, and transactional tools. Specific examples of each are presented in Table 1. This study will build on the framework in

Table 1, and further specify the definitions of these methods as used in the simulation model.

**Table 1. Transition Tools from Ferrell and Jones (2013)**

| Transition Tools | |
|---|---|
| Estate Tools | Wills<br>Trusts<br>Life Insurance<br>Transfer on Death Deeds |
| Property Ownership Forms | Joint Tenancy<br>Life Estate |
| Business Entities | Limited Partnership<br>Corporation<br>Limited Liability Company |
| Transactional Tools | Installment Sale to Outside Investors or Successor<br>Lease-to-Buy<br>Self-Canceling Installment Note (SCIN) |

*Summary*

This study seeks to utilize the discussed theories and academic literature as it seeks to expand into new areas of focus. Though many studies have mentioned the importance and difficulty in projecting a stochastic age of death, none have included it in their model, but have resorted to sensitivity analysis with respect to age or discounting procedures based on probabilities. In this study's model, stochastic mortality is included as a key component of the simulation. Few if any studies have quantitatively examined the added financial stress to the successor and the farm from multiple inheritors, which this study takes into account. Other studies that examined the effects of various transfer methods limited their scope to different types of wills and sizes of lifetime gifts, whereas this study compares and contrasts multiple methods and their repercussions. Finally, much of the previous literature examines maximizing utility or profits subject to some constraints using linear programming. This can essentially be an examination of best and worst case scenarios, which may be unrealistic or biased toward rare occurrences, resulting in a misstatement of the risk inherent in the scenario (Richardson, 2008). This study will use a stochastic simulation model to give a probabilistic forecast and measurement of success based on select key operating variables and improved risk ranking methods.

# CHAPTER III

# DATA

## *Commodities and Forecasts*

For this study's simulation model, historical U.S. average yearly prices and yields for the chosen commodities were gathered from the USDA, beginning in 1980 and ending in 2012. The commodities that were compiled, correlated, simulated, and used in the analysis are shown in Table 2 below.

**Table 2. Commodities Correlated**

| **Commodities** |
|---|
| Alfalfa |
| Barley |
| Corn |
| Cotton |
| Cotton Seed |
| Oats |
| Potatoes |
| Rice |
| Sorghum |
| Soybeans |
| Wheat |
| Cull Cows |
| Feeder Steers |

Deterministic forecasts for the ten year time horizon of 2013 to 2022 were acquired from the Food and Agricultural Policy Research Institute (FAPRI) (Westhoff, Gerlt, Whistance, Binfield, and Thompson, 2013); except for the potato forecast which was deterministically forecasted using a multiplicative seasonal and dampened additive trend, exponential smoothing model. This approach was used as it returned a lower Mean Absolute Percent Error than other methods tried (such as moving average, seasonal indexing, simple regression, or time series with lags and differences). The statistical results of the potato forecast can be seen in the Appendix in Table 8. In addition, the FAPRI forecasts for the price paid index (PPI), consumer price index, interest rates, and other farm expenses were employed in the model. Estimates for non-farm expenses, such as funeral costs or lawyer fees for construction of a will or trust were researched and then indexed with inflation using the PPI forecast of the FAPRI. Probate court costs were assumed to be four percent of the inheritance value, and trust management fees to be 0.75% of the inheritance value.

*Representative Farms*

To choose farms that represent the nation as a whole would be extremely difficult, if not impossible, and this study did not seek to create a general representation. Rather it seeks to provide insights through case study analyses of three Texas farms. The input data for the three farms were acquired from the Agricultural and Food Policy Center (AFPC) at Texas A&M University (Richardson, Outlaw, Knapek, Raulston, Herbst, Anderson, and Klose, 2013). The AFPC gathers data from Texas farms by meeting yearly with a group of 5-10 producers that generally represent each area of the state's farms, to determine their average yields, usual expenses, machinery and equipment complement, land acreage and value, and so forth. Two of the farms chosen for this model represent the Coastal Bend region of Texas (hereafter, TXCB), one being a 2,500 acre farm and the other an 8,000 acre farm. The third farm (10,000 acres) comes from the Northern Plains region of Texas (hereafter, TXNP). The 2,500 acre farm represents a smaller, declining profitability farm, and grows corn, cotton, and sorghum. The 8,000 acre farm was chosen to represent a mid to large size farm that could be considered an average producer with average profitability, and it produces cotton and sorghum. The 10,000 acre farm reflects a very large, and above average profitability farm. This farm raises irrigated and dry land cotton, sorghum, and wheat, as well as irrigated corn. These are rotated with acreage in fallow. All of the farms have a mixture of bought, cash-rent, and share-lease acreage. This information is summarized in Table 3.

**Table 3. Representative Farms**

| **Region** | **Acres** | **Profitability** | **Crop Mix** |
|---|---|---|---|
| Texas Coastal Bend | 2,500 | Declining | Corn, Cotton, Sorghum |
| Texas Coastal Bend | 8,000 | Average | Cotton, Sorghum |
| Texas Northern Plains | 10,000 | Above Average | Corn, Cotton, Sorghum, Wheat |

*Taxes*

Tax data was obtained from the U.S. Internal Revenue Service (IRS) for the years 2012 and 2013 for both single and married filing jointly filing status (U.S. Department of the Treasury, n.d.). This inflation rate assumed between those two years was used as a constant inflation rate for years after for tax brackets that are indexed with inflation. Also, an actuarial life table was obtained from the U.S. Social Security Administration in determining the probabilities of life expectancies for the owner and the spouse (U.S. Social Security Administration, 2009). An actuarial life table from the IRS was used to determine the length of the note for the self-canceling installment note. Furthermore, 130% of the long-term Applicable Federal Rate (AFR) was used for the self-canceling installment note interest rate, as outlined by the IRS and discussed in further detail in the Methods chapter of this study.

The state of Texas has no income taxes or estate taxes and so these were not included in the model. Property taxes were a part of the representative farm data and indexed with inflation according to FAPRI projections. However, the state franchise tax did apply in the case of the LLC, and so was included in the model according to the state tax code (Window on State Government, 2013).

*Insurance*

Regarding life insurance, a policy quote for a $500,000 indemnity and a twenty year term, with a one-time proceeds payment for a non-tobacco using, relatively healthy, seventy-year old man, was found on an online website that gathers quotes from the top one hundred and two life-insurance companies (Beyond Quotes, 2013). Guaranteed revenue crop insurance is also used in the model, at a coverage rate of 70%.

*Validation*

To statistically validate if the simulated means follow the same distribution as the historical means, or to compare the means of two series simulated with different distributions, the author employed the 2-Sample t-test and failed to reject the null hypothesis that the simulated means were statistically equal to the historical data means.

The Student's t-test was used to test the simulated variables' correlation coefficients against the assumed correlation matrix to determine if they were statistically equal. The results showed that none of the correlation coefficients for any two simulated variables were statistically different from the historical correlation coefficients at the 99 percent level.

# CHAPTER IV

# METHODS AND DESCRIPTION OF MODEL

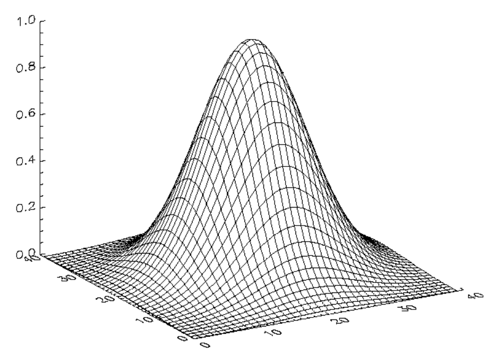
The process of simulation was approached using various economic and finance theories to gauge the risk of a variety of transfer methods in relation to farm specific case studies. The author chose to employ stochastic simulation of variables as the primary methodology. This allows a comparison of the inherent risk (variability in outcomes) of the different methods of intergenerational transfer. A stochastic model (as opposed to a deterministic model) is one in which there are essentially multiple variables changing simultaneously, rather than one at a time, in a what-if analysis. As a result, instead of a point estimate, there is a distribution of possible outcomes around the forecast. This is accomplished by applying a random error term (obtained from thirty-two years of historical values in this case) to the forecast (Richardson, 2008). Thus, there is an estimated probability density function and cumulative distribution function for decision variables (such as Net Present Value, debt to asset ratio, probability of economic success, total estate taxes, among others) that will be used to measure performance or success. More specifically, the author estimated key economic variables, and utilized their statistical distributions to provide a representation of the risk or variability associated with each method of intergenerational transfer. The complexity of this method becomes more apparent as one considers that each of the key decision variables is calculated from farm financial statements. For example, the distribution of the debt to asset ratio would reflect how the variability in prices, yield, and death affect the balance sheet. The simulation takes into account more than thirty years of historical data and forecasts a ten year period. A complete transfer upon death of the owner may or may not take place in the forecasted period (dependent upon the probability of the owner's death and random simulation). The simulation performs 500 iterations for each of the twenty-eight scenarios described later. This process of simulation and its benefits are described in further detail below.

*Theoretical Foundation*

An intergenerational transfer poses a unique problem, as it often has two conflicting and competing objectives (Glauben, Tietje and Weiss, 2004). One objective is to maximize the wealth or benefit to the owner, while the other objective seeks to minimize the cost (or maximize the wealth) to the successor. If the owner were to focus entirely on the former, an inter-vivo transfer would rarely, if ever occur. The higher risk-to-return to the owner associated with a farm transfer would usually encourage a sale or lease of all farm assets in order to obtain a more financially secure income source during retirement years. In contrast, if an owner focuses entirely on the latter objective and gifts the entire farm to a successor, the owner would need to rely on alternative off-farm income or continue receiving consistent living expense payments from the successor for financial sustainability during retirement. In the latter scenario the retiring owner stands the risk of receiving no retirement if the successor fails to succeed in the farm business. This could happen from poor farm management, or as a result of economic hardship, such as the 1980's Farm Financial Crisis. Many other cases lie between these two scenarios, each having a varying risk and perceived benefit to the owner.

Despite this risk, succession still occurs. There are three generalized theories for why this is the case: altruism, exchange, and other personal factors (Cox and Rank, 1992; Mishra, El-Osta and Shaik, 2010). The theory of each of these alone have prompted many in depth studies, and so will not be treated in full here, but the general theme of each should be highlighted. Altruism suggests concern for the welfare of others (Becker, 1974), and in the case of the farm transfer this might be the well-being of progeny. Exchange theory proposes the motive for succession planning and wealth transfers is to receive something in return: companionship, retirement income, or other services (Bernheim, Shleifer and Summers, 1985). Other personal factors behind an intergenerational farm transfer could include the continuation of family legacies or emotional ties to land (Mishra, El-Osta and Shaik, 2010). This study does not seek to explain which of these is the cause of the motivation, or to define an objective function to maximize some utility equation subject to certain budget constraints. Instead, it assumes that for a succession to take place there is a point where the competing objectives (of the owner and successor) are balanced. It can be thought of as a three-dimensional plane representing the competing objectives at the base, and the highest point of this plane is where this balance, maximization, or satisfice of the objectives takes place; where a transfer takes place despite the challenges and perceived risks of the process (see Figure 1). Roush (1978) described some of these competing objectives as assumed in his model, calling it a farm family utility function, which included several goal variables – some to be maximized, while others to simply satisfice. As previously mentioned on page 9, Roush lists them as: income and financial security for the owners, distribution of property to the successor and other off-farm heirs, farm business stability and growth, and net value of equity transferred to the heirs. This study's model is built on the assumption that similar underlying goals are present within all farm transfers (and hence implicitly found in this model). The study seeks to perform an analysis of the benefits and risks of various succession strategies, keeping in mind these underlying goals.

**Figure 1. Example Illustration of Competing Objectives**




(Exelis, n.d.)

This will be done through stochastic simulation, which gives an expected result with a distribution about that mean that demonstrates the inherent risk in a particular scenario due to the parts of a business decision a farmer cannot control (such as variability in prices, weather, farmland values, yields, interest rates, credit restrictions, etc.). Stochastic simulation gives a range and the likely outcome, or the positive answer (Richardson, 2008) that can allow the decision maker to choose their preferred alternative based on their risk preferences. Simulation utilizes pseudo random number generation to create stochastic variables. The specific method used in this study is Latin Hypercube sampling (Inman, Davenport and Zeigler, 1980; Richardson, 2008), which divides the distribution in N intervals (N representing the number of iterations to be run; in this study it is 500), and randomly pulls from each of those intervals. This ensures all segments of the probability distribution are considered, and creates stochastic uniform standard deviates (USDs). These USDs are then correlated using the correlation matrix of the historical data of prices and yields, thus representing the risk more accurately by not under or over representing that risk (Richardson, 2008). These correlated uniform standard deviates (CUSDs) are employed in a multivariate empirical distribution, using the inverse transform method. The empirical distribution is used to more accurately reflect the actual underlying distribution by taking historical data and using interpolation to form that distribution, rather than assuming a certain distribution (such as a normal distribution) for each variable. The result is a stochastic error term that defines the risk around each mean or forecasted variable. Each stochastic variable can be defined as following:

$$Y = a + bX + \tilde{e} \quad (1)$$

or in other terms,

$$\tilde{Y}_{T+i} = \hat{Y}_{T+i} * (1 + Stochastic\ CUSD_i) \quad (2)$$

where $a + bX$ or $\hat{Y}_{T+i}$ is the forecasted, deterministic component at time (T) plus $i$; $\tilde{e}$ or $(1 + Stochastic\ CUSD_i)$ is the stochastic portion of the variable or outcome $Y$ or $\tilde{Y}_{T+i}$ that defines the inherent risk. These formulas are used for risky variables with known probabilities, such as yield and price. In contrast, uncertain variables have unknown distributions and parameters and therefore cannot be simulated directly, but can be simulated indirectly by using an example of worst-case scenario outcome (Richardson, 2008). This is done by assigning likelihood to a scenario with a probability of P, and then simulating probability P using a Bernoulli distribution (Richardson, 2008). This latter method of using a Bernoulli distribution and an assumed probability is employed in simulating death of the owner(s) in this study's model. When these risky and uncertain variables are combined, the result is a probability forecast of intergenerational transfer success that explains the risk and uncertainty of forces that are out of farm operators' control (Richardson, 2008).

Roush (1978) identifies different types of risky variables. His definitions, combined with Richardson's (2008) are given here: certainty variables are those which are known by having perfect or complete information (also known as control variables). Objective risk variables are those that can be forecasted from historical data, with a range of risk in which they will likely fall. Subjective risk variables are those that may not have historical data but can be assigned a probabilistic outcome based on experience. Uncertainty variables are those with extremely low probability (often unknown) and high impact. Uncertainty variables are often referred to as black swans. Hardaker, Hurine, Anderson, and Lien (2004) further define risk in several ways as it relates to production agriculture; production risk (yield, weather, etc.), price risk, relationship risk (business partnerships), financial risk, and human/personal risk (death, divorce, etc.). All of the above mentioned forms of risk are calculated into this study's model. Risk references are individualized, internal, inclinations toward risk bearing activities. For example, some may find skydiving to be a wonderful and regular source of entertainment, while others see it as a death wish and would never consider doing the activity. The former could be likened unto a risk loving preference, and the latter, an extremely risk averse preference. Each individual lies somewhere between those two extremities. These risk preferences can be numerically defined, and then used to rank risky alternatives, such as methods of transferring a family farm. The theory and history behind this is time-tested and frequently used by economists. Von Neumann and Morgenstern (1944) offer the idea of maximizing expected utility as a method of measuring risk aversion, which was carried forward on the shoulders of Arrow (1965) and Pratt (1964), who suggest measuring the degree of risk by an absolute risk aversion coefficient (ARAC) and a relative risk aversion coefficient (RRAC). Anderson and Dillon (1992) later presented a classification of risk aversion in the following Table 4 below.

**Table 4. Classification of Risk Aversion of Anderson and Dillon (1992)**

| **Classification of Risk Aversion** | |
|---|---|
| 0 | Risk neutral |
| 0.5 | Hardly risk averse |
| 1.0 | Normal or somewhat risk averse |
| 2.0 | Rather risk averse |
| 3.0 | Very risk averse |
| 4.0 | Extremely risk averse |

The problem still arises though of ranking these various risky scenarios. Using purely averages, or best or worst case scenarios loses the benefits of using simulation, as it does not utilize the probability distribution of that number actually occurring. Hardaker, Richardson, Lien, and Schumann (2004) utilize Stochastic Efficiency with Respect to a Function (SERF) to rank risky alternatives. This method ranks from highest to lowest the certainty equivalents (Freund, 1956) at each risk aversion level, and then displays them in a graph, with the most preferred method at the top. Another method is Stochastic Dominance with Respect to a Function (SDRF), which measures the difference between two risky cumulative distributions functions (CDF), at each value on the Y axis, and weights differences by a utility function using the decision maker's ARAC, then ranks them according to the highest, or farthest to the right, or in other words, the most dominating CDF (Hadar and Russell, 1969; Meyer, 1977; Mjelde and Cochran, 1988). These methods will be employed to rank the methods of transfer according to the KOV chosen.

