# A Stochastic Simulation of Intergenerational Farm Transfers

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## INTRODUCTION

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 recent and current economy and business environment. The evidence is plain. Nearly a third of the current U.S. farm owner-operators are 65 or older (though some or many of these operators may be already retired, live on the farm, and are simply continuing to own farm assets as a conscious succession planning strategy) (U.S. Department of Agriculture, 2013). And while 88% of family firms plan to keep their business within the family (Laird Norton Tyee Northwest Family Business Survey, 2008), statistics show that only about 30% of those will be successful in passing from the first to the second generation, and only 12% of those from the second to the third (Davis and Dyer, 2003). Currently in the United States, farm real estate alone is worth over $1.85 trillion dollars (Nickersen, 2012). Individuals age 65 and over own 29% of agricultural land, and another 28% is owned by those ages 55-64. In contrast, farmers under 34 years of age own merely 4% of agricultural land (Peel, 2013). Given these facts, there will be over a half trillion dollars in agricultural land assets transferred over the next decade (though some, or even perhaps a majority of these farmers may already have a well-developed succession plan in place). It is evident that farm family succession planning in the United States, though a long standing issue, is taking on a heightened focus.

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), the potential need to fund long term care (or long term care insurance) for the benefit of the owner or spouse, 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, 2000). 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 the relatively recent recession and slow recovery from the downturn (Inwood, 2013). This can create strategic conflicts within the farm organization. Assets may be sold to improve cash flow used to fund retirement instead of 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 in order 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 more stressed 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 that are incurred that must be paid 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 and other issues emphasize how a chosen intergenerational transfer method could impact capital needs, long term viability of the firm, and residual estate value. The objective of this study is to evaluate eight succession methods and their ensuing capital requirements under risk and uncertainty in order to execute an intergenerational farm ownership transfer. This is done from viewpoints of the lender, owner-operator, and successor, in an effort to provide findings that will help these three groups effectively plan for future capital needs, examine risk levels inherent in the decision, and compare the feasibility of various transfer methods. For clarity, in this study, the owner is defined as the primary owner/operator of the farm (typically a parent or grandparent). The successor is the family member who will inherit or takeover the farm and intends to operate the farm as their primary means of income (typically a child or grandchild). An off-farm inheritor is a family member who may potentially receive assets from a progenitor, but does not plan to personally operate the farm.

## PREVIOUS STUDIES

The academic literature is replete with research on intergenerational transfer and this section will summarize some of the studies used as a foundation for our study (for a more complete bibliography see Peterson (2013)). Past research has focused on many related topics such as conflict over division of assets (Taylor and Norris, 2000) and the impact objectives may have on the economic

long-term viability of the farm (Boehlje, 1973; Roush, 1978). This is why a sensitivity analysis of the transfer objective is performed in this study. Other studies defined key terms and we employ Gasson and Errington's (1993) definitions: 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, and retirement is when the current owner/manager departs from active management and labor roles within the business.

Timing was found to be a critical issue in the transition of a farm because 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 providing 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. Some studies have stressed the importance of including other time dimensions of intergenerational transfer, specifically timing of death (Boehlje and Eisgruber, 1972; Roush, 1978). Therefore, our model includes death as a stochastic (random) variable, accounts for estate management tools, and examines the outflow to nonfarm heirs and its effects.

Glauben, Tietje, and Weiss (2004) look at how an intergenerational transfer poses a unique problem, as it often has two conflicting and competing objectives; one to maximize the wealth or benefit to the owner, while the other 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 off-farm income or receive 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 is unsuccessful 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 due to factors of altruism, exchange, and personal considerations (Cox and Rank, 1992; Mishra, El-Osta and Shaik, 2010). Roush (1978) described some of these competing objectives as assumed in his model: 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 are implicitly found in the model. The study seeks to perform an analysis of the benefits and risks of various succession strategies, keeping in mind these underlying goals.

