ASSESSING THE RATE OF SUCCESS OF ALTERNATIVE FARM TRANSITION STRATEGIES

By

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Abstract: Research suggests only 30 percent of family owned businesses successfully transfer from the founding generation to the second generation. These success rates continue to decline when transferring to subsequent generations. Development of a decision tool to assist in making choices about strategies best allowing farm families to keep the farm in operation and satisfy heirs could reduce the risk of conflict with respect to the plan's implementation. The question is, what farm transition strategies reduce farm financial stress? A representative Oklahoma farm, family, and set of farm transition strategies are developed. Each strategy is imposed on the model farm subject to time, equity, and cash flow demands. Net farm income and the strategy's cash flow demands are used to determine the plan's feasibility. A Monte Carlo simulation is then utilized to consider variability in net farm income. Each strategy is simulated 500 times. The probability of success for each alternative strategy is then calculated by the number of successful transitions divided by the total number of iterations, based on criteria for leverage and cash flow. Results found strategies with an equal division of assets functionally requiring repurchases of assets from off-farm siblings are more challenging to accomplish. More successful strategies incorporated placing operating and land assets in separate legal entities, with both heirs owning the land entity. Creating financial assets either equal to the value or equal to one-half the value of the operating entity to give to the off-farm heir proved to be more successful. Another approach consisted of a lifetime farm business transfer in which the farm heir purchases shares of the operating entity each year, with help from the preceding generation when funds are deficient. At the end of the transition, cash reserves are split amongst heirs and the heirs are equal owners in the land entity.

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CHAPTER I

INTRODUCTION

Farm transition planning—the process of transferring the ownership and management of farm assets to the next generation of farm operators—is an ever-growing topic of discussion as farmers and ranchers plan for the future of their growing and complex operations. Successfully transferring the family farming operation across generations is a significant challenge for farm families (Boehlje and Eisgruber 1972; Tauer 1985; Lobley 2010; Mishra et al. 2010). One of the main objectives of farm transitioning should be to maintain a viable operation across generations (Mishra et al. 2010; Lobley 2010; Schreiber 2012). The long-term viability of the farm, financial security for the founding generation, and maintaining the farm within the family are documented goals of many farmers (Kirkpatrick 2013). Wittman and Radakovich (2009) agreed that in developing a farm transition plan, long-term longevity of the family operation should be of upmost importance.

However, research from the Family Business Institute indicated that family-owned and operated businesses have roughly a 30 percent success rate in transferring the assets and control of their business from the founding generation to the second

generation, 12 percent make it from the second to the third generation, and a dismal 3 percent successfully transfer from the third to the fourth generation (Ferrell et al. 2013). In a 2009 survey of Minnesota farmers, nearly 90 percent of the respondents did not have an up-to-date farm transfer plan and nearly 60 percent did not have an up-to-date estate plan (Hachfeld et al. 2009). Spafford (2006) claimed that the main reasons farm transitions fail are inadequate estate and retirement planning, insufficient farm capitalization, and failure to properly prepare the next generation of farm operators. Many farmers desire to keep what they have built in one piece, and not see the family farm subdivided and/or sold. However, the low success rates mentioned above indicate this desire is rarely met, arguably often due to inadequate transfer plans or no plan at all.

When an estate and transition plan are not present, state intestacy laws typically require heirs be given undivided interest in ownership of assets, after all debts have been paid (Huff 1995). According to USDA farm balance sheet data from 2017, real estate value accounted for nearly 83% of farmers' total asset values (ERS 2019). However, the value of those assets can only be realized if the land base is sold. This poses a challenge for an on-farm heir desiring to keep the farm at its current level of operation after the ownership of real estate is split between siblings. The on-farm heir can operate a much smaller farm or purchase the remaining portion of the farm assets from their siblings. However, it is often challenging to service the debt incurred in purchasing such a large portion of an expensive and illiquid asset that generates relatively low cash returns.

Preliminary work shows that in many cases either on-farm heirs or off-farm heirs have to make concessions in the form of either diminished net present values of their inheritance or the size of the farming operation ultimately handed down at the time of the

transition. Taken together, the land-intensive nature of farm wealth and the challenges of its transfer contribute to the low rate of transition success. Despite the pressing need for more information and specific strategy evaluation regarding farm transition planning, very few empirical studies investigate this issue (Mishra and El-Osta 2008).