The combined Net Present Value was the main output variable chosen to measure each scenario against the others in this study; this measure has been utilized in other similar studies (Richardson and Nixon, 1984; Richardson and Mapp, 1976). After-tax NPV is the present value of the operator's annual cash withdrawals (CW) plus the present value of the change in net worth (NW):

(3)

$$NPV = \sum_{t=1}^{T} \frac{CW_t}{(1 + Discount\ Rate)^t} + \frac{NW_T}{(1 + Discount\ Rate)^t} - NW_0$$

where CW is defined as cash withdrawals for family living expenses, NW is net worth, *t* is each period in the forecast, and *T* is final time period and *0* is the beginning time period (Robison and Barry, 1996). The discount rate is held constant over the planning horizon so the individual knows what the rate is when reporting the probability of economic survival (probability that NPV is positive). Different discount rates each year also confuse the NPV, as it is not known if the farm produced the increased (or decreased) NPV or if it was the lower (or higher) discount rates each year. A 5% discount rate is assumed, which is about a 7.5% interest rate reduced by a 35% income tax rate (0.075 * (1-0.35)= 0.04875).

*Key Assumptions*

There are certain assumptions that must first be made in order to establish a firm foundation for the following explanation of the model. The first assumption is that the owner, wife, and successor are committed to the transfer. There exists a near perfect trust between all them that the other will not exclude them after certain period of time, or after a death of another individual. This allows for certain scenarios to occur that would not be possible otherwise. Secondly, all individuals are perfectly honest and are in average health for their age. Thus, when for example the self-canceling installment note is used, and the agreement is made and the owner dies immediately thereafter, it was not in an attempt to evade taxes illegally, but simply an honest chance occurrence that the owner died immediately. Third, the successor will make the exact same business decisions the owner would make in the same situation. Thus, there is no advantage given to the owner (or to the successor) for experience or knowledge (or lack thereof).

*Stochastic Variables*

The simulation model built in this study has deterministic control variables and stochastic variables. The stochastic variables are commodity prices and yields, and mortality of the owner and spouse (husband and wife). The stochastic mortality of the owner and spouse was accomplished by employing the Bernoulli distribution (as explained in the *Theory* section of this paper), which essentially enables or disables an on or off switch, given a certain probability (Richardson, 2008). The probabilities of mortality at each age are taken from the Social Security Life Table by gender and according to their age in each year of the time horizon, thus creating a stochastic death event. The yield and price variables were simulated (using the method described in the *Theory* section of this paper), using formula (2) and then used in calculating yearly revenue. As acreage devoted to each commodity remains fixed, revenue is simply calculated as acres of the commodity multiplied by the stochastic yield and price in the given year. Stochastic expenses also occur due to a stochastic yield. For example, a custom harvest expense each year is measured by each yield unit of the commodity harvested (e.g. $0.03 per bushel); thus the higher the yield, the higher the expense and vice versa.

*Control Variables*

Some of the input control variables include: non-stochastic cash farm expenses for 2012 (or the year before the first year to simulate), crop mix (total acreage and acreage devoted to each crop), crops grown, beginning cash, beginning equipment complement and accompanying information, as well as beginning loan amounts, rates, and a local basis for those loans. The loan information is used to calculate the yearly interest and principal payments. All payments are assumed to take place at year end (December 31st, at 11:59 p.m.) and all debt is acquired January 1.

A farm's local basis is calculated for price and yield of each crop. Historic five-year national averages and the local farm's averages are differenced to find the basis, which is then added to the stochastic national price to determine the price received by the farm. An interest basis for the long-term (more than nine year term length; e.g. land), mid-term (between one and nine year term length; e.g. machinery), and operating and savings (less than one year) rates are similarly calculated using the previous year's rate difference as the basis. When a farm is unable to meet its cash flow needs in a year, short-term debt is increased to account for the shortage. This is termed carryover debt and the operating interest rate is used for the interest payment calculations. It is then assumed the debt is paid off in full the following year. If in the following year there is not enough cash flow to pay off this debt and meet other farm and family expenses, debt on the unpaid obligation and other unmet cash flow expenses is incurred in the same manner.

Machinery depreciation is calculated using straight-line depreciation with a zero salvage value over its economic life for business management purposes (with the option to do double declining balance or sum of year digits depreciation). The Modified Accelerated Cost Recovery System (MACRS) and Section 179 of the tax code are used for tax depreciation purposes. The actual fair market value (FMV) of the machinery is calculated by decreasing its value at the rate of 6.5% per year. At the end of the economic life of each piece of machinery, a replacement is purchased. The machinery is always traded-in for its current FMV. The remaining balance of the cost of the replacement machinery is financed through a fixed rate loan over a five-year term length. When the owner has completely retired and the successor has full management of the farm, the successor begins to buy the machinery that is at the end of its economic life (instead of the owner). This is done by the owner gifting equipment that is at the end of its economic life each year to the successor in order to trade it in and purchase a new replacement in the same manner as stated above. New (un-purchased) equipment value is assumed to increase according to FAPRI projections. Building values (already purchased) are assumed to decrease 2% per year, and farmland value to also increase according to FAPRI projections.

The assumption is made that the owner and the successor operate as sole proprietorships unless otherwise specified. Thus, moving in and out of the business happens not through partnership (except in the case of an LLC), but instead through leasing or buy-sell agreements.

*Family Profile and Inheritance*

Beginning age of the owner and spouse in the simulation model (husband and wife), number of children (and/or grandchildren), and the desired inheritance for each potential heir, are all required input data. The first of these is used in the calculations for the stochastic mortality variable described above, and is assumed to be age 70, or the average of 67 (the average age farmers begin at least semi-retirement (Baker and Epley, 2009)), and 73 (the average age of farm owner/operators over the age of 65 (U.S. Department of Agriculture, 2011)). The second is needed to examine how fragmented the estate is; three children (including the successor) are assumed in this model. The third of these data input variables is to determine a "leakage factor" (the value, wealth, or capital leaving from the standpoint of the farm business). To determine the extent of this leakage the option is given in the model to do an equal or equitable transfer. The equitable transfer requires a specific sum to be inputted as an inheritance for each off-farm child; for example $200,000, as assumed in the 10,000 acre farm ($150,000 for the 8,000 acre farm and, $100,000 for the 2,500 acre farm). The assumption is also made that the successor will always keep on farming. Thus, if there are three children (including the successor) in the family and the owner decides on an equal division of the farm value as an inheritance to the children, the successor would then be required to purchase the other two off-farm children's share of the family farm (roughly 66% of the value of the total inheritance given). A loan is acquired from the bank to fund this purchase, and can potentially be quite substantial, especially if an equal division is chosen, and thus create a large amount of debt stress on the farm. The loan is the inheritance amount to be given to off-farm heirs minus any cash given in the inheritance. In other words, the successor does not buy back the cash from the off-farm inheritors, and he also uses his own cash inheritance to pay them out before taking out a loan on the remainder amount. Furthermore, if the owner so desires, an amount can also be given to grandchildren that would incur the same effects explained above when gifted solely to the children. In this model, no amount will be given to the grandchildren, and an equitable transfer rather than an equal transfer will be chosen, though the effects of an equal transfer will be addressed.

The successor may be either a child or grandchild, thus affecting the tax laws that apply to the situation (such as a Generation Skipping Tax, or just a regular Lifetime Gift Tax). In this model the successor is a child. Also, the number of children that the successor has is an input that affects the tax calculations and in this model it is assumed the successor is married and has two children.

*Retirement, Family Living Withdrawals, and Salary*

Years until retirement is another control variable that determines when the transfer takes place, as well as the rate of transfer. This is calculated as a changing percentage of the share of management, which also includes the same share of the revenues and expenses, taxes, and so forth, transferred to the successor. As an illustration, in the case of the lease-to-buy option if the gradual exit rate option is chosen, and if the years until retirement are five (which is assumed in this model), then in the first year the owner's portion of the management and accompanying portion of income and risk would be decreased by 20% (one divided by five). The next year the rate would be 40%, and so on until full retirement is consummated. The other option is to have the manager completely retire in the first year. Retirement is assumed to be five years for the LLC and lease-to-buy methods as it is right in the middle of the time horizon of ten years, but the first year for the self-canceling installment note. When complete retirement of the owner happens, all management is transferred (note: this is solely a transfer of management, shares of income and risk, etc., not the transfer of hard assets such as land, machinery, or cash). Also, the successor's salary decreases at the same rate of entrance into management, but the successor also receives that same percentage of the income of the farm. Again, if the 20% per year entry rate is used, his salary as paid by the owner's sole proprietorship would decrease by 20%, but the successor begins to receive 20% of the income (and accompanying risk) from the farm in general. The model also assumes that when a gradual exit rate is elected, the farm can hire part-time labor to cover the lost labor of the owner (calculated as the cost of a regular employee salary multiplied by the percentage of owner's exit) if the owner is less than 50% removed from the business. If the owner is greater than 50% retired, then the farm has to hire on a full-time, salaried employee. In addition, the option is given (and assumed) that once the owner has fully retired, the successor begins to buy his own equipment and the owner no longer buys the machinery. Before full retirement, the owner always buys the equipment and allows the successor to either rent it from him or borrow it.

Family living expenses (withdrawals) are assumed for the owner and successor. The successor's withdrawals are the same for all farms at $40,000 and indexed with inflation. The owner's withdrawals vary by farm. In addition, in years of positive income, a 2% bonus (of the net farm income) is used to simulate the farmer's marginal propensity to consume. The owner also specifies the years until he begins to take out social security income; in this model, it is assumed to be the same year he completely retires from active farm management (five years). When either complete retirement or the owner's death has transpired, the model then assumes the successor's family living expenses increase to what the owner was formerly withdrawing as a living expense. When complete retirement does occur and the owner is still living, the owner either continues to receive family withdrawals from the farm, or lease or installment payments. If the former farm owner is no longer living and the wife is still alive, she receives a salary or continues to receive family withdrawals from the farm. The option may be elected for the owner and wife (and/or the successor) to receive a withdrawal from the farm minus any off-farm income (such as social security or interest income).

*Transfer Methods*

As discussed in the Literature Review chapter, Ferrell and Jones (2013) suggested various ways a farm could be transferred (see Table 1). These methods were adapted and used in this model. The eight individual possibilities are as follows: will or trust; buy-sell agreement, lease-to-buy (LTB), or a Limited Liability Company (LLC); life insurance, gifting, or outside investors. This study groups them into three groups, as briefly outlined here and then discussed in further detail later (see also Table 5 below). The first group is a necessity, or at least should be, and is termed in this paper as Legal Documents (or Legal Docs for brevity); though not having either a trust or will is a possibility, this study always includes one or the other. The second group is classified as

Inter-Vivo Transfer tools and aid in succession arrangements to transfer management or value before the death of the owner. The last group will be identified as Estate Tools, which primarily assist with the transfer at or after death. For example, life insurance is categorized as an Estate Tool, as it can only assist the intergenerational transfer when the owner has passed away. Outside investors would be used primarily when the estate is highly fragmented and hence has a large leakage of farm value during transfer, and so part of the estate is sold off to satisfy the off-farm heirs and leased back. Lastly, gifts could be classified in the Inter-Vivo Transfer tools and Estate Tools category, as they do occur while the owner is alive and can help transfer value and management, but have been classified in the third category as they are primarily used to reduce the value of the estate in order to decrease potential estate taxes due upon death. In addition, gifts are classified in the third group because they can also be used in combination with others in the second category, as will be discussed later, whereas the others in the Inter-Vivo Transfer group cannot be used in combination with each other. A summary of these three groups can be seen in Table 5.

**Table 5. Methods of Family Business Transfer**

| **Succession Tools** | | |
|---|---|---|
| Legal Docs | Inter-Vivo Transfers | Estate Tools |
| Will | Buy-Sell Agreement | Life Insurance |
| Trust | Lease-to-Buy | Gifting |
| | LLC | Outside Investor |

*Legal Documents*

Legal Docs have two options, a will or trust. A will is assumed to be a simpler document and to have a cost of $1,500 to form. A trust is assumed to be a more complex legal document and as such requires a larger formulation cost (assumed at $3,500). Both are formulated in year one of the planning horizon, before any death events occur. There is also a probate or management fee associated with each of these documents and this is calculated as a percentage of the inheritance value. The probate court fee is assumed at 4% and the trust management fee at 0.75% of the inheritance value. These fees were found to be general averages likely to be experienced in the current market, but can be adjusted as needed. Both the probate and management fees are considered a one-time occurrence (at the death of the owner if he dies first, and again if the wife dies later within the time horizon), as the assumption is made that the entire estate value is immediately transferred upon death through these mediums, and not left in a trust to grow and be taken out later. In the trust scenario, it is assumed that all income for tax purposes is passed through to heirs. If this assumption is not made, significant trust income taxes would be levied against the farm. This is a point to keep in mind as individuals consider using a trust as a means of passing on the farm.

*Inter-Vivo Transfers*

The first of the inter-vivo transfer tools to be discussed is the buy-sell agreement. There are two methods that could be used; a buy-out of assets through a third party, such as a lending institution, or a formal agreement written up between the two concerned parties. The latter is often termed an installment sale if the entire sum is not paid up front, but stretched out into payments over several periods of time. One type of installment sale is a self-canceling installment note (SCIN). A SCIN is similar to a traditional installment sale, in that a price, interest rate, and time period are agreed upon, and then the debtor makes regular payments to the creditor based on those criterion. The key difference between the two installment methods is that when the creditor dies in a SCIN agreement, the remaining debt unpaid is annulled. This unpaid debt is neither counted as income nor as part of the estate value, under current tax laws. In contrast, if it is a regular installment note, the unpaid portion continues to be paid as income in respect to a decedent (IRD), and the right to receive such income is referred to as an IRD receivable. The IRD is transferred in an estate and becomes part of the taxable estate value. If the IRD is sold, or otherwise transferred to another party, it is counted as taxable income (U.S. Department of the Treasury, 2005). Thus, the SCIN poses an obvious advantage in transferring an estate. There are some catches though. According to the IRS code, a SCIN must either add a premium onto the regular FMV price or a premium onto the AFR interest rate. Also, the length of the note must be shorter than the expected life span of the individual, as set forth by official IRS actuarial tables. As there is no specific direction outlined by the IRS code for the amount that this premium should be (or at least that the author could find) this model assumes an interest premium that equals the difference between the regular long-term AFR rate and 130% of the AFR rate. For example, if the regular long-term AFR rate was 2%, then 130% of this rate would be 2.6% and the premium used would be 0.6%. The SCIN method, as opposed to the regular installment method, is used in this model, and the agreement is assumed to always begin in the first year of the time horizon. The asset being sold through the SCIN is always and only all farmland owned by the operation. Options in the transfer process through the SCIN are, again, a gradual exit rate for the owner after the sale, or an immediate retirement upon sale of the land. This model also assumes that upon agreement of the SCIN, the remaining amount of the owner's debt on the land loan is paid for by the successor through the successor's own loan with the bank for the same amount, but over a term length of another 20 years, rather than the remaining life of the owner's loan. Thus, there is a transfer of third party debt to the successor. The FMV of the land minus the amount of owner's previous debt outstanding on the loan becomes a note receivable to the owner and a mortgage payable to the successor. Annual payments are assumed. The option is also given of a "washout" of cash changing hands, which is accomplished by the owner leasing back the land at the same cost of the annual payments from the successor.

The second type of transfer tool utilized in this study is the lease-to-buy agreement. This model assumes the lease-to-buy contract begins the first year of the time horizon, and is a lease on the farmland only. The lease part of the agreement is the same length as the years until retirement and when the lease is up, the option is given to buy. If the lease-to-buy option is exercised, the successor purchases all farmland from the owner. Though the option is made available to never purchase (lease until death), in this model it is assumed the successor always exercises the option to buy, unless otherwise specified. The purchase of the farmland can be done in one of two ways; either using a SCIN or through a loan from the bank. If a SCIN method is used, the same basic assumptions apply as explained above. If the successor obtains a loan through the bank, the appropriate interest (with basis) and a 30-year term is used. This amount covers any remaining debt the owner has on the land. The purchase price is the FMV minus the lease payments made in the previous time frames (thus the lease payments are applied as payments down on the FMV). In general, the SCIN method will be utilized to compare more evenly across methods of transfer, but the bank method will also be discussed and its implications. Regarding the lease payments, they are always cash payments (no share lease agreement between the owner and successor). The cash lease amount can be the FMV of lease payments (the same rate the farm is paying or would pay to a third party source), or equal to the debt payments the owner would make on the remaining balance of the associated land or equipment loan(s). The latter option is given for both land and equipment (though equipment is never included in the option-to-buy, it can be leased). Equipment leasing, if the debt payments are not chosen, is a percentage of the FMV of the machinery; in this case, a 3% rate is assumed. In comparing across scenarios, the FMV payments will be utilized rather than debt payments. If the owner dies before the lease contract on the land is complete, the land is not bought, but simply inherited.