## METHODOLOGY

We have chosen to employ stochastic simulation of variables as our primary methodology. This will allow us to compare 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 we are essentially changing multiple variables simultaneously, rather than one at a time, in a what-if analysis. As a result, instead of a point estimate, we have a distribution of possible outcomes around our forecast. This is accomplished by applying a random error term (obtained from thirty-three years of historical values in our case) to the forecast (Richardson, 2008). Thus, we estimate a 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, we estimate key economic variables, and utilize their statistical distributions to provide a representation of their risk or variability associated with each method of intergenerational transfer. The complexity of this method becomes more apparent as we consider that each of the key decision variables is calculated from farm financial statements. For

example, our distribution of the debt to asset ratio would reflect how the variability in prices, yield, and death affect the balance sheet. Our simulation takes into account more than 30 years 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 below.

This simulation utilizes eight transfer methods (similar to Ferrell and Jones (2013)), which are divided into three groups: 1) Legal Documents, 2) Inter-Vivo Transfer tools, and 3) Estate Tools (Table 1). We assume that a Legal Document (in the form of either a trust or will) is always present. Inter-Vivo Transfer tools aid in succession arrangements to transfer management or value before the death of the owner. The Estate Tools primarily assist the transfer of the farm estate at or after death.

**Table 1. Methods for transfer of farm ownership.**

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

For our purposes of examining transfer methods, we compare twenty-eight unique combinations of these eight succession tools. Each combination, or scenario, will include either a will or a trust. In this model, a will costs less to set up, but incurs greater cost in probate court fees upon death. In regards to Inter-Vivo Transfer tools, a self-canceling installment note (SCIN) will be used for a buy-sell agreement. A SCIN is similar to a traditional installment sale, in that a price, interest rate, and time period are agreed upon, and payments to the creditor are made based on those criterion. The difference between the two is that when the creditor dies in a SCIN agreement, the remaining debt is annulled and is not counted as income or as part of the estate value, under current tax laws. In a lease-to-buy (LTB) agreement, when the lease term agreed upon is up, the option is given to buy and if this option is exercised, the successor purchases all farmland from the owner. The purchase can be done in one of

two ways; using a SCIN (same assumptions as above) or through a loan from the bank. The purchase price is the fair market value (FMV) minus any lease payments made previously. If the owner dies before the lease contract on the land is complete, the land is not bought, but simply inherited. The SCIN method will be utilized to compare more evenly across methods of transfer in the base assumptions model, but the bank method and its implications will also be discussed. The last tool is a Limited Liability Company (LLC). The LLC is set up as a 1,000 share partnership with a pass through-entity for tax purposes. The owner and successor contribute their entire net worth into the LLC and then shares are distributed according to contributed net worth. Outside investors" estate tool is where the successor sells the land to an outside investor, and then leases the same land back from the outside investor.

A sensitivity analysis is done to assess the impact on our analysis if an equal division of the estate to the off-farm and on-farm heirs is made upon death of the owner. In this alternate scenario (as in the base model), the successor always buys out the other heirs to keep on farming. This fragmentation might cause a significant strain on the farm business and represent a loss of capital from the farm.

Once we have completed the simulation, we rank the results using a key decision variable, namely Net Present Value (NPV). However, recall that NPV includes a measure of risk or distribution of outcomes; therefore our ranking method must take both the value of NPV and the likelihood of it actually occurring into account. Following Hardaker, Richardson, Lien, and Schumann (2004) this ranking is accomplished by using Stochastic Efficiency with Respect to a Function (SERF). Assuming that our decision makers are willing to take on more risk as their wealth increases, SERF ranks the transfer methods by the level of NPV and its associated risk premium (certainty equivalents). For our purposes, NPV is defined as:

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

where CW equals operator's cash withdrawals, NW is net worth, t is each period in the forecast, T is final and 0 is the beginning time period (Robison and Barry, 1996). We assume that a discount rate of 5% is held constant over the planning horizon (about a 7.5% interest rate reduced by a 35% income tax rate).

A simulation model's success hinges on careful consideration of the data and the underlying assumptions about markets, conditions, and behaviors. Great care was taken in the selection of data and appropriate constraints. This model is founded on three basic assumptions: 1) the owner, spouse, and successor are committed to the transfer and fully trust one another, 2) all individuals are perfectly honest and are in average health for their age, 3) the successor would make the exact business decisions the owner would in any given situation (thus, there is no advantage to either owner or successor for experience or knowledge, or lack thereof). For space considerations, we summarize the remaining assumptions in Table 2. Full details can be found in Peterson (2013).