Problem Statement

Providing farm families with better information about the options and opportunities associated with alternative farm transfer strategies can help farm families develop unique plans that meet their individual needs. Consequently, farm families facing a family business transition are interested in learning how to facilitate that transition with fewer negative impacts on the business as well as on the family dynamics. The development of a decision tool to assist in making choices about what strategies best allow them to keep the farm in operation and satisfy their heirs could reduce the risk of conflict with respect to the plan's implementation. Additionally, this tool aids in determining the operation's long-term financial viability with respect to the alternative strategy selected by the farm owner. The fundamental question is, which farm transition strategies reduce farm financial stress?

This study develops a model that allows researchers and Extension educators to simulate alternative farm transition strategies with the goal of increasing the success rate of farm asset transfers. The development of a representative Oklahoma farm is a necessary step in decision tool development. Alternative strategies are then evaluated, utilizing the representative farm, to determine the financial impact these scenarios have on the farm stakeholders' available cash flow. Measuring the probability of success and the effect each plan has on the farm cash flows provides educational examples illustrating

how these various plans can be arranged for a typical farm business. It is intended for these example strategies to support farm transition research and educational efforts. There is not a one-size-fits-all solution to farm transitioning; however, developing a decision tool and strategies for farm owners can help initiate a plan that can be adjusted to fit individual situations. Through this study, the goal is to see a higher percentage of farms make a successful transition. Numerous farm families may benefit financially across generations as a result of the information provided by this research by preserving their family farming legacy for years to come.

Objectives

The goal of this research is to develop a decision tool to simulate and assess the probability of success for alternative farm transition strategies. A successful farm transition strategy is defined as one that allows the farm heir continuous access to the entire farm asset base, equitably compensates off-farm heirs, and is attainable by utilizing funds from the farm cash flows to finance the strategy. Specifically, the objectives are as follows.

1) Determine the ability of the farm cash flows, supplemented by off-farm income of the farm owner's spouse, to support a transition strategy over a 20-year planning horizon. Alternative strategies consist of utilizing the following tools:
    a. Commercial loans;
    b. Seller financing;
    c. Sinking fund investments;
    d. Second-to-die whole life insurance policies; and
    e. Lifetime farm business transfers.

2) Determine the probability of a successful farm transition using alternative strategies subject to time, equity, and cash flow constraints.
3) Provide educational examples and tools to support farm transition research and educational efforts.

Methodology

In this research, a spreadsheet tool is used to accomplish the objectives. By utilizing enterprise budgeting and benchmark farm financial ratios, a 1.0 full time equivalent Oklahoma farm consisting of beef cattle and crop production is developed. Net farm income data from the Kansas Farm Management Southeast Association is used to determine trends and variability in farm income for the representative farm. The farm balance sheet information and net farm income are then used to calculate the farm cash flows. The cash flow demands of each alternative strategy is calculated and subtracted from the available farm cash flow to determine its feasibility.

A Monte Carlo simulation is then utilized to consider variability in net farm income. It is then determined if the farm cash flows are sufficient to fund the cash flow demands of each alternative strategy. When the funds are sufficient to meet the criteria of each strategy, it is considered a success. Likewise, when there are insufficient funds to meet the criteria for a strategy, it is considered a failure. The probability of success for each alternative strategy is then calculated by the number of successful transitions divided by the total number of iterations.

Outline of Study

The remainder of this research is structured as follows. Chapter two discusses previous literature concerning the challenges and opportunities associated with how to transfer a farming operation from one generation to the next and how other researchers have tried to solve this problem. Chapter three provides the conceptual framework, the strategies simulated, the representative farm, and the decision criteria assessing the success of a transition strategy. Chapter four discusses the simulation results. Chapter five provides conclusions, implications, and limitations.