The last Inter-Vivo Transfer tool to be examined is a Limited Liability Company (LLC). The LLC is set up as a partnership, and is a pass through-entity for tax purposes, with 1,000 shares (also called units of ownership interest, but will be termed shares for purposes of this paper). Both the owner and successor contribute their entire net worth into the LLC; then the shares are distributed according to contributed net worth. Due to the successor now being a partner instead of an employee or separate business, he is no longer eligible to receive a tax deductible farm wage, and must instead also take out family withdrawals and pay his portion of the income taxes and self-employment taxes. In the model, it is assumed that the owner and successor never withdraw more money than they need to meet the allotted family withdrawals. Thus, a cash reserve or deficit is never incurred on their separate financial statements. All deficits and surpluses are built up on the LLC's financials, and passed through only as an increase (or decrease) in the value of each one's shares in the company. In order to transfer shares and wealth, gifts are then given of shares. No discount is applied to these shares when gifted, but are gifted at full value. When gifting shares, an original percentage of the shares can be gifted upon formation of the LLC (for instance, 40%). Also, a constant amount of shares can be gifted each year (say 10% of remaining shares, or the tax free gift amount each year). This model will assume a tax free amount to be gifted, and if the share value to be gifted is not exactly that amount, the amount of shares (and their corresponding value) is rounded up; i.e. the owner will gift just above the taxable amount, rather than just under it. The base assumptions model will also assume a 10% original gift amount.

*Estate Tools*

Life insurance is the first estate tool discussed here. A $500,000 policy with a 20 year term length and an annual premium of $11,500 is purchased. The owner or successor may pay the premium, or the successor and off-farm heirs can split the cost evenly among themselves. The $500,000 is paid immediately and in full upon death of the owner. In this model, the assumption is made that the successor pays for the policy in its entirety. The successor first uses it to pay off the off-farm heirs, before collecting the remainder of the investment.

In the case of cash gifting, one must input either to gift a set amount (for instance, $40,000), or a tax free amount to the successor individually, and each off-farm heir (child and/or grandchild). The amount to the children can be gifted to the bloodline child as well as their spouse (the in-law), or to just the direct bloodline heir. This option allows for gifting double the amount tax free to the same family. There is also an input for how much has already been gifted, but assumed as zero in this model. For cash gifts, the author assumes the owner and his spouse gift at the beginning of the year, and they only give cash gifts if they have remaining cash from the previous year to give the above specified amount to all the children and still have cash left over. Then if there is enough to satisfy that constraint, and the owner is also gifting to grandchildren, the same constraint applies to giving gifts to grandchildren. The last person to receive any gifts in this same process is the successor. The amount of gifts given is calculated to find the accumulated taxable portion each year. Also, the accumulated portion given to off-farm heirs is summed and then, upon death of the owner, that amount is subtracted from their inheritance. Thus, the owner in essence is “paying off” the off-farm children *for* the successor before death, and thus the successor is given last priority in being given extra sums of money. When gifting shares in the case of the LLC (or non-cash gifts), shares can only be gifted to the successor, but children can inherit shares, which then must be bought back by the successor.

The last method of estate tools is the use of outside investors. Whenever the owner dies, all farmland is sold to an outside investor. It is assumed that a contract upon sale requires that the investor cash-lease back to the successor the same farmland (at FMV) for life, or until in some future date the successor decides to buy it back at the increased FMV price. This creates an additional cash flow for the successor to pay out off-farm heirs, cover farm expenses, and pay any taxes that might come due. The land is sold immediately upon inheritance, thus no capital gain is recognized in the process.

*Death Events*

Three death situations are possible: owner and wife die in the same year; the owner dies later than the wife; and the owner dies and the wife dies in a following year. This model makes certain assumptions concerning the inheritance, management, transfers, etc. that occur in each situation. This may not necessarily represent the way the transfer would always take place, but it is one explanation of a way it may occur in order to analyze those circumstances. The assumptions are made that the owner (the husband) is the primary manager and the wife does not wish to personally manage the farm after the death of her husband. On the other hand, the husband will continue to manage the farm, if he is not already retired, even after the death of his wife. Given these assumptions, under the first death event situation earlier, all net worth is transferred to the heirs and divided according to the pre-specifications of the will or trust, and funeral expenses are paid for by the successor. In the second situation, nothing happens upon death of the wife, other than a funeral expense is incurred; but when the husband dies later, the inheritance of the entire farm value is distributed and the successor pays for the funeral expenses. In the final situation, all farm value, excluding cash (which is kept by the wife to insure as stable of a retirement as possible), is inherited by the heirs and divided according to the will or trust specifications, and the wife pays the funeral expenses. Also, if cash upon death of the husband is greater than the estate tax exemption amount for a single person, then the difference between the remaining cash and the exemption amount is also part of the inheritance. This is done in order to minimize estate taxes as much as possible upon death of the wife, while ensuring her still a large sum of cash reserves. When the wife dies in a later year, all remaining cash goes to the successor, as he (if need be) has financially supported the wife throughout the reminder of her life with a "salary", or in the case of an LLC, continued family withdrawals, and will pay for all funeral expenses. This last situation was used to examine the effects of supporting one (or more) individuals after a complete retirement from the farm for a potentially extended period of time. All death events happen immediately at the beginning of the year. The assumption is made that the family living withdrawals do not decrease upon death of the wife or husband. If estate taxes are incurred upon death, the individual recipients of the inheritance pay their share of the estate taxes, according to the amount they receive. Probate and management fees are assumed to be paid according to inheritance received (e.g. the given percentage multiplied by the inheritance they are to receive).

*Scenarios*

In this study, a scenario will be termed as a unique combination of these succession planning methods. They can be thought of as spectrum of decisions. At one extreme, we may have no will, no trust, and no planning methods employed at all. The other end of the spectrum could be a complex combination of a trust, LLC, various gifting strategies, insurance, and outside investors. In this study, 28 unique scenarios along this spectrum are examined. These are outlined in Table 6 below.

**Table 6. Scenario Combinations of Business Transfer Methods**

| Scenario Combinations | | | |
|---|---|---|---|
| **Scenario** | **Legal Docs** | **Inter-Vivo Transfer** | **Estate** |
| 1 | Will | Nothing | Nothing |
| 2 | Will | Nothing | Life Insurance |
| 3 | Will | Nothing | Gifting |
| 4 | Will | Nothing | Outside Investor |
| 5 | Will | SCIN | Nothing |
| 6 | Will | SCIN | Life Insurance |
| 7 | Will | SCIN | Gifting |
| 8 | Will | Lease-to-Buy | Nothing |
| 9 | Will | Lease-to-Buy | Life Insurance |
| 10 | Will | Lease-to-Buy | Gifting |
| 11 | Will | LLC | Nothing |
| 12 | Will | LLC | Life Insurance |
| 13 | Will | LLC | Gifting |
| 14 | Will | LLC | Outside Investor |
| 15 | Trust | Nothing | Nothing |
| 16 | Trust | Nothing | Life Insurance |
| 17 | Trust | Nothing | Gifting |
| 18 | Trust | Nothing | Outside Investor |
| 19 | Trust | SCIN | Nothing |
| 20 | Trust | SCIN | Life Insurance |
| 21 | Trust | SCIN | Gifting |
| 22 | Trust | Lease-to-Buy | Nothing |
| 23 | Trust | Lease-to-Buy | Life Insurance |
| 24 | Trust | Lease-to-Buy | Gifting |
| 25 | Trust | LLC | Nothing |
| 26 | Trust | LLC | Life Insurance |
| 27 | Trust | LLC | Gifting |
| 28 | Trust | LLC | Outside Investor |

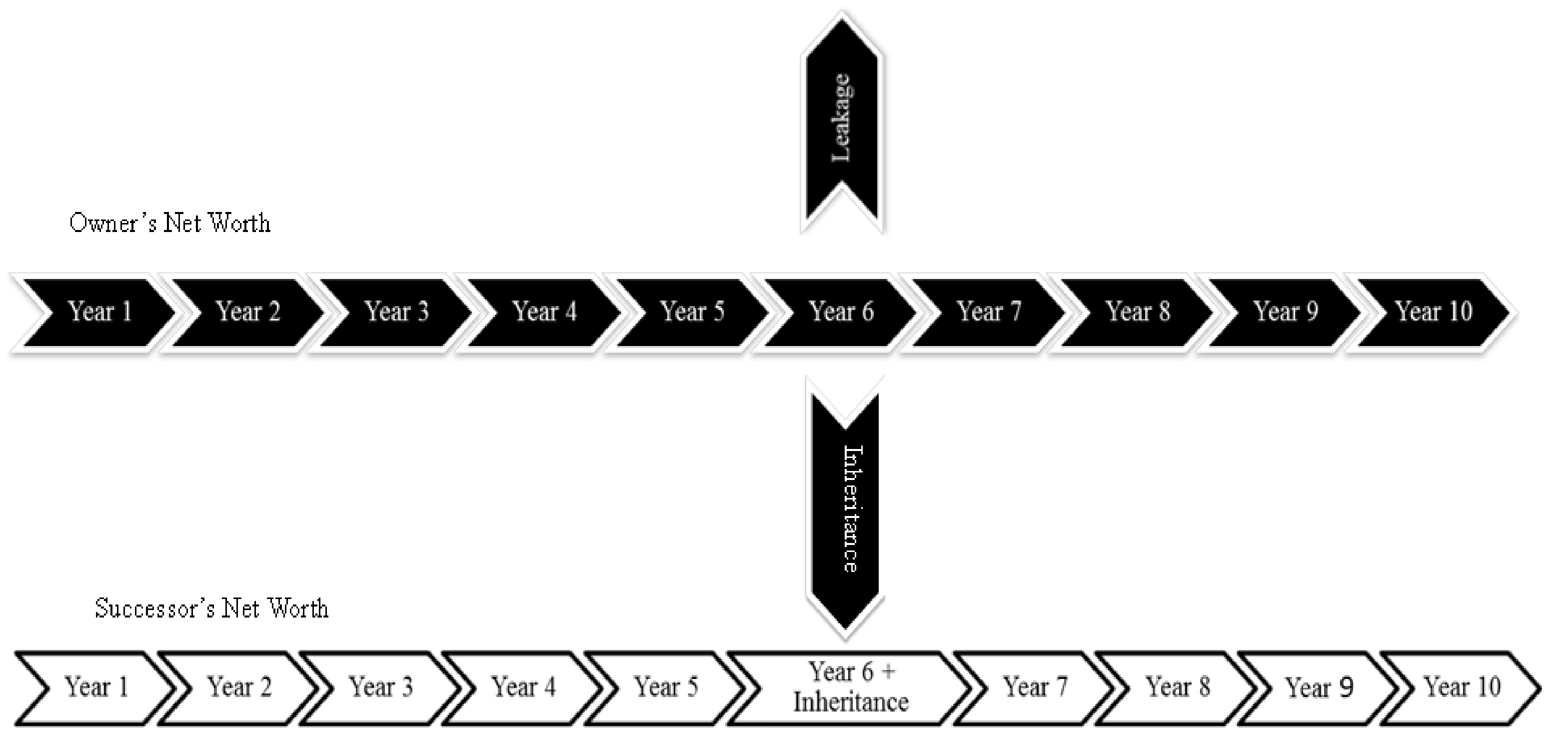
*Key Output Variables*

There are several key output variables (KOVs) that were analyzed in this model including: combined net present value of the owner and successor, probability of cash being less than zero at year end, probability of economic success, total debt capital volume, and total estate and gift taxes, and debt to asset ratio. Each of the subsections of this section will explain the KOVs and explain why they were selected in this study.

**Net Present Value**

Regarding the KOV used to rank the risky alternatives (scenarios), it was very important to select one that would determine what method may be most preferred to a farm business, dependent upon risk preferences. This brings back one of the original problems suggested by the author of how to measure benefit to both the owner and successor, or meeting the competing objectives of maximizing the benefit to the owner and successor. This study used a KOV of combined NPV of the owner and successor (NPV being defined in formula (3) earlier). NPV was chosen because it reflects the effects of various transition methods on cash flows in each year and the ending net worth of the farm. The NPV of the successor and the owner was then combined in order to create one KOV that would reflect the benefit (or detriment) to each individual. This KOV would also include the farm financial benefit of inheritance as well as the leakage factor discussed earlier (equity leaving the farm business to the off-farm inheritors, taxes, and so forth). This method was chosen as the author chose to focus on the farm business, the successor, and the owner rather than on the welfare of the entire family that would include off-farm heirs. Figure 2 (on the next page) illustrates this concept.

**Figure 2. Illustration Example of Leakage Factor**



When the owner lives through the entire ten year planning horizon, there is no effect different than looking at the owner by himself. In contrast, when the owner dies in, for example, year six, his ending net worth in year ten would be zero, and the inheritance given to the successor has been included in the successor's ending net worth, along with its appreciated or depreciated value at the end of those years (dependent upon the transfer method chosen). The amount that is not given to the successor is factored out of the equation, as a leakage of value from the farm business to the off-farm heirs. For all intents and purposes, it has become an expense to the farm business.

### Probability of Economic Success and of Negative Cash Flow

Though a farm business may be operating, it may slowly be trending toward failure. The variable chosen to define this is the probability of economic success, or the probability of the present value of ending net worth being greater than beginning net worth. This variable is not stating the business will fail, but simply shows whether or not there has been value added through the transfer process. The probability of negative cash flows is calculated for each year for each scenario. This will help to demonstrate the businesses ability to meet short term cash flow needs.

### Estate and Gift Taxes and Debt Capital Volume

The estate and gift taxes are calculated as a total sum of estate taxes paid by the successor, the owner's gift taxes, and estate taxes paid by the farm business (as when it is an LLC). Loan volume is calculated as total short term debt plus mid and long term debt (such as equipment and land loans, or to buy out off-farm inheritors).

**Debt to Asset**

The main ratio examined was the debt to asset ratio (D/A). The D/A is calculated by dividing the total debt by the total assets, which is a demonstration of the solvency (or the ability to meet long term obligations) of the company. Note that if the owner is dead or the successor is not earning any farm income, the ratios are not calculated for each of them respectively. Thus, only farm business relevant years are taken into consideration. One might question not including years after the owner's death if the wife is alive, but in the model the assumption is made that all debt and assets (excluding cash) is transferred at the death of the husband. If the wife cannot meet living expenses given the remaining cash and her social security income, the successor will support her to cover the remaining expenses, thus she will never have debt or farm income, given the assumptions made for this model.

# CHAPTER V

# RESULTS

*Base Assumptions*

Before reporting all results a quick summary of the base assumptions will be presented. In the base scenario, there are three children, two of which are off-farm. The off-farm children will inherit a fixed amount of money, and the successor the remaining portion of the estate. Each scenario makes certain assumptions based on the specific transfer method. When the SCIN method is chosen, the owner retires in the first year and the successor then makes annual payments to the owner and leases the equipment as a percentage of the FMV. In the LTB scenario, a gradual exit rate is utilized and the owner completely retires by year five of the time horizon. The successor leases equipment under the same assumptions and leases land until when in year five, the successor purchases the land from the owner using a SCIN. Whenever the owner retires, social security income is immediately taken out. In the LLC, both the owner and the successor contribute their entire net worth to the LLC, and when gifting takes place, it is only gifting of shares to the successor, equal to the tax free gift amount as set forth by the IRS. When gifting (besides the case of the LLC), tax free cash gifts are given each year the owner is alive (if there is enough beginning of year cash). The last transfer method is life insurance, where a $500,000 policy covering the owner is bought by the successor. These base assumptions are combined with the use of SDRF and SERF risky alternatives ranking methods, a power utility function (which assumes the decision maker exhibits relative risk aversion, or is willing to take on more risk as wealth increases), and the KOV of combined NPV in order to report the preferred farm transfer methods for each of the three farm case studies (2,500, 8,000 and 10,000 acres). These results that come from this run of the model are categorized as the base results. Then, four alterations were made from the base assumption scenario and each model was then run for each of the case studies in order to compare the results from theses alterations to the original base assumption results (for the particular scenario). For alteration results, increases and decreases in the KOVs will be reported as percent changes from the base assumptions. The highlights of the preferred methods will be presented for each alteration in order of farm size and by alteration (run) of each model.