**Table 2. Underlying Base Assumptions Covered in the Model**

| **Capital Assets** |
|---|
| 1. Depreciation methods. |
| 2. Buying/trade-in process for equipment. |
| 3. Timing and process of transferring equipment and who buys it. |
| 4. Appreciation/depreciation rates on property, plant, and equipment. |
| 5. Lease rates. |
| **Family Profile, Retirement, and Inheritance** |
| 1. Age of those involved, the number of children, marital status, etc. |
| 2. Amount of inheritance, division/fragmentation of the estate. |
| 3. Retirement age, process, and timing. |
| 4. Labor costs, salary for owner/successor, and rate of exit. |
| 5. Process, amount of retirement support, social security income, and events at the death of the owner or spouse. |
| **Financials** |
| 1. Off-farm income. |
| 2. Farms' basis for prices, yields, and interest. |
| 3. Crop insurance. |
| 4. Amount of family living withdrawals. |
| 5. Non-farm expenses; e.g. probate and trust management fees, funeral costs, lawyer fees, etc. |
| 6. Tax data and assumptions. |
| 7. Payments, acquisition, and timing of debt payments and obligations. |

## DATA

Historical U.S. average yearly prices and yields for commodities came from 1980-2011 USDA reports. The price paid index (PPI), consumer price index, interest rates, and other farm expenses for all crops came from The Food and Agricultural Policy Research Institute's (FAPRI) 2013-2022 deterministic forecasts (Westhoff, Gerlt, Whistance, Binfield, and Thompson, 2013). The Agricultural and Food Policy Center (AFPC) at Texas A&M University maintains a model of different sized farms that are considered to be representative of their geographic location and industry (Richardson, Outlaw, Knapek, Raulston, Herbst, Anderson, and Klose, 2013). Our study uses the AFPC models of three representative Texas farms (Table 3) as our source of farm financial data. All of the farms have a mixture of owned, cash-rent, and share-lease acreage.

**Table 3. Description of Representative Farms**

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

The stochastic variables in the model are commodity prices and yields, and mortality of the owner and spouse (presumed husband and wife, respectively). The probabilities of mortality at each age are taken from the Social Security Life Table (U.S. Social Security Administration, 2009) by gender and according to age in each year of the time horizon, to create the stochastic death event (see Peterson (2013) for method used). The stochastic yield and price variables were used to calculate yearly revenue

and expenses. Some of the input control variables include: cash farm expenses for 2012, crop mix by acreage, beginning cash, equipment complement, and loan information.

## Key Output Variables

Several key output variables (KOVs) were analyzed in this model (Table 4), one of which is used to rank our scenarios. As indicated previously we use a KOV of combined NPV of the owner and successor to rank our scenarios. NPV was chosen because it reflects the effects of various transition methods on yearly cash flows as well as the ending net worth of the farm. The NPV of the successor and the owner was then combined in order to create one measure that reflects the benefit (or detriment) to each individual. This KOV includes the farm financial benefit of inheritance as well as cost of losing farm capital in the transaction. This method was chosen as it focuses on the farm business, the successor, and the owner rather than on the welfare of the entire family that would include off-farm heirs.

**Table 4. Key Output Variables.**

| |
|---|
| • Combined net present value of the owner and successor (NPV) |
| • Probability of economic success (probability of the present value of ending net worth being greater than beginning net worth) |
| • Probability of cash being less than zero at year end (average for the ten year time horizon) |
| • Debt to asset ratio (D/A) (average for the ten year time horizon) |
| • Total average debt capital volume (average for the ten year time horizon) |
| • Total average estate and gift taxes (average for the ten year time horizon) |

## RESULTS

The results for the base model and the sensitivity analysis (shown as Alt 1) of that model are displayed in Table 5. Only the most and least preferred scenarios are reported for each farm (see Peterson (2013) for more detailed results). The combined NPV, standard deviation of the NPV, and the average total debt for those reported scenarios are shown in Table 5. Other notable findings for the base assumption run are found in Table 6. The percent change in the probability of economic success in Table 6 is shown as a change from no succession at all to the average probability across all 28 methods

of succession scenarios. In Table 7, the percent change in probability of economic success is a comparison of the average probability across all 28 methods in the base scenario to the same in the altered model for the sensitivity analysis.