CHAPTER II

REVIEW OF LITERATURE

Successfully transferring the family farming operation across generations is a major issue affecting farm families (Boehlje and Eisgruber 1972; Tauer 1985; Lobley 2010; Mishra et al. 2010). One of the main objectives of farm transition planning should be to maintain a viable operation across generations (Lobley 2010; Mishra et al. 2010; Schreiber 2012). Ensuring the long-term viability of the farm, providing financial security for the founding generation, and the keeping the family farm within the family were all documented goals of farmers (Kirkpatrick 2013). Wittman and Radakovich (2009) agree that in developing a farm transition plan, long-term longevity of the family operation should be of upmost importance. However, research from the Family Business Institute indicated that family-owned and operated businesses have roughly a 30 percent success rate in transferring the assets and control of their business from the founding generation to the second generation, 12 percent make it from the second to the third generation, and a dismal 3 percent successfully transfer from the third to the fourth generation (Ferrell et al. 2013). Despite the need for more information on thisissue, few empirical studies investigate this issue (Mishra and El-Osta 2008).

Hachfeld et al. (2009) conducted twelve farm transition and estate planning workshops throughout Minnesota, with the goal of educating producers about these issues. Farmers were asked to complete a survey at the end of each workshop which contained questions related to whether or not they found certain parts of the workshop beneficial, whether or not they had an up-to-date estate plan, and whether or not they had an up-to-date farm transfer plan (Hachfeld et al. 2009). Of the 524 attendees, 296 completed the survey. Of these respondents, 57.8 percent did not have an up-to-date estate plan, and 88.9 percent did not have an up-to-date farm transfer plan, but 81.4 percent stated they planned to develop an estate and farm transition plan within the year after attending the workshop (Hachfeld et al. 2009). Six months after the final workshop was completed, a follow-up survey was mailed out to the participants. Of the 152 completed follow-up surveys, 59.4 percent stated they had started developing a farm transfer plan, with 12.5 percent stating their plan had been implemented. Another 57.3 percent had started developing a personal estate plan, with 7.3 percent having a completed and implemented plan (Hachfeld et al. 2009).

Determining a successor is an important aspect in developing a farm transition plan (Baker et al. 2000; Calus and Van Huylenbroeck 2008; Lobley 2010; Kirkpatrick 2013). Calus and Van Huylenbroeck (2008) claimed that current farm management practices are often influenced by succession plans. Their measured the effects farm succession had on total farm assets, and how having a successor, uncertainty about a successor, or not having a successor influenced this measure. Generally, as the principal decision maker increases in age, more assets were accumulated. When a successor is present, there was more of an incentive for the principal operator to continue expanding

the farm; however, when there is uncertainty or no successor, farmers begin to downsize or liquidate by consuming more of their capital (Calus and Van Huylenbroeck 2008). Lobley (2010) agreed that when a farm successor is present or identified, the farm owner is more likely to continue expanding and investing in the farm. He found research that suggests when a farm successor is not present, the farm faces a greater likelihood of failure, which could have significant effects on the family farming system (Lobley 2010). Baker et al. (2000) surveyed over 1,500 Iowa farmers to determine how they were planning for retirement and how farm succession influenced their plans. From 418 viable responses, they found that 71 percent of the respondents had yet to determine a farm successor. The average age of the respondents was 54, and the average age of retirement indicated was 66, leaving a mere 12 years to develop a farm succession plan.

Several studies agreed that retirement planning is a critical component in developing a farm transition plan (Wittman and Radakovich 2009; Mishra et al. 2010; Kirkpatrick 2013). However, many farmers delayed retirement because they do not want to relinquish control of the farm (Baker et al. 2000; Hachfeld et al. 2009; Wittman and Radakovich 2009; Lobley 2010). Baker et al. (2000) reported approximately a third of 418 survey respondants said they would never retire. They also found that half of the surveyed participants had not discussed any retirement plans with family or legal advisors (Baker et al. 2000). Kirkpatrick (2013) cited a *FARMTRANSFERS* survey in which 589 Wisconsin farmers were asked about retirement plans. They found 73 percent plan to either never retire or to only partially retire. How long the preceding generation decides to stay in the family business can also have a major effect on the optimal timing and future success of the operation (Kimhi 1997). The preceding generation's unwillingness

to retire and remove themselves from the decision making process of the farm has negative impacts on the farm success (Wittman and Radakovich 2009; Kirkpatrick 2013). Part of this unwillingness may be explained by two factors: financial security after retirement or emotional ties to the farm.