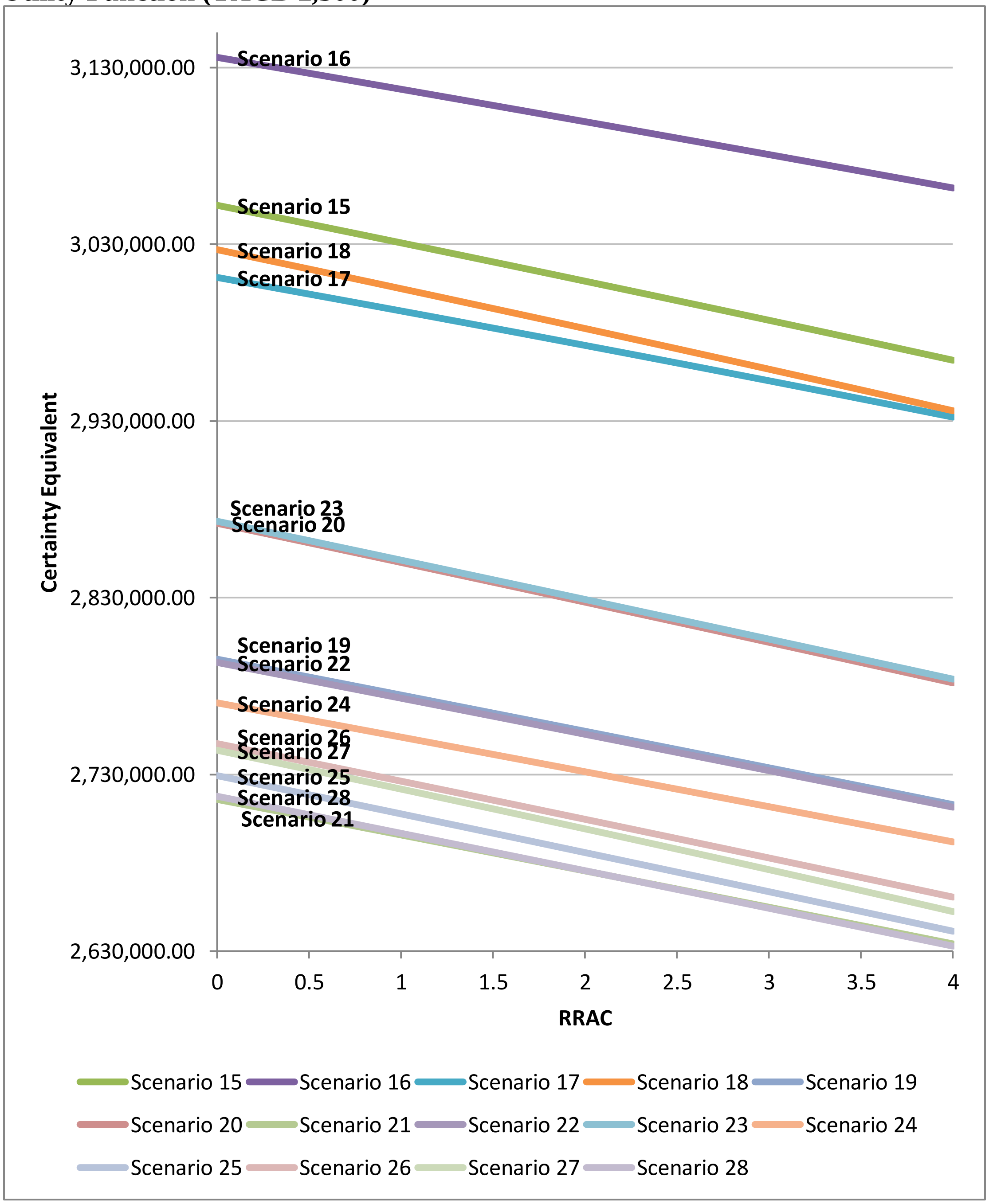
*Base Results*

In the base assumptions model the most preferred method for the 2,500 acre farm is Scenario 16 (trust, life insurance, and no Inter-Vivo Transfer method). The least preferred is Scenario 14 (will, LLC, and outside investors). The 8,000 acre farm's most preferred method is also Scenario 16, with the least preferred method being Scenario 10 (will, LTB, and cash gifts). For the 10,000 acre farm, the most preferred method for decision is a split, depending upon the decision maker's risk aversion. For those that fall between zero and three on the risk aversion classification scale (see Table 4), the most preferred method is Scenario 27 (trust, LLC, and gifting of shares). For those greater than three on the risk aversion scale, the most preferred method changes to Scenario 20 (trust, SCIN, and life insurance). The least preferred method for both is Scenario 4 (will, no Inter-Vivo Transfer method, and outside investors). In nearly all cases across all farms the trust took precedence over its will counterpart. Any transfer costs at death (such as funeral expenses, probate fees, etc.) become estate tax deductible expenses and thus the trust reduces the taxable estate by a much smaller amount, thus incurring higher taxes. This benefit of reduced estate taxes though does not outweigh the higher cost of the probate fees. Other notable findings for the base assumption run are that for the 2,500 acre farm there were no estate or gift taxes, due to the farm never exceeding the IRS tax free estate amount. On the 8,000 acre farm, estate and gift taxes occurred in about two-thirds of the scenarios, and of those the average was about $6,500 in estate taxes paid by the successor and no gift taxes. Whereas, for the 10,000 acre farm estate taxes occurred in every scenario and they averaged, across all scenarios, over $1.5 million in estate taxes paid by the successor. Furthermore, when the D/A for the owner and successor, they were frequently negatively correlated. For example, on the 2,500 acre farm, Scenario 5 D/A for the owner was on average 3% while for the successor it was 78%. Regarding capital debt volume, on average Scenario 18 (trust, no Inter-Vivo Transfer method, and outside investor) was the lowest for the 2,500 acre farm, and Scenario 28 (trust, LLC, outside investors) was the lowest for the 8,000 and 10,000 acre farm. The highest for the three farms were Scenario 12 (will, LLC and life insurance) for the 2,500 and Scenario 5 (will, SCIN, no Estate Tool) for the 8,000 acre farm, and Scenario 6 (will, SCIN, and insurance) for the 10,000 acre farm Also, the probability of combined economic success decreased 89% from the option of no succession to the succession scenarios across all scenarios for the 2,500 acre farm; the 8,000 acre farm probability of success changed -36.1% and the 10,000 acre farm -17.1%. Percentage point changes in the probability of economic success from no succession to succession across all scenarios can be seen in the Appendix, Table 24.

Figure 3, 4 and 5 below show the SERF charts of the results just described. For ease of reading and to simplify, as a trust is always preferred to a will across all farms, only the trust scenarios will be shown and reported. The highest on the chart is most preferred, the lowest the least preferred. The relative risk aversion is found along the x-axis.

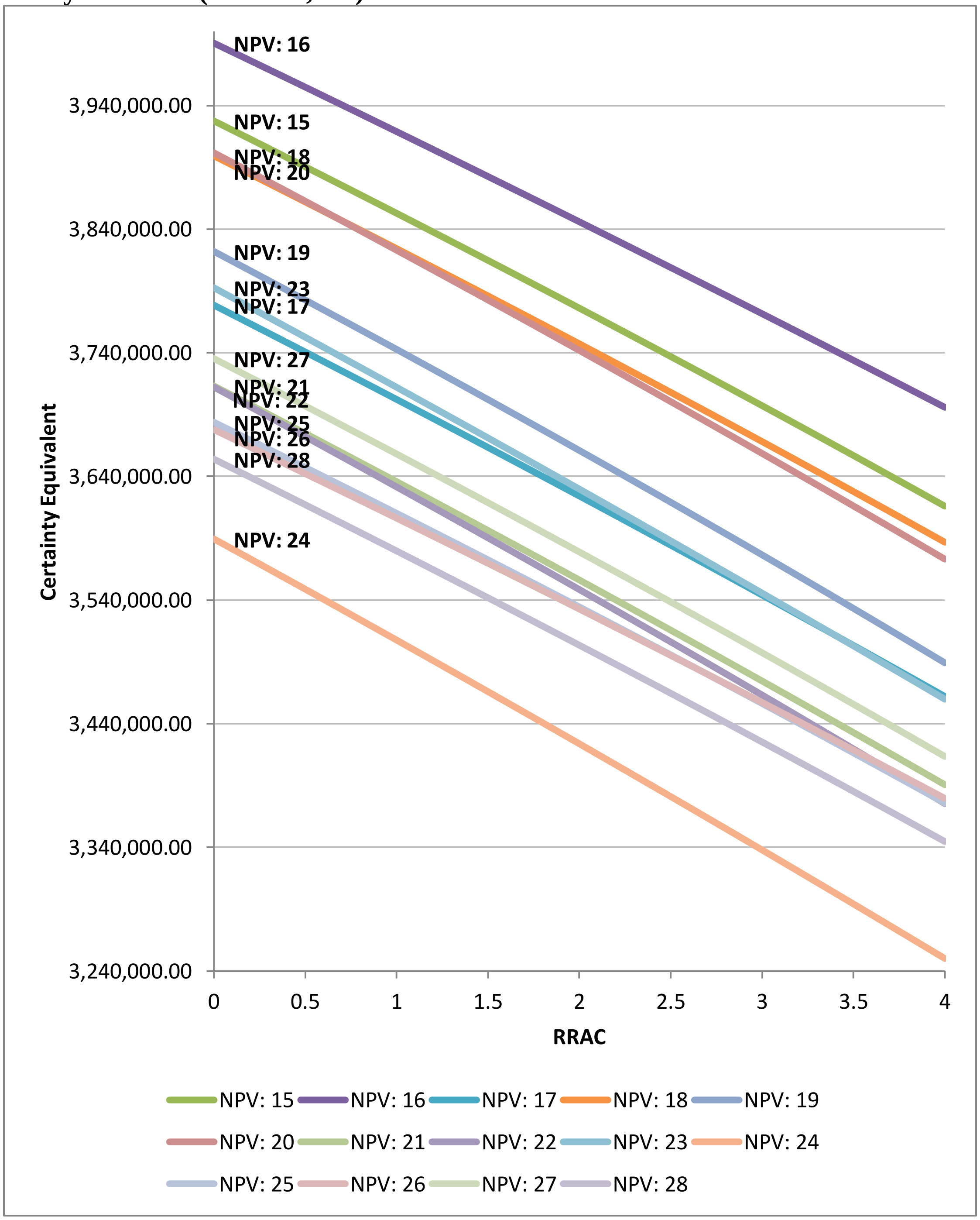
For all alterations (discussed after Figures 3, 4, and 5 below), summary statistics in comparison to the base assumptions model are presented in the Appendix for just the scenarios affected by the alterations (e.g. for the fourth alteration, only Scenario 27 summary statistics will be shown, as it is the only one that is affected by the change).

**Figure 3. Stochastic Efficiency with Respect to a Function (SERF) Under a Power Utility Function (TXCB 2,500)**




[2] Figure 3 descriptions of the scenarios shown here can be found in Table 6.

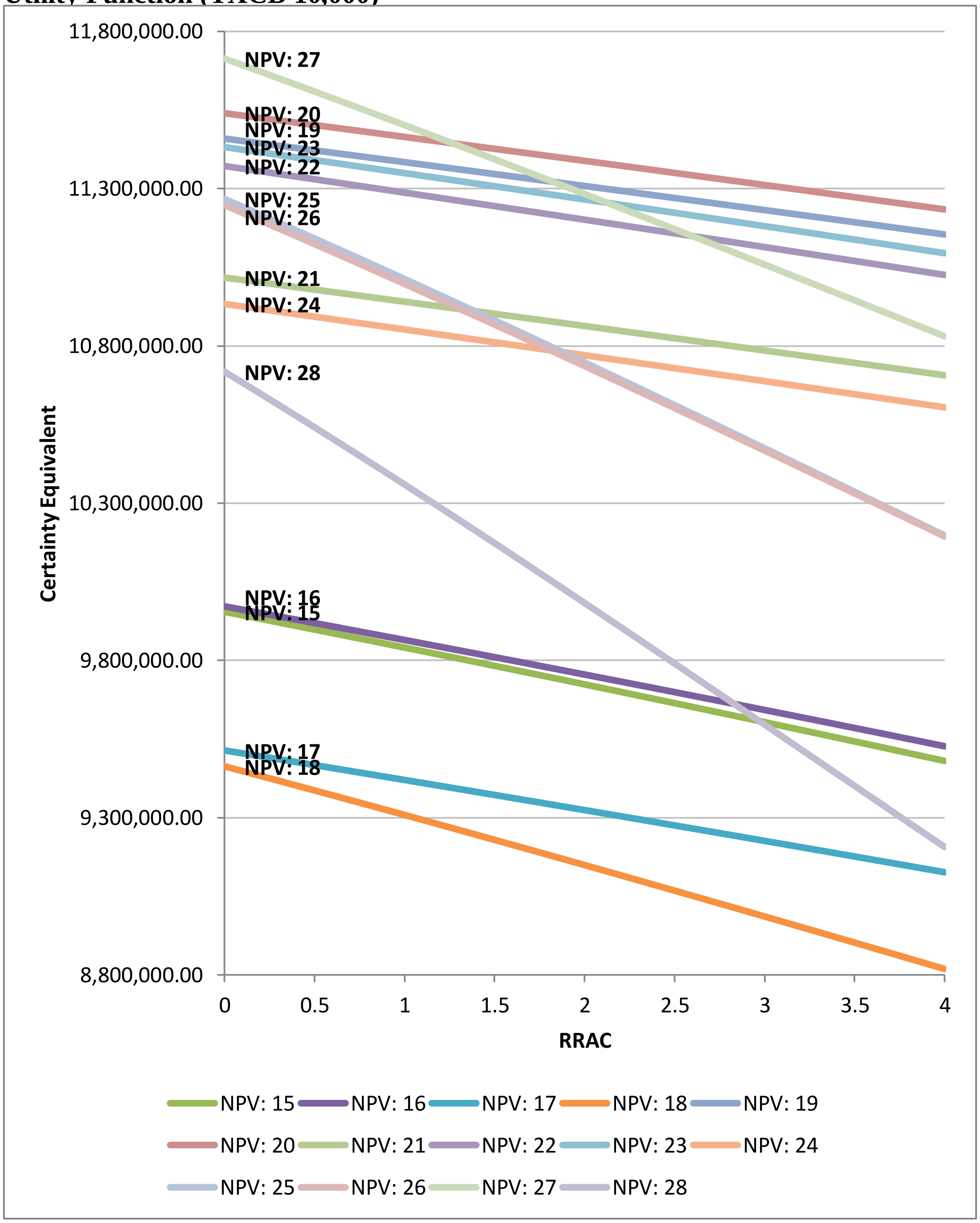
**Figure 4. Stochastic Efficiency with Respect to a Function (SERF) Under a Power Utility Function (TXCB 8,000)**




---

[3] Figure 4 description of the scenarios can be found in Table 6.

**Figure 5. Stochastic Efficiency with Respect to a Function (SERF) Under a Power Utility Function (TXCB 10,000)**




[4] Figure 5 descriptions of the scenarios can be found in Table 6

*First Alteration*

The first alteration of the base scenario used an equal transfer instead of a fixed amount (or equitable transfer). For the 2,500 acre farm the most preferred methods remained the same, Scenario 16 (trust, no Inter-Vivo method, and life insurance), while the least preferred methods changed to Scenario 12 (will, LLC, and life insurance). The 8,000 acre farm's most preferred scenario was Scenario 20 (or trust, SCIN, and life insurance) and the least preferred method was Scenario 12 (will, LLC, and life insurance). For the 10,000 acre farm, Scenario 20 (trust, SCIN, and life insurance) was the most preferred method and Scenario 14 (will, LLC, and outside investors) was least preferred. This alteration also resulted in a lower NPV and an increased coefficient of variation (CV) in all scenarios across all farms.

The percent change for the successor's D/A for the 2,500 acre farm in the equal transfer increased on average over the 28 scenarios by 31%, as well as a -28% change in the successor's probability of economic success. In this alteration the owner's ratios and probability remained essentially unchanged. In the 8,000 acre farm the changes were more dramatic. The percent D/A increase for the successor was 57%, and percent change in probability of economic success decreased by 22%. Also, results showed a 51% increase in the probability of the owner having negative ending cash and 27% increase of the same for the successor. The 10,000 acre farm had a -23% change in probability of success from no succession to succession (on average the probability is 66%), which is about a 10% decrease from the equitable transfer average. The average D/A for the successor nearly doubled to 35% and furthermore, and there was a 36% increase in debt capital. Lastly, there was a 64% increase in the probability of negative cash flows for the successor. Percentage point changes in the probability of economic success from the base model to the alteration one can be seen in the Appendix, Table 25.

*Second Alteration*

The second alteration of the model was including a washout for the SCIN, and the LTB was funded through the bank instead of a SCIN. For the 2,500 acre farm, the most preferred method remained the same while the least preferred method changed to Scenario 10 (will, LTB, and cash gifts). The 8,000 acre farm remained unchanged for the most and least preferred methods. For the 10,000 acre farm the most preferred method remained the same, and the least preferred changed from Scenario 4 (will, no Inter-Vivo Transfer method, and outside investor) to Scenario 10 (will, LTB, and cash gifts).