## Sensitivity Analysis

We included an alteration to the base scenario that employs an equal inheritance for all inheritors instead of a fixed amount of inheritance for the off-farm heirs (such as $150,000), with the successor inheriting the rest (or equitable transfer). This alteration resulted in a lower combined NPV (on average, a 63.3% percent change decrease) and an increased coefficient of variation (CV) in all scenarios across all farms. Also see Table 7 for other results which demonstrate the increased risk and negative impacts on the likelihood of success for farm business, as well as the increase of the debt to asset ratio (which may eventually result in increasingly stressed loans, and even bankruptcy).

## Table 5. Summary of Results

| Farm | Model | Ranking | Legal Docs | Inter-Vivo | Estate | Avg. Combined NPV | Std. Deviation | Avg. Total Debt |
|---|---|---|---|---|---|---|---|---|
| TXCB 2,50 | 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 |

| Farm | Model | Ranking | Legal Docs | Inter-Vivo | Estate | Avg. Combined NPV | Std. Deviation | Avg. Total Debt |
|---|---|---|---|---|---|---|---|---|
| TXCB 8,00 | 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 |

| 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 |

## Table 6. Other Notable Results

| Farm | Avg. Total Estate and Gift Taxes | Taxes as % of Beg. Net Worth | Lowest Avg. Total Debt Capital Scenario | Highest Avg. Total Debt Capital Scenario | Avg. Change in Probability of Economic Success |
|---|---|---|---|---|---|
| TXCB 2,500 | $0 | 0% | Trust, Nothing, Outside Investor | Will, LLC, Life Insurance | -89.3% |
| TXCB 8,000 | $6,500 | 0.15% | Trust, LLC, Outside Investor | Will, SCIN, Nothing | -36.1% |
| TXNP 10,0000 | $1.5 Million | 9.12% | Trust, LLC, Outside Investor | Will, SCIN, Life Insurance | -17.1% |

**Table 7. Sensitivity Analysis Results in Comparison to the Base Model**

| Farm | % Change in D/A | % Change in Probability of Economic Success |
|---|---|---|
| TXCB 2,500 | 31% | -28% |
| TXCB 8,000 | 57% | -22% |
| TXNP 10,000 | 35% | -10% |

## DISCUSSION

### TXCB 2,500

The most preferred method, for the 2,500 acre farm with the base assumptions, was one that used a trust, lacked any Inter-Vivo Transfer, and used life insurance. Each Inter-Vivo Transfer has an associated cost, such as increased taxes (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 farm value being lost to these costs, there must be a greater return to warrant using it. 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 in the small farm scenario would be one where the owner 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, a trust is preferred to a will. The trust has a lower cost to the successor upon death of the owner because it avoids probate court. As a note of interest regarding Inter-Vivo Transfer methods, 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, LLC, outside investors). The representative farm in this model has poor financial performance and relies heavily upon value gained through appreciation of land as a main source of increasing net worth. However, upon sale of the farmland, there is no further appreciation of the land value. Thus, a sale to outside investors would

result in a great net worth loss. Also, in this option, due to the sale, the business would be required to rent 100% of the 2,500 acres instead of the 80% it currently rents and would see a significant increase in operating expenses. These combined factors usually result in ending net worth being lower than if the land was not sold and makes this a less-preferred method. Although this is not the preferred method, we recognize that there may be times when it is necessary to sell the land in order to cover debts, and allow the business to continue operating. This would be a short-term solution for a long-term problem though, and would be better tackled by improving efficiency, profitability, and other general business practices. The use of an LLC results 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 make Scenario 14 (will, LLC, outside investors) the least preferred method.