Related to financial security, Baker et al. (2000) found that, of those farmers who plan to retire, the majority expected their retirement income to come from continued operation of the farm or from the sale of farm assets. Kirkpatrick (2013) stated that Social Security is the second most common form of retirement income. Mishra and El-Osta (2008) suggested a good farm transition plan should consider retirement incomes for the current, retiring generation. Kimhi (1997) offered a solution, that before the transfer of the family business, the successor receives a salary while the retiring generation takes in the residual income. After the transfer has taken place, these income distributions were reversed (Kimhi 1997).

Despite wanting financial security in their retirement years, monetary reasons are not the only determinants impacting the decision of farmers to retire. Agriculture is unique in that the family business and home are so closely intertwined, both physically and emotionally (Kirkpatrick 2013). Often times, the family farm is also the place of residence for farmers (Mishra et al. 2010). Farmers need to realize that retirement evokes emotions related to their identity and coming to terms with no longer controlling their farm (Kirkpatrick 2013). It is important to craft well-defined, long-term retirement goals that do not contradict one another (Kirkpatrick 2013). Extension educators can help families with this planning process through facilitating informative discussions

(Kirkpatrick 2013), as planning for farm succession and retirement can cause increased financial and emotional stress for all those involved (Lobley 2010).

Fetsch (1999) suggested that farmers do not lack business skills, but lack communication and people skills when dealing with family discussions about the farm succession planning. Transfer plans should consider both the economic factors determining its success, and the interfamily relationships in an effort to reduce family conflict (Boehlje and Eisgruber. 1972). If this is not done, dissention, disagreements, jealousy, and family turmoil may arise from those who do not feel like they were treated fairly (Taylor and Norris 2000; Mishra and El-Osta 2008). As noted earlier, "lack of family consensus and disagreement among heirs," was one of the top five obstacles families encountered in developing their farm transfer plan (Hachfeld et al. 2009, p. 5). When there are multiple heirs present, determining which heir should control the business can lead to dissention (Kimhi 1997).

Taylor and Norris (2000) discuss family conflicts that can arise from transferring the family farm to the next generation, not from an economic perspective, but from a family relationship perspective. The authors' goal was to determine what causes these conflicts and how to best resolve them. Conflicts among siblings can arise when there is disagreement in terms of what is considered a fair inheritance (Taylor and Norris 2000). Equal or equitable divisions can be used to divide up the operation, depending on whether or not contributions of the heirs will be recognized in the transfer. Regardless of what approach is used, one sibling may perceive the method as fair while the other deems it unfair, which leads the author to believe fairness may be the underlying cause of the conflict (Taylor and Norris 2000). The closeness of the siblings and the strength of their

prior relationship can affect the likelihood of conflict or allow them to work through the decision with little disagreement. Using survey data from on-farm and off-farm siblings, the authors measured sibling conflict caused by the farm transfer by considering agreement on rules of fairness, agreement on fairness of transfer, and perception of family warmth (Taylor and Norris 2000). They found more conflict among siblings when they had differing rules of fairness, when they considered their family warmth to be lower, and when they did not agree the transfer was completely fair. The authors suggest more open and honest communication among all those involved is likely to mitigate this conflict. In addition to addressing the question of equal versus equitable transfers, working to foster closeness of relationships and rules of fairness may allow for less conflict, or at least the capability of working through conflict with little to no adverse effects (Taylor and Norris 2000).

When dividing up farm and personal assets, equitable, not necessarily equal, transfers should be considered (Boehlje and Eisgruber 1972). Whitman and Radakovich (2009) claim that giving everyone involved in the farm transition equal ownership or pay is a mistake. If a goal of long-term longevity of the operation is important to the family, they believe farm owners should realize equal transfers of ownership and wealth may not be the most beneficial to the success of the farm. Not only is this possibly an unfair solution, but it does not recognize the heirs' contributions in terms of effort, knowledge, or management (Whitman and Radakovich 2009). When joint ownership of property or the business is given to all heirs, conflicts can arise due to conflicting incentives (Kimhi 1997). Ways address this issue are discussed below.