The washout and buying through a third party lender proved to be detrimental, as it resulted in a lower NPV and generally a higher CV for all farms. See Appendix Tables 15-18 and Tables 26-27. Scenarios that included cash gifting were impacted to a greater extent due to the increased strain on cash flow. For example, there was an average increase in D/A across all LTB methods of 18.06%, but only 3.98% without Scenario 10 (will, LTB, cash gifts) and 24 (trust, LTB, cash gifts). This suggests that the cash gift scenarios will have a harder time meeting cash needs, thus causing greater debt.

*Third Alteration*

The next change was that the option to buy on the lease was not exercised. Thus, the successor leases from the owner until death, at which point the successor would inherit the farm. The SCIN was still a washout, (as in alteration two). In all farms, their respective most preferred methods remained unchanged from the base. Regarding the least preferred methods, the LTB scenarios became the least preferred methods for the 2,500 acre farm. The 8,000 and 10,000 acre farms had similar effects, in that the LTB methods fell in the rankings to some of the least preferred methods. On all farms, the lease resulted in a lower NPV than the base model. Though, on the 8,000 acre and 10,000 acre farm the lease until inheriting resulted in a lower NPV than exercising the lease-to-buy option through bank financing.

*Fourth Alteration*

The last alteration used a higher initial gifting of shares for the LLC (25%) and higher gifting per year (7% of shares each year). For the 2,500 acre farm the alteration did not improve the rankings of the LLC gifting shares scenarios and the most and least preferred methods remained the same. Regarding the 8,000 acre farm, it also did not show an improvement in ranking, but did increase NPV by 8%. Again, the most and least preferred methods remained the same. The 10,000 acre farm's most preferred method was Scenario 27 (trust, LLC, and gifting of shares) for all risk aversion levels, increasing average combined NPV by over 17% and decreasing the standard deviation. Though there were some gift taxes incurred, the percent change in average total estate and gift taxes paid was -38% (or over a million dollar decrease). The least preferred remained Scenario 4 (will, no Inter-Vivo Transfer method, and outside investors), though interestingly enough it was not because it had the highest taxes. A summary of these findings is shown in Table 7 below.

## Table 7. Summary of Most and Least Preferred Scenarios for each Farm and Model, Average and Standard Deviation of Combined NPV, and Average Total Debt for those Scenarios.[5]

| Farm | Model | Ranking | Legal Docs | Inter-Vivo | Estate | Avg. Combined NPV | Std. Deviation | Avg. Total Debt |
|---|---|---|---|---|---|---|---|---|
| TXCB 2,500 | Base | **Most Preferred** | Trust | Nothing | Life Insurance | $ (34,459) | $ 410,441 | $ 13,640,127 |
| | | **Least Preferred** | Will | LLC | Outside Investors | $ (462,942) | $ 427,875 | $ 14,018,099 |
| | Alt 1 | **Most Preferred** | Trust | Nothing | Life Insurance | $ (297,070) | $ 476,512 | $ 14,597,863 |
| | | **Least Preferred** | Will | LLC | Life Insurance | $ (765,268) | $ 573,044 | $ 17,509,753 |
| | Alt 2 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 13,640,127 | $ 13,640,127 | $ 13,640,127 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 14,757,442 | $ 14,757,442 | $ 14,757,442 |
| | Alt 2 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 13,640,127 | $ 13,640,127 | $ 13,640,127 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 16,935,969 | $ 16,935,969 | $ 16,935,969 |
| | Alt 4 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 13,640,127 | $ 13,640,127 | $ 13,640,127 |
| | | **Least Preferred** | Will | LLC | Outside Investors | $ 14,018,099 | $ 14,018,099 | $ 14,018,099 |

| Farm | Model | Ranking | Legal Docs | Inter-Vivo | Estate | Avg. Combined NPV | Std. Deviation | Avg. Total Debt |
|---|---|---|---|---|---|---|---|---|
| TXCB 8,000 | Base | **Most Preferred** | Trust | Nothing | Life Insurance | $ 522,532 | $ 1,080,844 | $ 17,289,602 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 106,987 | $ 1,124,197 | $ 25,096,239 |
| | Alt 1 | **Most Preferred** | Trust | SCIN | Life Insurance | $ 367,750 | $ 1,136,201 | $ 27,840,021 |
| | | **Least Preferred** | Will | LLC | Life Insurance | $ (706,468) | $ 1,693,438 | $ 22,546,386 |
| | Alt 2 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 17,289,602 | $ 17,289,602 | $ 17,289,602 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 24,595,052 | $ 24,595,052 | $ 24,595,052 |
| | Alt 2 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 17,289,602 | $ 17,289,602 | $ 17,289,602 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 25,345,129 | $ 25,345,129 | $ 25,345,129 |
| | Alt 4 | **Most Preferred** | Trust | Nothing | Life Insurance | $ 17,289,602 | $ 17,289,602 | $ 17,289,602 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 25,096,239 | $ 25,096,239 | $ 25,096,239 |

| Farm | Model | Ranking | Legal Docs | Inter-Vivo | Estate | Avg. Combined NPV | Std. Deviation | Avg. Total Debt |
|---|---|---|---|---|---|---|---|---|
| TXNP 10,000 | Base | **Most Preferred** | Trust | LLC | Share Gifts | $ 4,346,965 | $ 3,388,682 | $ 4,378,725 |
| | | | Trust | SCIN | Life Insurance | $ 4,173,152 | $ 2,044,571 | $ 29,254,439 |
| | | **Least Preferred** | Will | Nothing | Outside Investors | $ 6,442,730 | $ 6,442,730 | $ 6,442,730 |
| | Alt 1 | **Most Preferred** | Trust | SCIN | Life Insurance | $ 3,724,645 | $ 2,215,753 | $ 29,852,905 |
| | | **Least Preferred** | Will | LLC | Outside Investors | $ (1,234,933) | $ 10,135,928 | $ 12,202,464 |
| | Alt 2 | **Most Preferred** | Trust | LLC | Share Gifts | $ 4,378,725 | $ 831,717 | $ 12,127,015 |
| | | | Trust | SCIN | Life Insurance | $ 19,521,116 | $ 7,000,549 | $ 48,835,911 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 31,639,926 | $ 10,420,637 | $ 78,362,135 |
| | Alt 2 | **Most Preferred** | Trust | LLC | Share Gifts | $ 4,378,725 | $ 831,717 | $ 12,127,015 |
| | | | Trust | SCIN | Life Insurance | $ 19,521,116 | $ 7,000,549 | $ 48,835,911 |
| | | **Least Preferred** | Will | LTB | Cash Gifts | $ 23,733,032 | $ 10,632,474 | $ 69,041,515 |
| | Alt 4 | **Most Preferred** | Trust | LLC | Share Gifts | $ 4,282,940 | $ 598,259 | $ 11,658,012 |
| | | **Least Preferred** | Will | Nothing | Outside Investors | $ 6,442,730 | $ 2,794,388 | $ 12,138,337 |

[5] The "Model" descriptions in Table 7 are Base for the base assumptions model. Alt is an abbreviation for alteration, for the different alterations performed to the base model.

# CHAPTER VI

# DISCUSSION

*TXCB 2,500*

Regarding the 2,500 acre farm in the base assumptions model, the most preferred method (Scenario 16; trust, life insurance, and no Inter-Vivo Transfer method), using combined NPV as the KOV, was one that lacked any Inter-Vivo Transfer. Each Inter-Vivo Transfer has an associated cost. Some examples of costs may be additional taxes due to an increase in income taxes (such as in the case of the LLC where the successor's salary no longer becomes a tax deductible expense for the farm and the need for the successor to pay self-employment taxes), the owner paying taxes on interest income from the SCIN or lease income, or other similar expenses. Due to some value being always lost in these Inter-Vivo Transfer methods there must be a greater return to the cost to warrant using it, which in the case of this small farm, there was not. This would largely be because the successor never incurs estate taxes due to the small size of the farm. Therefore, the most preferred method would be one where the owner essentially does not engage in any Inter-Vivo Transfer methods until death and then would gift the entire estate tax free to the successor. Concerning the Legal Docs aspect, the preferred method used a trust rather than a will. The trust is preferred to the will as the trust has a lower cost to the successor upon death of the owner because it avoids probate court.

When Inter-Vivo Transfer methods are used, the SCIN was preferred to the LTB method for the small farm, though not by a large margin. This would be primarily due to the fact that the owner pulls social security earlier for the SCIN (year one, as that is when he retires, as opposed to year five in the LTB scenarios). Both of the SCIN and LTB methods were preferred over the LLC method because the cost to the successor associated with these methods (such as a lease payment or installment payment) benefits the owner, and if they are not used for family living are eventually inherited back by the successor.

The least preferred method for this farm was Scenario 14 (will, selling the farmland to outside investors, and creating an LLC). There are several reasons why this combination may be least preferred. Upon sale of the farm land, there is no longer value gained through appreciation of the land. For the specific farm being analyzed in this model, due to a poor financial performance it relies heavily upon value gained through appreciation of land as one of the main sources of increasing net worth. Thus, a sale to outside investors would result in a great loss of net worth. Also, the outside investors option is detrimental as the farm business would be required to then rent 100% of the 2,500 acres instead of the 80% it currently is renting due to the sale, significantly increasing operating expenses. These factors combined would usually result in ending net worth being lower than if the land was not sold and makes this a non-preferred method. As a side note, there may be times when, although this is not the preferred method, it may be necessary to liquidate the land in order to cover debts, and allow the business to continue operating. This method could allow the company pay off debts or restructure the business debt. This would be a merely a short-term solution for a long-term problem and would be better tackled by improving financial efficiency, profitability, and general business practice improvements. If an LLC were used, as suggested earlier, it would result in increased taxes due to the successor paying self-employment taxes and the successor's salary no longer being tax deductible. In addition, in Texas, sole proprietorships do not have an income tax applied to them, whereas a franchise tax is levied against the LLC. These factors combine to make Scenario 14 (will, selling the farmland to outside investors, and creating an LLC) the least preferred method in the base scenario.

Also, worthy of note is that the second least preferred method was Scenario 7 (will, SCIN, and cash gifts). This method put significant strain on cash flows from the standpoint of the successor, the owner, and the business. Even when no succession occurs this 2,500 acre farm was only forecasted to have a combined probability of economic success of 3.9%, and so any additional strain on the farm significantly impacts it. Furthermore, cash gifting was always the least preferred method among Estate Tools. The reason for this is similar to the reason above, as the few years the farm would have positive cash flow, the owner would be gifting much of the cash away. Gifting is a way to minimize taxes and maximize net worth, if it is not cash being gifted (such as shares being gifted in the LLC method), or if there is large sum of cash on hand that if gifted will not significantly affect working capital. Otherwise, this process puts too significant of a strain upon cash flows and is also risky. For example, when one might have a good year, the next year may be a poor price year resulting in the farm not being able to meet that year's own cash flow needs. The gifting reduced the working capital cushion they might have had from the previous year that would absorb some of the market shock in the bad year. In summary, methods that strained cash flows in any way were less preferred to methods that minimized value changing hands before death.

*TXCB 8,000*

In the 8,000 acre farm the most preferred method was Scenario 16 (trust, no Inter-Vivo Transfer method, and life insurance), which is the same as the 2,500 acre farm. It is the preferred method for similar reasons, meaning that rarely does this farm pay estate taxes, and when paid, they are a relatively small amount. Thus, the returns of the Inter-Vivo Transfer methods do not outweigh the costs associated with those methods. Life insurance is included among the most preferred methods because, given the probability that the owner passes away 37.2% of the time within the ten year period, the return to the cost is quite high. The indemnity allows for greater cash flow upon actual transition of the estate and may be used for various cash outflow requirements (such as buying out off-farm heirs). The next preferred method (after those without any use of Inter-Vivo Tools), was Scenario 20 (trust, SCIN, life insurance). This is partially due to the early pulling of social security income (year one instead of year five), which employs the theory of the time value of money. Also, the annulment of debt upon the decease of the owner reduces the estate value and thus minimizes estate taxes, small though they may be. Lastly, it provides a steady and yet not burdensome income for the owner.

The least preferred method was Scenario 10 (will, LTB, and cash gifts), which causes significant cash flow strain on the business. This is because although the 8,000 acre farm is larger than the 2,500 acre farm it owns less land than even the 2,500 acre farm (320 acres, or 4% of the land farmed); thus already leasing a great deal of its land. Given the assumption that the successor does not begin buying his own equipment until the owner is fully retired, this means that the successor would then have the expenses associated with leasing a full complement of equipment and nearly 8,000 acres of land by year four (right before retirement) of the time horizon. Because the successor's only assets are any cash he has (an amount starting at only $3,000) and his pickup truck one would anticipate significant strains due to the amount of cash flow and very few hard assets to cushion any market fluctuations. The situation worsens when the time comes for the successor to buy in year five, when he begins to purchase his own machinery and all farm land from the owner. This suddenly creates significant debt, in addition to an already cash stressed and previously low owned-asset farm. There would also be more financial strain for this scenario because of the assumption being made that the farm can hire part-time labor to cover the gradual exit of the owner until the owner is over 50% retired. After this, the farm must hire on another full-time employee to cover the owner's decrease in work. This adds another additional expense while the owner is still receiving a share of the income (because he is not fully retired). Furthermore, even in the case the owner dies before the lease agreement is up (five years), and the successor inherits the land, rent already paid to the owner is essentially lost as an expense instead of being deducted from the cost of the land, thus making it a second rate method to other inherit only options. These all combine to make a highly risky scenario.

*TXNP 10,000*

The 10,000 acre farm's most preferred method was a split between Scenario 27 (trust, LLC, and gifting) and Scenario 20 (trust, SCIN, and life insurance). Scenario 27 is preferred more for those ranging from risk neutral to moderately risk averse. For those that are very to extremely risk averse, the preferred method is Scenario 20 (see Figure 5 and Table 4). Scenario 27 includes a conservative gifting strategy. The owner originally gifts 10% of the value of his shares of the LLC to the successor upon startup (year one), then gifts the tax free value of shares each year. Thus, if he lives until year ten, this may prove to significantly lower estate taxes, and decrease other transfer costs. In contrast, if he dies early in the time period (e.g. year two), the owner is not able to gift enough of the estate to lower estate taxes sufficiently to be more preferred than Scenario 20. In Scenario 20, the successor buys the farm land immediately (which is 56% of the value of the farm), before any death event. Thus, even if the owner dies the first year, the successor retains the farm land, reduces the taxable estate, and decreases his liabilities. Consequently, a more risk averse individual (or one that fears early death and its accompanying effects), would prefer Scenario 20 rather than 27. The LTB option (Scenario 23), is the next preferred method after Scenario 20 and 27, as it also employs the use of a self-canceling installment note in the LTB contract. In this case though, it is done later in the time horizon, thus suffering the risk of early death.

The least preferred method was Scenario 4 (will, no Inter-Vivo Transfer method, and outside investors). Land makes up over 56% of the beginning value of this farm and 33% of the acreage farmed. Thus, selling off that value, and having to rent all 10,000 acres is not as profitable as retaining the land. Also, not using any Inter-Vivo Transfer method results in over $1.7 million average estate taxes. These combined make it the least preferred scenario.

*General Observations from Alterations*

When an equal transfer was chosen instead of an equitable transfer, there was an almost certain failure of the farm business. As stated earlier, there was over a 31% average increase in the D/A for the 2,500 acre farm. Even in the most preferred scenario for the equal transfer of assets, the successor's D/A increases from 48% in the first year to over 91% in the tenth year (with a maximum value of 178%), over an 88% increase. Across all farms, there was approximately a two-thirds increase in the D/A of the successor. Simply stated, an equal division of the estate among off-farm heirs and the successor would have hazardous effects upon the farm business. For the 10,000 acre farm, Scenario 20 (trust, SCIN, and life insurance), was most preferred because it immediately removes a large share of the value of the farm from the inheritance to be divided. This reduces leakage from the farm and minimizes the amount the successor would have to buy back from the off-farm inheritors. Concerning when inheritance was fixed for off-farm heirs, the probability of success increased as the farms size increased; partly because the off-farm inheritance plays a smaller and smaller role in the KOV as a percentage of the farm. Thus the leakage factor has a reduced effect.

The washout did not end up assisting the transfer for any of the farms. In fact, the opposite was true, as they all, for the most part, caused the SCIN to drop in the rankings. This was due to two things; the owner would have less cash to live on because he is paying a “lease” payment back to the successor and receiving nothing in return (he’s retired), and unless there already existed a significant amount of cash built up, this would rid the owner of a secure retirement income source, requiring him to pull out short-term debt to cover family living expenses. Secondly, when using the washout the owner must pay income taxes on the interest received from the SCIN payments and the successor must pay income taxes from the lease income. So, though no real income was generated, the IRS would treat it as such, thus increasing income taxes for both the owner and the successor.