It is noteworthy 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 the 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 that is 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 a strain on cash flows and is also risky. For example, one might have a good year, but 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 from the previous year that could have absorbed some of the market shock in the bad year. In summary,

for the small farm, methods that strained cash flows in any way were less preferred to those that minimized value transferred 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 a preferred method for similar reasons; 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 associated costs. Life insurance is included among the most preferred methods because, given the probability the owner passes away 37.2% of the time within the ten year forecast 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 least preferred method was Scenario 10 (will, LTB, and cash gifts), which causes significant cash flow strain on the business. Although the 8,000 acre farm is larger than the 2,500 acre farm, it owns less land (320 acres, or 4% of the land farmed), and instead leases 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 the successor would 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 (about $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 expense while the owner is still receiving a share of the income (because he is not fully retired). Even in the case where the owner dies before the lease agreement is up 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. This makes the combination of a will, lease-to-buy arrangement, and cash gifts 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 (trust, LLC, and gifting)is preferred for those ranging from risk neutral to moderately risk averse while Scenario 20 (trust, SCIN, and life insurance) is preferred for those that are very to extremely risk averse. Scenario 27 (trust, LLC, and gifting) includes a conservative gifting strategy where the owner 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 of the forecast, this may significantly lower estate taxes, and decrease other transfer costs. In contrast, if he dies in an earlier time period, the owner has not gifted enough of the estate to sufficiently lower estate taxes that would make this scenario more preferred than Scenario 20 (trust, SCIN, and life insurance). In Scenario 20 (trust, SCIN, and life insurance), the successor buys the farmland 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 financial consequences), would prefer Scenario 20 (trust, SCIN, and life insurance) rather than 27 (trust, LLC, and gifting). The LTB option (Scenario 23), is the next preferred

method 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). Owned land makes up over 56% of the beginning value of this representative farm and 33% of the acreage farmed. Thus, selling off that value and renting all 10,000 acres is not as profitable as retaining the land. Also, not using any Inter-Vivo Transfer tools results in an average of $1.7 million in estate taxes. These combined make it the least preferred scenario for the large farm.

## General Observations and Sensitivity Analysis

In nearly all cases for all farms the trust took precedence over its will counterpart. Any transfer costs at death (funeral expenses, probate fees, etc.) become estate tax-deductible expenses. A trust reduces the taxable estate by a much smaller amount than a will, and incurs higher taxes. Yet, probate fees had a higher cost than the higher taxes caused by a trust.

When an equal transfer of farm assets to all inheritors (our sensitivity alteration), was chosen instead of an equitable transfer, there was an almost certain failure of the farm business. On every farm, the probability of economic success decreased from the base scenario. As stated earlier, there was over a 31% average increase in the debt-to-asset ratio for the 2,500 acre farm. Even in the most preferred scenario for the equal transfer of assets, the successor's debt-to-asset ratio 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 over a one-third increase in the debt-to-asset ratio 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 a loss of farm assets and minimizes the amount the successor has to buy back from the off-farm inheritors. When inheritance was fixed (or equitable, as in the base

model) for off-farm heirs, the probability of success increased with farm size. This is partly because the off-farm inheritance plays a smaller and smaller role in the NPV as a percentage of the farm. Thus the loss of farm assets has a reduced effect.

In general, SCIN was usually preferred to LTB for several reasons. One possible reason is that SCIN provides a better tax mitigation strategy (capital gains tax, rather than income tax, lower taxable income, etc). Another more likely reason is that in the SCIN scenario assumptions, the farmer retires completely in year one. This allowed for earlier drawing of social security income and reduced labor expense that would be caused by the gradual retirement of the owner (as discussed in the TXCB 8,000 section), thus providing a total lower net cost to the farm business.

## CONCLUSION

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 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. Thus, profitability should be a prerequisite to succession. If profitability is not present, the potential best option may be for it to become a "last generation" farm business. Our 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. The lending community, however, should not be considered the one and only source of funding. They are solely a partial source of funding for the productive asset base. The owners and others must shoulder some of the weight themselves. 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) Minimizing 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.

Finally, 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. If that balance is found, farmland may be a stable and logical continuing investment for much of the owner's accumulated wealth, especially if liquidity issues can be solved. In addition, the owner may gain great personal utility value by keeping the farm in the family, continuing the family legacy, and watching children and grandchildren take over and continue to operate the farm business successfully. 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.

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