Agriculture is a capital-intensive industry where most of the farm wealth is contained in real estate, a highly illiquid asset not readily divisible (Mishra et al. 2010). According to USDA Economic Research Service, real estate makes up approximately 83% of the average farm balance sheet (ERS 2019). Boehlje and Eisgruber (1972) show that the largest portion of an heir's farm inheritance is land. Since land is relatively illiquid and generates very low annual cash returns, its inheritance can pose a challenge to an heir (Ferrell et al. 2013; Boehlje and Eisgruber 1972). Schreiber (2012) stated that splitting the land up into many smaller pieces to transfer to several heirs may not be a wise idea as it may cause the farm to fall below a size that can capture economies of scale. Therefore, keeping the land in one piece can help the farm continue to grow and be successful (Boehlje and Eisgruber 1972). Schreiber (2012) gives the analogy that there are only so many times a pie can be sliced before each slice is so small that no one can enjoy it. The availability of off-farm capital can alleviate the liquidation or splitting-up of farm assets and mitigate conflicts that may arise from the transfer (Boehlje and Eisgruber 1972). Decreases in farm production profits may cause many small and mid-size farms to exit the industry (Blank et al. 2004). Normally, for firms to stay in the market, they must not only remain profitable to cover costs of production, but also be competitive in terms of rates of return when compared to other possible investments (Blank et al. 2004). However, many farms generate low or even negative returns from production. This complicates matters when determining the economic soundness of the farming operation (Blank et al. 2004).

Families that fail to plan may be faced with selling portions of farm assets and conflict arising among family members (Mishra and El-Osta 2008). In cases where the

heirs were given equal amounts of ownership of the land and on-farm siblings wish to keep the farm at its current size, they must purchase their sibling's shares of the operation (Mishra and El-Osta 2008). Using a third-party financing source may prove to be difficult for younger adults who have very little equity. However, there are programs though the USDA that allow young farmers to purchase land with favorable loan terms and interest rates (Ferrell et al. 2013). But even with these programs, young farmers are still at risk of defaulting on their debt service due to the fact that land itself generates low cash returns when compared to other investments. Small changes in income can put the borrower at risk of not being able to make the loan payments (Ferrell et al. 2013). Other methods of purchasing the farm are through buy-sell agreements either by heir-financing or by the use of life insurance (Tauer 1985).

As mentioned earlier, an equal transfer to heirs may not be an equitable transfer (Boehlje and Eisgruber 1972; Wittman and Radakovich 2009; Schreiber 2012). However, tension can arise when determining how best to transfer the family farm, especially when deciding how to split the assets between siblings (Taylor and Norris 2000). Compensating off-farm heirs with some form of inheritance may help mitigate sibling conflict after the transfer, depending on how the siblings perceive fairness (Taylor and Norris 2000). This could come from life insurance or off-farm investments specifically made by the farm owners for this purpose (Boehlje and Eisgruber 1972; Blank et al. 2004; Mishra and El-Osta 2008). An outside investment could provide liquid cash funds to be used as an off-farm heir's inheritance, which may mitigate asset liquidation in the transfer process (Boehlje and Eisgruber 1972). Mishra and Morehart (2001) found that some farmers invest in off-farm investments in an effort to diversify their risk. These type

of investments include mutual funds, bonds, CDs, IRAs, and stocks. Their research found that as farm size increased, farms were more likely to be financially diversified with off-farm investments. This also held true with the age and level of education of the farm operator (Mishra and Morehart 2001). However, smaller farms, farms with a high amount of debt, and those who are more diversified in their production are less likely to invest in off-farm investments (Mishra and Morehart 2001). Although this is an option in preparing a farm transition plan, choosing to invest off of the farm may need to be approached with caution as Baker et al. (2014) claimed that diverting funds to other investments could interfere with growth and success of the farm. Ferrell et al. (2013) claim that, "Compensating non-farm heirs who want their inheritance in a more liquid form still presents a potential capital drain for the on-going farm business, but, in many cases, can be at least reduced with proper planning."