The purchase of the land through the bank instead of an SCIN caused the LTB scenarios to drop in the rankings (to varying degrees; after the alteration, Scenario 24 and 10 fell ten places in rankings for the 2,500 acre farm). Thus, to no surprise, it did not help the farm as the liability requires a higher interest rate, would not be annulled upon death of the owner, and would be paid to a third party rather than to the owner (i.e. is not retained in the company in some form). Moreover, the entire capital gains tax must be paid immediately, rather than spread out over several years as would be the case of the self-cancelling installment plan. On the 10,000 acre farm this alteration caused the LTB ranking to become the new least preferred method.

SCIN was usually preferred to LTB for several reasons. One possible reason being that lease income is usually higher than interest income (as recognized by the IRS), and thus taxed at a higher tax bracket rate. In the SCIN method, interest was taxed plus a capital gains tax (spread out over several years, as they are installment payments and not one lump sale) on the payments from the successor to the owner. If the owner had sufficiently low income, he did not have to pay capital gains tax in that year. Thus, depending upon the income for that year, the tax for the SCIN would sometimes be less than the LTB. The capital gains tax is 15-20%, whereas income tax ranges from 10-39.5%. Thus, it is possible that the overall income taxes will be higher for the LTB than for the SCIN. A more likely reason is that in the SCIN scenario, the farmer retired completely in year one. This allowed for earlier drawing of social security income and reduced the labor expense that would be otherwise caused by the gradual retirement of the owner (as discussed in the TXCB 8,000 section of this chapter). When the two methods were put on a "level playing field" (i.e. both using gradual exit rates, but the land still purchased in the first year for the SCIN method) for the 2,500 acre farm, Scenario 7 (will, SCIN, and cash gifts) became the new least preferred method. Scenario 23 (trust, LTB, and life insurance) became the next most preferred method, after Scenarios 15 through 18 (the no Inter-Vivo Transfer methods scenarios). This occurs due to the earlier receipt of social security, the increased likelihood of inheriting rather than paying for it (in the LTB scenario), and the significantly lower cost of lease compared to the installment payments puts less strain upon the successor. This change in results reflects the risk of death and its associated repercussions, and again, the time value of money theory.

Regarding the last alteration, the increased rate of gifting only assists if the farm is predicted to go over the estate value. On the 10,000 acre farm, Scenario 27 (trust, LLC, and share gifting) increased in ranking to always be most preferred when a slightly more aggressive gift plan was chosen (original gifting of 25% and lower yearly percentage of gifting of, e.g.7%). When the gifting strategy was too aggressive (original gift of 33% and yearly gifts of 10%) it began to incur higher and more frequent gift taxes, thus reducing its ranking significantly. Thus, careful planning and wise use of the tax-free amount of gifts allowed for a good method of transferring the farm. Cash gift methods were never ranked high as a transfer plan. As previously discussed, cash gifts reduced the ability of the farm to cushion against dips in the market, and the cash could be better invested elsewhere.

# CHAPTER VII

# CONCLUSIONS AND FURTHER RESEARCH

The objective of this study was to evaluate eight succession methods and their ensuing capital requirements under risk and uncertainty in order to execute an intergenerational farm ownership transfer. This was done in an effort to provide findings that will help lenders, farmers, and successors to effectively plan for future capital needs, examine risk levels inherent in the decision, and compare the feasibility of various transfer methods.

In reference to improvements and additional research, one weakness of this model is the time horizon. Though one may make inferences from the trends caused by the succession, they are by no means conclusive. A longer range study that would be more likely show not only the short-term but also the longer-term impacts would be insightful. This model examined twenty-eight unique combinations of the scenarios; there are obviously more than twenty-eight ways to transfer a farm, with innumerable alterations and slight adjustments that could be made. The intent of the model was not to explain all ways, nor find the "best" method for all farms, but rather an examination and insight into the methods examined for the three given case study farms. However, an examination into more complex trust options, multiple and more complex combinations of the methods discussed (e.g. a trust, LLC, gifting of shares, life insurance, and leasing some assets as one possible scenario) may also be insightful and reveal advantages of these various methods not shown through this limited analysis. Furthermore, all value created from the farm that is not used in paying for expenses and debt remains as cash and only earns a savings account interest rate of return. Thus, a model that included some sort of reinvestment strategy, either through external markets or through acquisition of more land would also be insightful. Another weakness in the model assumes that the successor (and owner) will always be able borrow more capital. A model that addresses the risk of not obtaining capital, or the probability of a lender foreclosing on the farm, should also be examined. Furthermore, these are simply three case scenarios in one state of the U.S. Other states besides Texas do have estate and gift taxes, and so the potential impact should be examined in those states as well. Lastly, this model assumes a young, beginning farmer. It may be of interest to examine the change in effects if the successor is instead a mid-aged farmer with a small operation of his own on the side. This may reduce some of the financial stressors otherwise incurred by the current low asset bearing successor.

In summary, there are many important lessons to be gained from this analysis, but the six key takeaways are:

1) Across all cases of succession methods there is an increase of over 106% in average total debt capital (as compared to no succession over the same time horizon), suggesting financial markets will have a significant role in this process.
2) It is likely that an already stressed loan or business will become more so through the succession process, creating a significant risk of default to the lender, loss of a secure retirement to the owner, and loss of income/career

for the successor. The results also suggest a strong likelihood that lenders can expect at least an initial slight decrease in successor profitability and liquidity ratios. Thus, lenders should be concerned that due diligence has been given to ensure a detailed transfer plan is in place before loans are granted, and that the firm is currently in at least a fairly strong financial position. If there *is* a proper and well thought-out strategic plan in place, the lender can stand to potentially gain much from the process, as shown by the figures above of increased debt levels.

3) Significant and detailed planning of the ability of the company to handle a succession (determined by the transfer method chosen, the goals of the owner and successor, family living expenses, etc.) should be thoroughly examined before it is attempted. There is no one-size fits all or silver bullet. Each farm must examine their specific farm, situation, family and business goals, and other criterion in order to create the most effective succession plan for them.
4) Action should be taken immediately. The effects of an earlier death can have significant, even devastating, impacts upon the financial security of a farm business, if proper planning has not taken place.
5) Avoiding debt or taxes should never be the sole criteria of decision making. The scenario that was consistently the lowest (or among the lowest) in debt capital was never the most preferred method on any of the farms given the KOV of combined NPV, and at times, was one of the

least preferred methods. The same could be said of those scenarios that avoid estate taxes, as they were also not always the most preferred. Though debt and tax management do play a critical role in the decision process, they are not the only factors to consider when transferring a farm. Under current tax laws, many farms may be able to avoid inheritance taxes altogether with proper planning. This makes straight gifting (an entire farm, or large portions of the shares, not cash) and inheriting one of the better options for many if they solely want to increase combined NPV, or value of the inherited farm business.

6) One of the more critical considerations is the goal of the owner. If the owner decides to transfer the farm equally, or to sell the entire farm to their heir at full value, or any other method that puts significant cash flow stress upon the business, they may put their inheritance and the future of their family farm in greater jeopardy than by using a more cost/successor friendly method.

A balance must be sought between benefit to the owner and successor. Deciding upon a method, creating a plan for carrying out the succession process, and moving forward with it as soon as possible is thus the crux of the situation. There are tools, individuals, and ways to make the succession process successful and profitable, but proper planning and immediate action is a must to maximize the benefits of them all.

REFERENCES

Anderson, J.R. and J.L. Dillon. "Risk Analysis in Dryland Farming Systems." Farming Systems Management Series No. 2, FAO, Rome, 1992.

Arrow, K.J. 1971. *Essays in the Theory of Risk Bearing*. Chicago: Markham Publishing Co.

Baker, J., M. Duffy, and A. Lamberti. 2001. "Farm Succession in Iowa." Beginning Farmer Center, Iowa State University. Ames, IA.

Baker, J.R. and E. Epley. 2009. "Iowa Farmers Business and Transfer Plans." Beginning Farmer Center, Iowa State University. Ames, IA.

Barnes, L.B., and S.A. Hershon. 1994. "Transferring Power in the Family Business." *Family Business Review* 7(4):377-392.

Becker, G.S. 1974. "A Theory of Social Interactions." *The Journal of Political Economy* 82(6):1063-1093.

Bernheim, B.D., A. Shleifer, and L.H. Summers. 1985. "The Strategic Bequest Motive." *Journal of Political Economy* 93(6):1045-1076.

Beyond Quotes. 2013. "Compare Plans." Available at http://www.beyondquotes.com/ (accessed July 25, 2013).

Bjuggren, P. and L. Sund. 2001. "Strategic Decision Making in Intergenerational Successions of Small- and Medium-Size Family-Owned Businesses." *Family Business Review* 14(1):11-23.

Boehlje, M.D., and L.M. Eisgruber. 1972. "Strategies for the Creation and Transfer of the Farm Estate." *American Journal of Agricultural Economics* 54(3):461-472.

Boehlje, M. 1973. "The Entry-Growth-Exit Processes in Agriculture." *Southern Journal of Agricultural Economics* 5(1):23-26.

Calus, M., G.V. Huylenbroeck, and D.V. Lierde. 2008. "The Relationship between Farm Succession and Farm Assets on Belgian Farms." *Sociologia Ruralis* 48(1):38-56.

Cox, D. and M.R. Rank. 1992. "Inter-Vivos Transfers and Intergenerational Exchange." *The Review of Economics and Statistics* 74(2):305-314.

Dana, L.E., and K.X. Smyrnios. 2010. "Family Business Best Practices: Where From and Where To?" *Journal of Family Business Strategy* 1(1): 40-53.

Dobbins, C.L. 1978. "The Intergenerational Transfer of the Farm Firm: A Recursive Goal Programming Analysis." PhD dissertation, Oklahoma State University.

Dobbins, C.L., and H.P. Mapp. 1982. "A Comparison of Objective Function Structures Used in a Recursive Goal Programming-Simulations Model of Farm Growth." *Southern Journal of Agricultural Economics* 14:9-16.

Exelis. n.d. "SURFACE Procedure (Exelis VIS Product Documentation Center)." Available at http://www.exelisvis.com/docs/SURFACE_Procedure.html (accessed July 23, 2013).

Ferrell, S.L. and R. Jones. 2013. "Legal Issues Affecting Farm Transition." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Franzen, N. 2013. "Transitions in Agriculture: Implications for Research, Data Development, and Policy Analysis." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Freund, R.J. 1956. "The Introduction of Risk into a Programming Model." *Econometrica*, 24(3):253-261.

Gasson, R. and A.J. Errington. 1993. *The Farm Family Business*. Wallingford: CAB International.

Glauben, T., H. Tietje, and C. Weiss. 2004. "Succession in Agriculture: A Probit and a Competing Risk Analysis." Paper presented at annual Meeting of the American Agricultural Economist Association, Denver, CO, 1-4 August.

Haberman, H., and S.M. Danes. 2007. "Father-Daughter and Father-Son Family Business Management Transfer Comparison: Family FIRO Model Application." *Family Business Review* 20(2):163-184.

Hadar, J. and W.R. Russell. 1969. "Rules for Obtaining Uncertain Prospects." *American Economic Review*, 59(1):25-34.

Hardaker, J.B., R.B.M. Hurine, J.R. Anderson, and G. Lien. 2004. *Coping with Risk in Agriculture*, Second Edition. Cambridge: CABI Publishing.

Hardaker, J.B., J.W. Richardson, G. Lien, and K.D. Schumann. 2004. "Stochastic Efficiency Analysis with Risk Aversion Bounds: A Simplified Approach." *The Australian Journal of Agricultural and Resource Economics* 48(2):253-270.

Hoeven, G. 2013. "Tax Policies that Impact Farm Transition." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 201-21 March.

Inman, R.L., J.M. Davenport, and D.K. Zeigler. 1980. "Latin Hypercube Sampling (a Program User's Guide)." Technical Report SAND 79-1473, Sandia Laboratories, Albuquerque, NM.

Inwood, S. 2013. "Social Forces and Cultural Factors Impacting Farm Transition." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Kauffman, N.S. 2013. "Credit Conditions for Young and Beginning Farmers." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Keating, N.C. and B. Munro. 1989. "Transferring the Family Farm: Process and Implications." *Family Relations* 38(2):215-219.

Kimhi, A. 1995. "Differential Human Capital Investments and the Choice of Successor in Family Farms." *American Journal of Agricultural Economics* 77(3):719-724.

Kimhi, A. and N. Nachlieli. 2001. "Intergenerational Succession on Israeli Family Farms." *Journal of Agricultural Economics* 52(2):42-58.

Knight, T.O. and J.W. Richardson. 1985. "Impact of Including an Additional Family in a Farming Operation on Firm Viability and Income." *Journal of the American Society of Farm Managers and Rural Appraisers* 49(2): 5-11.

Koenig, S.R. and J.L. Johansen. 2013. "Transitions in Agriculture: Perspective on the Farm Credit System." Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Kohl, D. and T. Wilson. 2004. “Understanding Key Financial Ratios and Benchmarks.” *Northwest Farm Credit Services,* Spokane, WA.

Laird Norton Tyee Northwest Family Business Survey. 2008. Available at http://www.wealthcounselforums.com/uploaded_files/state_group_file/25/173-FmBusSurv.08.pdf (Accessed July 25, 2013).

Lange, K.Y., J.W. Johnson, D. Hudson, P.N. Johnson, and B. Gustafson. 2011. “Equal or Just? Intergenerational Allocations within Family Farm Businesses.” Paper presented at annual meeting for Southern Agricultural Economics Association, Corpus Christi, TX, 5-8 February.

Meyer, J. 1977. “Choice Among Distributions.” *Journal of Economic Theory*, 14(2):326-336.

Mishra, A.K., H.S. El-Osta, and S. Shaik. 2010. “Succession Decisions in U.S. Family Farm Businesses.” *Journal of Agricultural and Resource Economics* 35(1):133–152.

Mjelde, J.W. and M.J. Cochran. 1988. “Obtaining Lower and Upper Bounds on the Value of Seasonal Climate Forecasts as a Function of Risk Preferences.” *Western Journal Agricultural Economics* 13(2):285-293.

Morris, M.H., R.O. Williams, J.A. Allen, and R.A. Avila. 1997. “Correlates of Success in Family Business Transitions.” *Journal of Business Venturing* 12(5):385-401.

Nickersen, C. 2012. *Trends in Major Land Uses*. Washington DC: U.S. Department of Agriculture. Available at http://www.ers.usda.gov/topics/farm-economy/land-use,-land-value-tenure/background.aspx#.UUuGwly9KSP/ (accessed November 27, 2012)

Peel, D.S. 2013. “Future U.S. Agricultural Production at Stake: The Challenge of Agricultural Producer Transition.” Paper presented at Data Development and Policy Analysis Conference, Washington, D.C., 20-21 March.

Pratt, J.W. 1964.“Risk Aversion in the Small and the Large.” *Econometrica* 32(1):122-136.

Richardson, J.W. 2008. Simulation for Applied Risk Management. College Station: Texas A&M University.

Richardson, J.W., C.M. Lemieux, and C.J. Nixon. 1983. “Entry into Farming: The Effects of Leasing and Leverage on Firm Survival.” *Southern Journal of Agricultural Economics* 15(2):139-145.

Richardson, J.W. and H.P. Mapp Jr. 1976. “Use of Probabilistic Cash Flows in Analyzing Investments Under Conditions of Risk and Uncertainty.” *Southern Journal of Agricultural Economics* 8(2):19-24.

Richardson, J.W. and C.J. Nixon. 1984. “The Effects of the 1980, 1981, and 1982 Tax Laws on Texas Rice Farmers.” *Southern Journal of Agricultural Economics* 16(1):137-144.

Richardson, J.W., O.L Outlaw, G.M. Knapek, J.M. Raulston, B.K. Herbst, D.P. Anderson, and S.L. Klose. 2013. "Representative Farms Economic Outlook for the January 2013 FAPRI/AFPC Baseline." Agricultural and Food Policy Center, Briefing Paper 13-1, Texas A&M University. Available at http://www.afpc.tamu.edu/pubs/3/590/Briefing%20Paper%2013-1%20to%20post%20to%20web.pdf (accessed May 5, 2013).

Robison, L. J., and P. J. Barry. 1996. *Present Value Models and Investment Analysis*. Northport AL: Academic Page.

Roush, C.E. 1978. "Economic Evaluation of Asset Ownership Transfer Methods and Family Farm Business Arrangements after the Tax Reform Act of 1976." PhD dissertation, Oklahoma State University.

Roush, C.E., H.P. Mapp, and C.D. Maynard. 1979. "Implications of the Tax Reform Act of 1976 for Farm Estate Planning." *Western Journal of Agricultural Economics* 4(2):133-146.

Taylor, J.E. and J.E. Norris. 2000. "Sibling Relationships, Fairness, and Conflict over Transfer of the Farm." *Family Relations* 49(3):277-283.

Von Neumann, J., and O. Morgenstern. 1944. *Theory of Games and Economic Behavior*. Princeton University Press.

U.S. Department of Agriculture, Economic Research Service. 2013. *Many Farm Operators are Retirement Age.* Available at http://www.ers.usda.gov/data-products/chart-gallery/detail.aspx?chartId=34780&ref=collection#.UVCMY49KK3 (accessed July 25, 2013).

U.S. Department of Agriculture, Economic Research Service. 2011. Agricultural Resource Management Survey Farm Financial and Crop Production Practices.

Available at www.ers.usda.gov/datafiles/Farm_Household_Income/table09.xls (accessed July 25, 2013).

U.S. Department of the Treasury, Internal Revenue Service. 2005. *Section 691.-Recipients of Income in Respect of Decedents*. Available at http://www.irs.gov/pub/irs-drop/rr-05-30.pdf. (accessed July 26, 2013).

U.S. Department of the Treasury, Internal Revenue Service. n.d. *Internal Revenue Service*. n.d..Available at http://www.irs.gov (accessed July 25, 2013).

U.S. Social Security Administration. 2009. *Actuarial Life Table*. Available at http://www.ssa.gov/oact/STATS/table4c6.html (accessed July 25, 2013).

Westhoff, P., S. Gerlt, J. Whistance, J. Binfield, and W. Thompson. 2013. "U.S. Baseline Briefing Book Projections for Agricultural and Biofuel Markets." Food and Agricultural Policy Research Institute, FAPRI-MU Report #01-13, University of Missouri. Available at http://www.fapri.missouri.edu/outreach/publications/2013/FAPRI_MU_Report_01_13.pdf (accessed May 5, 2013).

Window on State Government. 2013. *Overview of Texas Taxes*. Available at http://www.window.state.tx.us/taxes/ (accessed July 30, 2013).

APPENDIX

**Table 8. Statistics for Potato Forecast**

| Exponential Smoothing Forecast | |
|---|---|
| Level Smoothing Constant | 0.2904 |
| Dampening Parameter | 1.0454 |
| Periods in Season | 3 |
| Additive Trend Method | |
| Multiplicative Seasonal Method | |
| Confidence Level for P.I.s | 95% |
| Mean Abs. Percent Error | 10.462 |
| Median Abs. Percent Error | 8.649 |
| Weighted Abs. Percent Error | 9.934 |
| Theil's U2 Statistic | 0.123 |
| Root Mean Squared Error | 0.818 |
| Mean Abs. Error | 0.648 |

## Table 9. Combined NPV for TXCB2500, Base Assumptions Model

| Summary Statistics | | | | | | |
|---|---|---|---|---|---|---|
| | Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
| 1 | NPV: 1 | -129,202.02 | 446,250.85 | -345.39 | -0.10 | -1,657,089.59 |
| 2 | NPV: 2 | -49,751.62 | 406,648.37 | -817.36 | -0.11 | -1,245,382.95 |
| 3 | NPV: 3 | -170,622.04 | 418,115.25 | -245.05 | -0.25 | -1,657,089.59 |
| 4 | NPV: 4 | -152,742.65 | 454,343.83 | -297.46 | -0.08 | -1,677,571.56 |
| 5 | NPV: 5 | -375,570.78 | 421,284.03 | -112.17 | 0.02 | -1,654,801.03 |
| 6 | NPV: 6 | -303,286.15 | 440,128.50 | -145.12 | -0.01 | -1,562,328.95 |
| 7 | NPV: 7 | -455,140.36 | 414,811.98 | -91.14 | -0.01 | -1,654,801.03 |
| 8 | NPV: 8 | -380,031.24 | 421,141.11 | -110.82 | 0.03 | -1,666,765.84 |
| 9 | NPV: 9 | -304,537.28 | 436,160.38 | -143.22 | -0.01 | -1,546,598.59 |
| 10 | NPV: 10 | -403,313.20 | 410,754.07 | -101.84 | 0.00 | -1,666,765.84 |
| 11 | NPV: 11 | -453,252.86 | 433,767.57 | -95.70 | 0.02 | -1,772,163.11 |
| 12 | NPV: 12 | -434,299.64 | 423,034.86 | -97.41 | -0.04 | -1,657,726.69 |
| 13 | NPV: 13 | -437,848.03 | 447,038.06 | -102.10 | -0.42 | -3,170,277.31 |
| 14 | NPV: 14 | -462,942.08 | 427,875.08 | -92.43 | 0.08 | -1,708,395.34 |
| 15 | NPV: 15 | -118,168.88 | 440,928.63 | -373.13 | -0.10 | -1,616,807.48 |
| 16 | NPV: 16 | -34,458.83 | 410,440.91 | -1,191.11 | -0.12 | -1,247,667.12 |
| 17 | NPV: 17 | -159,001.67 | 413,385.68 | -259.99 | -0.24 | -1,616,807.48 |
| 18 | NPV: 18 | -143,268.44 | 448,527.42 | -313.07 | -0.08 | -1,639,661.50 |
| 19 | NPV: 19 | -375,042.38 | 420,699.54 | -112.17 | 0.02 | -1,642,116.87 |
| 20 | NPV: 20 | -298,124.07 | 442,956.00 | -148.58 | -0.01 | -1,563,747.56 |
| 21 | NPV: 21 | -454,403.63 | 414,612.54 | -91.24 | -0.01 | -1,642,116.87 |
| 22 | NPV: 22 | -376,877.81 | 420,308.46 | -111.52 | 0.04 | -1,624,750.71 |
| 23 | NPV: 23 | -296,993.78 | 441,575.87 | -148.68 | 0.01 | -1,548,848.37 |
| 24 | NPV: 24 | -399,753.09 | 410,048.09 | -102.58 | 0.01 | -1,624,750.71 |
| 25 | NPV: 25 | -440,947.62 | 430,703.85 | -97.68 | 0.01 | -1,721,718.07 |
| 26 | NPV: 26 | -422,827.77 | 427,010.99 | -100.99 | -0.05 | -1,660,169.69 |
| 27 | NPV: 27 | -426,567.87 | 433,294.79 | -101.58 | -0.08 | -2,071,479.23 |
| 28 | NPV: 28 | -452,614.96 | 424,327.69 | -93.75 | 0.07 | -1,661,539.44 |

## Table 10. Combined NPV for TXCB8000, Base Assumptions Model

Summary Statistics

| | Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
|---|---|---|---|---|---|---|
| 1 | NPV: 1 | 434,779.91 | 1,104,407.85 | 254.02 | 0.02 | -3,321,085.60 |
| 2 | NPV: 2 | 493,879.21 | 1,081,510.92 | 218.98 | 0.06 | -2,912,697.52 |
| 3 | NPV: 3 | 284,910.78 | 1,101,111.02 | 386.48 | 0.04 | -3,252,751.05 |
| 4 | NPV: 4 | 407,298.36 | 1,105,934.05 | 271.53 | 0.03 | -3,324,080.99 |
| 5 | NPV: 5 | 350,073.02 | 1,120,957.75 | 320.21 | -0.01 | -3,318,443.31 |
| 6 | NPV: 6 | 425,704.67 | 1,122,684.12 | 263.72 | 0.00 | -2,907,304.22 |
| 7 | NPV: 7 | 240,344.46 | 1,101,641.40 | 458.36 | 0.01 | -3,196,891.33 |
| 8 | NPV: 8 | 230,166.60 | 1,127,583.31 | 489.90 | 0.04 | -3,465,249.56 |
| 9 | NPV: 9 | 306,382.94 | 1,128,371.04 | 368.29 | 0.05 | -3,054,942.79 |
| 10 | NPV: 10 | 106,987.47 | 1,124,196.77 | 1,050.77 | 0.05 | -3,345,943.96 |
| 11 | NPV: 11 | 179,316.02 | 1,082,859.02 | 603.88 | 0.02 | -3,467,922.49 |
| 12 | NPV: 12 | 175,150.15 | 1,064,605.70 | 607.82 | 0.03 | -3,324,163.19 |
| 13 | NPV: 13 | 234,574.14 | 1,108,612.36 | 472.61 | 0.04 | -3,442,273.58 |
| 14 | NPV: 14 | 150,159.74 | 1,087,911.92 | 724.50 | 0.04 | -3,421,781.21 |
| 15 | NPV: 15 | 459,638.64 | 1,097,734.75 | 238.83 | 0.03 | -3,248,868.61 |
| 16 | NPV: 16 | 522,531.99 | 1,080,844.37 | 206.85 | 0.06 | -2,826,399.62 |
| 17 | NPV: 17 | 310,596.79 | 1,098,838.32 | 353.78 | 0.03 | -3,176,181.14 |
| 18 | NPV: 18 | 431,348.46 | 1,098,406.82 | 254.64 | 0.04 | -3,254,343.00 |
| 19 | NPV: 19 | 354,050.80 | 1,119,990.46 | 316.34 | -0.01 | -3,318,468.75 |
| 20 | NPV: 20 | 433,819.52 | 1,123,564.42 | 258.99 | -0.01 | -2,893,248.76 |
| 21 | NPV: 21 | 245,260.43 | 1,101,546.27 | 449.13 | 0.01 | -3,188,464.71 |
| 22 | NPV: 22 | 244,373.44 | 1,125,922.76 | 460.74 | 0.04 | -3,415,208.82 |
| 23 | NPV: 23 | 324,669.66 | 1,130,983.36 | 348.35 | 0.05 | -2,990,821.14 |
| 24 | NPV: 24 | 121,536.41 | 1,125,169.20 | 925.79 | 0.05 | -3,287,525.29 |
| 25 | NPV: 25 | 215,904.72 | 1,072,604.08 | 496.80 | 0.02 | -3,371,351.50 |
| 26 | NPV: 26 | 209,926.40 | 1,057,906.02 | 503.94 | 0.02 | -3,228,886.60 |
| 27 | NPV: 27 | 267,386.20 | 1,102,197.46 | 412.21 | 0.04 | -3,361,205.21 |
| 28 | NPV: 28 | 186,091.10 | 1,076,362.32 | 578.41 | 0.04 | -3,328,354.51 |

**Table 11. Combined NPV for TXCB10000, Base Assumptions Model**

Summary Statistics

| | Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
|---|---|---|---|---|---|---|
| 1 | NPV: 1 | 2,492,510.54 | 2,504,460.96 | 100.48 | -0.32 | -5,438,289.44 |
| 2 | NPV: 2 | 2,505,497.57 | 2,433,578.68 | 97.13 | -0.30 | -5,322,948.67 |
| 3 | NPV: 3 | 2,052,781.81 | 2,256,998.89 | 109.95 | -0.23 | -5,314,483.12 |
| 4 | NPV: 4 | 2,008,965.42 | 2,881,787.84 | 143.45 | -0.30 | -6,090,022.69 |
| 5 | NPV: 5 | 4,067,185.09 | 2,040,309.34 | 50.17 | -0.07 | -2,780,331.88 |
| 6 | NPV: 6 | 4,143,798.65 | 2,045,592.98 | 49.37 | -0.06 | -2,659,183.49 |
| 7 | NPV: 7 | 3,626,836.68 | 2,044,151.68 | 56.36 | -0.01 | -2,515,175.49 |
| 8 | NPV: 8 | 3,953,539.46 | 2,187,594.34 | 55.33 | -0.14 | -3,093,054.91 |
| 9 | NPV: 9 | 4,009,893.89 | 2,165,427.55 | 54.00 | -0.10 | -2,845,730.77 |
| 10 | NPV: 10 | 3,515,931.87 | 2,120,208.50 | 60.30 | -0.03 | -3,038,801.21 |
| 11 | NPV: 11 | 3,770,308.71 | 3,824,126.20 | 101.43 | -0.42 | -4,675,689.59 |
| 12 | NPV: 12 | 3,749,454.13 | 3,796,997.42 | 101.27 | -0.41 | -4,668,330.41 |
| 13 | NPV: 13 | 4,231,308.25 | 3,521,905.34 | 83.23 | -0.36 | -3,810,009.91 |
| 14 | NPV: 14 | 3,222,602.54 | 4,444,861.62 | 137.93 | -0.42 | -7,366,436.04 |
| 15 | NPV: 15 | 2,588,121.18 | 2,419,823.64 | 93.50 | -0.30 | -5,181,755.99 |
| 16 | NPV: 16 | 2,605,399.34 | 2,349,521.39 | 90.18 | -0.28 | -5,055,966.86 |
| 17 | NPV: 17 | 2,147,321.57 | 2,188,408.96 | 101.91 | -0.20 | -5,063,028.81 |
| 18 | NPV: 18 | 2,096,794.44 | 2,789,896.39 | 133.06 | -0.28 | -5,842,045.52 |
| 19 | NPV: 19 | 4,092,539.10 | 2,036,137.76 | 49.75 | -0.07 | -2,671,224.61 |
| 20 | NPV: 20 | 4,173,151.87 | 2,044,571.08 | 48.99 | -0.06 | -2,539,763.98 |
| 21 | NPV: 21 | 3,650,701.55 | 2,046,464.69 | 56.06 | -0.01 | -2,466,109.03 |
| 22 | NPV: 22 | 4,005,390.61 | 2,158,287.78 | 53.88 | -0.11 | -2,864,412.42 |
| 23 | NPV: 23 | 4,065,552.70 | 2,138,673.21 | 52.60 | -0.07 | -2,603,250.00 |
| 24 | NPV: 24 | 3,566,784.42 | 2,102,383.88 | 58.94 | 0.00 | -2,809,811.49 |
| 25 | NPV: 25 | 3,900,448.18 | 3,669,023.55 | 94.07 | -0.40 | -4,333,178.45 |
| 26 | NPV: 26 | 3,880,977.68 | 3,640,631.06 | 93.81 | -0.40 | -4,322,492.91 |
| 27 | NPV: 27 | 4,346,964.71 | 3,388,681.57 | 77.96 | -0.35 | -3,662,697.67 |
| 28 | NPV: 28 | 3,351,484.79 | 4,289,063.13 | 127.98 | -0.42 | -7,218,818.59 |

**Table 12. Combined NPV for TXCB2500, Alteration 1**[6]

Summary Statistics

| Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
|---|---|---|---|---|---|
| 1 NPV: 1 | -401,616.19 | 656,894.50 | -163.56 | -0.31 | -2,122,398.80 |
| 2 NPV: 2 | -305,727.82 | 485,249.10 | -158.72 | -0.04 | -1,601,641.53 |
| 3 NPV: 3 | -447,870.62 | 619,935.76 | -138.42 | -0.42 | -2,122,398.80 |
| 4 NPV: 4 | -384,032.65 | 636,074.05 | -165.63 | -0.29 | -2,134,036.03 |
| 5 NPV: 5 | -393,507.54 | 428,206.56 | -108.82 | -0.03 | -1,525,394.39 |
| 6 NPV: 6 | -316,818.00 | 431,257.75 | -136.12 | 0.03 | -1,585,604.76 |
| 7 NPV: 7 | -506,068.92 | 417,332.13 | -82.47 | 0.02 | -1,657,766.24 |
| 8 NPV: 8 | -475,355.85 | 530,788.92 | -111.66 | -0.63 | -2,110,592.32 |
| 9 NPV: 9 | -392,393.68 | 464,839.48 | -118.46 | -0.13 | -1,613,752.44 |
| 10 NPV: 10 | -501,200.67 | 516,205.56 | -102.99 | -0.68 | -2,110,592.32 |
| 11 NPV: 11 | -692,077.03 | 599,062.27 | -86.56 | -0.22 | -2,390,986.42 |
| 12 NPV: 12 | -765,267.58 | 573,044.04 | -74.88 | -0.16 | -2,402,410.62 |
| 13 NPV: 13 | -618,263.03 | 543,679.53 | -87.94 | -0.24 | -2,191,038.39 |
| 14 NPV: 14 | -689,473.88 | 577,279.84 | -83.73 | -0.12 | -2,312,743.23 |
| 15 NPV: 15 | -397,955.08 | 650,778.45 | -163.53 | -0.31 | -2,104,737.78 |
| 16 NPV: 16 | -297,070.03 | 476,512.29 | -160.40 | -0.02 | -1,566,434.07 |
| 17 NPV: 17 | -443,594.70 | 614,094.08 | -138.44 | -0.41 | -2,104,737.78 |
| 18 NPV: 18 | -380,580.82 | 630,244.26 | -165.60 | -0.28 | -2,118,938.99 |
| 19 NPV: 19 | -393,521.84 | 427,584.83 | -108.66 | -0.03 | -1,522,025.90 |
| 20 NPV: 20 | -311,938.73 | 433,417.02 | -138.94 | 0.03 | -1,587,023.37 |
| 21 NPV: 21 | -506,838.48 | 417,213.63 | -82.32 | 0.02 | -1,659,184.85 |
| 22 NPV: 22 | -474,372.46 | 526,893.94 | -111.07 | -0.61 | -2,092,939.94 |
| 23 NPV: 23 | -386,457.18 | 462,568.56 | -119.69 | -0.10 | -1,582,782.38 |
| 24 NPV: 24 | -499,894.23 | 512,186.58 | -102.46 | -0.66 | -2,092,939.94 |
| 25 NPV: 25 | -699,763.77 | 589,000.02 | -84.17 | -0.16 | -2,320,846.54 |
| 26 NPV: 26 | -752,062.23 | 557,430.05 | -74.12 | -0.12 | -2,332,541.80 |
| 27 NPV: 27 | -608,093.64 | 531,434.40 | -87.39 | -0.20 | -2,131,591.70 |
| 28 NPV: 28 | -676,395.54 | 561,733.71 | -83.05 | -0.09 | -2,245,214.15 |

[6] Alteration one is a change from the base model in assuming that there is an equal inheritance rather than equitable.

**Table 13. Combined NPV for TXCB8000, Alteration 1**

| Summary Statistics | | | | | | |
|---|---|---|---|---|---|---|
| | Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
| 1 | NPV: 1 | -93,727.56 | 1,424,129.33 | -1,519.43 | -0.21 | -4,884,324.27 |
| 2 | NPV: 2 | -8,647.10 | 1,297,035.76 | -14,999.66 | -0.13 | -4,452,247.57 |
| 3 | NPV: 3 | -649,051.27 | 1,246,927.46 | -192.12 | -0.12 | -5,048,810.45 |
| 4 | NPV: 4 | -91,120.11 | 1,420,061.06 | -1,558.45 | -0.20 | -4,817,345.19 |
| 5 | NPV: 5 | 281,823.88 | 1,157,078.98 | 410.57 | -0.06 | -3,255,824.13 |
| 6 | NPV: 6 | 361,264.93 | 1,137,633.09 | 314.90 | -0.02 | -2,852,489.75 |
| 7 | NPV: 7 | -34,757.35 | 1,122,181.61 | -3,228.62 | -0.02 | -3,533,769.89 |
| 8 | NPV: 8 | -68,871.47 | 1,272,062.14 | -1,847.01 | -0.15 | -4,528,994.95 |
| 9 | NPV: 9 | 25,755.06 | 1,197,337.91 | 4,648.94 | -0.05 | -4,094,999.55 |
| 10 | NPV: 10 | -422,962.16 | 1,197,267.27 | -283.07 | -0.11 | -4,815,002.99 |
| 11 | NPV: 11 | -664,202.01 | 1,711,401.03 | -257.66 | -0.19 | -5,355,882.64 |
| 12 | NPV: 12 | -706,468.67 | 1,693,438.73 | -239.70 | -0.18 | -5,336,623.72 |
| 13 | NPV: 13 | -459,384.19 | 1,570,257.72 | -341.82 | -0.13 | -4,982,226.47 |
| 14 | NPV: 14 | -661,745.09 | 1,705,264.77 | -257.69 | -0.18 | -5,262,985.69 |
| 15 | NPV: 15 | -83,986.99 | 1,414,071.88 | -1,683.68 | -0.20 | -4,858,433.33 |
| 16 | NPV: 16 | 5,399.07 | 1,285,738.28 | 23,814.06 | -0.13 | -4,412,275.72 |
| 17 | NPV: 17 | -639,552.22 | 1,239,169.60 | -193.76 | -0.12 | -5,024,650.48 |
| 18 | NPV: 18 | -81,526.06 | 1,410,125.84 | -1,729.66 | -0.19 | -4,791,454.25 |
| 19 | NPV: 19 | 283,906.65 | 1,154,890.68 | 406.79 | -0.06 | -3,253,993.87 |
| 20 | NPV: 20 | 367,570.25 | 1,136,200.74 | 309.11 | -0.02 | -2,836,578.58 |
| 21 | NPV: 21 | -33,570.56 | 1,120,787.31 | -3,338.60 | -0.02 | -3,531,949.93 |
| 22 | NPV: 22 | -63,033.31 | 1,266,040.46 | -2,008.53 | -0.14 | -4,510,477.94 |
| 23 | NPV: 23 | 35,911.96 | 1,191,327.20 | 3,317.35 | -0.04 | -4,062,401.64 |
| 24 | NPV: 24 | -418,210.37 | 1,192,867.01 | -285.23 | -0.10 | -4,796,687.19 |
| 25 | NPV: 25 | -622,521.36 | 1,664,729.35 | -267.42 | -0.17 | -5,256,240.04 |
| 26 | NPV: 26 | -666,483.62 | 1,648,588.64 | -247.36 | -0.15 | -5,238,299.61 |
| 27 | NPV: 27 | -422,038.15 | 1,531,840.88 | -362.96 | -0.11 | -4,898,600.83 |
| 28 | NPV: 28 | -620,774.54 | 1,659,145.54 | -267.27 | -0.15 | -5,163,343.09 |

**Table 14. Combined NPV for TXCB10000, Alteration 1**

| Summary Statistics | | | | | | |
|---|---|---|---|---|---|---|
| | Name | Mean | Std Dev | Coef Var | Skewness | Minimum |
| 1 | NPV: 1 | -27,526.78 | 5,342,324.97 | -19,407.74 | -0.57 | -12,397,184.44 |
| 2 | NPV: 2 | 35,244.45 | 5,178,448.89 | 14,692.95 | -0.57 | -12,135,151.28 |
| 3 | NPV: 3 | -495,536.63 | 4,991,802.60 | -1,007.35 | -0.56 | -12,317,789.30 |
| 4 | NPV: 4 | -131,184.24 | 5,407,047.77 | -4,121.72 | -0.51 | -12,314,460.64 |
| 5 | NPV: 5 | 3,614,550.65 | 2,264,135.94 | 62.64 | -0.34 | -5,940,935.26 |
| 6 | NPV: 6 | 3,707,638.76 | 2,222,578.31 | 59.95 | -0.32 | -5,737,988.07 |
| 7 | NPV: 7 | 3,147,841.96 | 2,169,861.51 | 68.93 | -0.25 | -5,814,307.10 |
| 8 | NPV: 8 | 2,698,798.08 | 3,561,538.69 | 131.97 | -1.12 | -11,085,057.74 |
| 9 | NPV: 9 | 2,793,755.27 | 3,444,663.34 | 123.30 | -1.11 | -10,645,691.19 |
| 10 | NPV: 10 | 2,234,493.51 | 3,357,273.57 | 150.25 | -1.12 | -11,062,372.86 |
| 11 | NPV: 11 | -1,166,927.47 | 10,087,752.95 | -864.47 | -0.57 | -18,377,486.71 |
| 12 | NPV: 12 | -1,204,715.94 | 10,077,499.15 | -836.50 | -0.57 | -18,385,859.69 |
| 13 | NPV: 13 | -81,970.24 | 8,919,326.61 | -10,881.18 | -0.54 | -15,145,160.74 |
| 14 | NPV: 14 | -1,234,932.58 | 10,135,927.65 | -820.77 | -0.55 | -18,072,243.00 |
| 15 | NPV: 15 | 9,438.65 | 5,295,225.50 | 56,101.50 | -0.57 | -12,284,454.95 |
| 16 | NPV: 16 | 76,619.75 | 5,126,419.37 | 6,690.73 | -0.57 | -12,010,881.38 |
| 17 | NPV: 17 | -459,972.26 | 4,947,163.60 | -1,075.54 | -0.56 | -12,210,091.02 |
| 18 | NPV: 18 | -96,307.96 | 5,361,711.09 | -5,567.26 | -0.51 | -12,204,666.45 |
| 19 | NPV: 19 | 3,627,517.97 | 2,256,872.09 | 62.22 | -0.34 | -5,902,406.43 |
| 20 | NPV: 20 | 3,724,645.08 | 2,215,753.06 | 59.49 | -0.32 | -5,689,011.14 |
| 21 | NPV: 21 | 3,158,677.33 | 2,165,661.20 | 68.56 | -0.25 | -5,780,208.71 |
| 22 | NPV: 22 | 2,720,927.65 | 3,532,232.79 | 129.82 | -1.11 | -10,955,511.94 |
| 23 | NPV: 23 | 2,819,987.22 | 3,412,478.10 | 121.01 | -1.10 | -10,499,743.16 |
| 24 | NPV: 24 | 2,254,773.97 | 3,329,901.45 | 147.68 | -1.11 | -10,933,929.29 |
| 25 | NPV: 25 | -1,012,985.42 | 9,886,906.02 | -976.02 | -0.57 | -17,915,077.46 |
| 26 | NPV: 26 | -1,048,904.42 | 9,874,416.73 | -941.40 | -0.57 | -17,919,371.19 |
| 27 | NPV: 27 | 54,199.15 | 8,742,519.82 | 16,130.36 | -0.54 | -14,737,079.68 |
| 28 | NPV: 28 | -1,090,936.60 | 9,946,073.37 | -911.70 | -0.54 | -17,609,801.98 |

**Table 15. Combined NPV for TXCB2500, Alteration 2**

| | Summary Statistics | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 19)** | $ (401,951) | $ 385,715 | -95.961 | $ (1,625,393) | $ 611,588 |
| **Alt (Scen 20)** | $ (319,054) | $ 415,911 | -130.357 | $ (1,503,680) | $ 868,038 |
| **Alt (Scen 21)** | $ (402,954) | $ 385,439 | -95.653 | $ (1,625,393) | $ 611,588 |
| **Alt (Scen 22)** | $ (569,866) | $ 431,292 | -75.683 | $ (2,009,807) | $ 637,814 |
| **Alt (Scen 23)** | $ (491,162) | $ 428,796 | -87.302 | $ (1,707,167) | $ 567,651 |
| **Alt (Scen 24)** | $ (631,601) | $ 415,350 | -65.761 | $ (2,009,807) | $ 497,035 |

[7]

**Table 16. Combined NPV for TXCB8000, Alteration 2**

| | Summary Statistics | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 19)** | $ 326,915 | $ 1,097,971 | 335.858 | $ (3,295,828) | $ 3,606,837 |
| **Alt (Scen 20)** | $ 407,613 | $ 1,102,531 | 270.485 | $ (2,868,851) | $ 3,558,487 |
| **Alt (Scen 21)** | $ 192,443 | $ 1,083,635 | 563.093 | $ (3,166,291) | $ 3,365,739 |
| **Alt (Scen 22)** | $ 194,634 | $ 1,141,422 | 586.446 | $ (3,578,967) | $ 3,581,054 |
| **Alt (Scen 23)** | $ 276,484 | $ 1,141,643 | 412.915 | $ (3,154,579) | $ 3,531,709 |
| **Alt (Scen 24)** | $ 79,242 | $ 1,132,706 | 1429.422 | $ (3,450,210) | $ 3,367,982 |

**Table 17. Combined NPV for TXCB10000, Alteration 2**

| | Summary Statisitcs | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 19)** | $ 3,815,681 | $ 1,859,826 | 48.742 | $ (1,521,993) | $ 9,363,766 |
| **Alt (Scen 20)** | $ 3,905,438 | $ 1,874,061 | 47.986 | $ (1,371,433) | $ 9,687,029 |
| **Alt (Scen 21)** | $ 3,321,816 | $ 1,907,044 | 57.410 | $ (2,127,655) | $ 9,372,666 |
| **Alt (Scen 22)** | $ 2,094,716 | $ 2,325,872 | 111.035 | $ (5,542,214) | $ 8,682,474 |
| **Alt (Scen 23)** | $ 2,137,901 | $ 2,281,404 | 106.712 | $ (5,267,009) | $ 8,981,135 |
| **Alt (Scen 24)** | $ 1,696,793 | $ 2,204,913 | 129.946 | $ (5,479,852) | $ 8,744,000 |

[7] Alteration two makes use of a washout and buying through a third party lender.

**Table 18. Combined NPV for TXCB2500, Alteration 3**

| Summary Statistics | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 22)** | $ (376,878) | $ 420,308 | -111.524 | $ (1,624,751) | $ 788,409 |
| **Alt (Scen 23)** | $ (296,994) | $ 441,576 | -148.682 | $ (1,548,848) | $ 869,450 |
| **Alt (Scen 24)** | $ (399,753) | $ 410,048 | -102.575 | $ (1,624,751) | $ 677,183 |

[8]

**Table 19. Combined NPV for TXCB8000, Alteration 3**

| Summary Statistics | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 22)** | $ 160,116 | $ 1,132,302 | 707.175 | $ (3,444,638) | $ 3,453,477 |
| **Alt (Scen 23)** | $ 240,561 | $ 1,143,128 | 475.193 | $ (3,020,250) | $ 3,401,468 |
| **Alt (Scen 24)** | $ 20,069 | $ 1,138,023 | 5670.496 | $ (3,318,374) | $ 3,252,403 |

**Table 20. Combined NPV for TXCB10000, Alteration 3**

| Summary Statisitcs | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Alt (Scen 22)** | $ 2,848,770 | $ 2,249,229 | 78.954 | $ (4,880,158) | $ 8,894,791 |
| **Alt (Scen 23)** | $ 2,884,698 | $ 2,203,792 | 76.396 | $ (4,745,994) | $ 8,848,182 |
| **Alt (Scen 24)** | $ 2,383,046 | $ 2,115,159 | 88.759 | $ (4,710,724) | $ 8,076,752 |

[8] Alteration three uses a washout and the option to buy is not exercised for the LTB.

**Table 21. Combined NPV for TXCB2500, Alteration 4**

| Summary Statistics | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Base (Scen 27)** | $ (426,568) | $ 433,295 | -101.577 | $ (2,071,479) | $ 747,893 |
| **Alt (Scen 27)** | $ (424,007) | $ 425,355 | -100.318 | $ (1,713,377) | $ 725,442 |

**Table 22. Combined NPV for TXCB8000, Alteration 4**

| Summary Statistics | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Base (Scen 27)** | $ 267,386 | $ 1,102,197 | 412.212 | $ (3,361,205) | $ 3,648,342 |
| **Alt (Scen 27)** | $ 288,947 | $ 1,118,222 | 387.000 | $ (3,350,790) | $ 3,687,064 |

**Table 23. Combined NPV TXCB10000, Alteration 4, Scenario 27**

| Summary Statistics | | | | | |
|---|---|---|---|---|---|
| | **Mean** | **StDev** | **CV** | **Min** | **Max** |
| **Base (Scen 27)** | $ 4,346,965 | $ 3,388,682 | 77.955 | $ (3,662,698) | $ 11,479,030 |
| **Alt (Scen 27)** | $ 5,104,920 | $ 2,360,524 | 46.240 | $ (3,662,698) | $ 10,731,011 |

[9] Alteration four includes a more aggressive share gifting strategy.

**Table 24. Percentage Point Change from No Succession to Succession**

| Probability of Economic Success | | | |
|---|---|---|---|
| **Farm** | **No Succession** | **Succession** | **Percentage Point Change** |
| TXCB 2,500 | 3.900% | 0.436% | -3.464% |
| TXCB 8,000 | 16.800% | 10.736% | -6.064% |
| TXNP 10,000 | 85.800% | 71.121% | -14.679% |

**Table 25. Percentage Point Change from Base to Alt 1**

| Probability of Economic Success | | | |
|---|---|---|---|
| **Farm** | **Base** | **Alt 1** | **Percentage Point Change** |
| TXCB 2,500 | 0.436% | 0.314% | -0.121% |
| TXCB 8,000 | 10.736% | 8.400% | -2.336% |
| TXNP 10,000 | 71.121% | 64.021% | -7.100% |

**Table 26. Change from Base to Alt 2 for SCIN Methods**

| Debt-to-Asset (Owner) | | | | |
|---|---|---|---|---|
| Farm | Base | Alt 2 | Percentage Point Change | Percent Change |
| TXCB 2,500 | 2.486% | 45.737% | 43.250% | 1739.543% |
| TXCB 8,000 | 2.463% | 9.862% | 7.400% | 300.442% |
| TXNP 10,000 | 0.497% | 0.525% | 0.028% | 5.545% |
| Debt-to-Asset (Successor) | | | | |
| Farm | Base | Alt 2 | Percentage Point Change | Percent Change |
| TXCB 2,500 | 79.447% | 74.707% | -4.740% | -5.967% |
| TXCB 8,000 | 48.078% | 48.022% | -0.056% | -0.116% |
| TXNP 10,000 | 31.328% | 32.099% | 0.771% | 2.461% |

**Table 27. Change from Base to Alt 2 for LTB Methods**

| Debt-to-Asset (Owner) | | | | |
|---|---|---|---|---|
| Farm | Base | Alt 2 | Percentage Point Change | Percent Change |
| TXCB 2,500 | 26.434% | 15.626% | -10.808% | -40.886% |
| TXCB 8,000 | 12.198% | 14.439% | 2.241% | 18.372% |
| TXNP 10,000 | 3.205% | 3.230% | 0.025% | 0.771% |
| Debt-to-Asset (Successor) | | | | |
| Farm | Base | Alt 2 | Percentage Point Change | Percent Change |
| TXCB 2,500 | 61.058% | 63.330% | 2.273% | 3.722% |
| TXCB 8,000 | 40.519% | 41.248% | 0.729% | 1.798% |
| TXNP 10,000 | 13.806% | 16.514% | 2.707% | 19.610% |