Schreiber (2012) and Tauer (1985) both discuss the option of using life insurance to help transfer the farm. The preceding generation can take out a life insurance policy so after their death, the on-farm heirs can use the funds from the policy to purchase their siblings' portion of the farm inheritance under a buy-sell agreement (Schreiber 2012). Tauer (1985) recognizes the need for a well thought-out farm transition plan and the challenges on-farm heirs face in purchasing their siblings' portion of the farm when their parents give them equal, rather than equitable, shares of the operation. In one option, the insured parents or farm owners are not the policy owner, but rather the on-farm heir (Tauer 1985). Upon death of the parents, the proceeds from the policy are then used to fund a buy-sell agreement reached between the siblings. The parents are slowly paying insurance premiums up until death, rather than the heirs making loan payments after

death (Tauer 1985). Financing through a third-party lender or borrowing from the seller are methods that have been traditionally used in the past. Tauer (1985) analyzed investment decisions considering whole-life or term life insurance plans and installment payments for men ages 25, 45, and 65 along with various discount rates and income tax rates. Time of death was the only stochastic variable. He found installment payments would generally be preferred by a risk-taker and life insurance would be preferred by someone more risk-averse (Tauer 1985). An individual's risk preference, age, tax rate, and their cost of insurance or capital were major characteristics that determine which choice the individual should make. However, life insurance proved to be optimal in many cases (Tauer 1985). Purchasing large life insurance policies may be challenging for many beginning farmers who lack larger amounts of income, but the partial use of life insurance can be more affordable and provide the off-farm heirs with immediate funds when starting a buy-sell agreement, instead of waiting for installment payments to come in after the death of the parents (Tauer 1985).

Blank et al. (2004) found that farm owners have diversified their portfolios and at times substituted nonfarm capital for farm capital, with nonfarm capital consisting of retirement benefits, stocks and bonds, dividends paid out on non-farm assets, and capital gains from nonfarm assets. Changes in the amount of nonfarm capital can have larger impacts on the farm wealth than changes in farm capital (Blank et al. 2004). This indicates there may be benefit for farmers to shift some of their capital resources out of agriculture (Blank et al. 2004). Due to variability in farm income, many farm families choose not to sell farm assets, but rather seek other sources of off-farm income (Mishra et al. 2010). Many farms depend on government payments and off-farm income to

supplement household income (Mishra et al. 2010). Blank et al. (2004) agree that government payments may be significant to many farm families. The accessibility of off-farm capital can alleviate the liquidation or splitting-up of farm assets and mitigate conflicts that may arise from the transfer (Boehlje and Eisgruber 1972). Off-farm employment by farmers differs across farms depending on farm size, farm experience, and other factors (Mishra and Goodwin 1997). Mishra and Goodwin (1997) also found there was a positive correlation between the off-farm labor supply and the riskiness of farm income. Farmers who have a higher income variability were more likely to have an additional job other than just working on the farm (Mishra and Goodwin 1997). Those farmers with more experience in farming or those with larger farms were less likely to have an off-farm job (Mishra and Goodwin 1997).

Mishra and Sandretto (2002) analyzed the variability in net farm income in the U.S. from 1933 to 1999, with the goal of determining if its variability has decreased over the time period. They found the variability in real net farm income did not diminish over this time period (Mishra and Sandretto 2002). Additionally, they examined how off-farm income had helped in reducing farm household income variability. The amount off-farm income depends heavily on how much time the operators can spend off of the farm, which is determined by how labor-intensive their farming operation is (Mishra and Sandretto 2002). The authors determined that the addition of off-farm income has had a significant role in supporting farm income in times of lower revenue and has decreased farm household income variability (Mishra and Sandretto 2002). This is beneficial to farmers as Blank et al. (2004) claimed that many farms generate extremely low, and often times negative, returns from production.

Other methods that have been used to transfer farms involve the use of various legal mechanisms and business forms, all of which are as unique as the individual family situations. Ferrell et al. (2013) laid out the advantages and disadvantages of using wills, trusts, joint tenancy with right of survivorship, life estates, transfer-on-death deeds, limited partnerships, corporations, and limited liability corporations.

In terms of business structure, certain types of legal entities are more conducive in keeping the business entity (farmland) intact while dividing up its ownership among heirs (Boehlje and Eisgruber 1972). Properly organizing and preparing all legal documents in preparation for a farm transfer is an important component of the planning process (Schreiber 2012). While this research does not specifically focus on the financial, tax, and liability/risk implications associated with the various legal mechanisms, it is nevertheless an important part of the farm transition planning process. Some assumptions may be made in terms of the various legal entities the farm operating assets and farm land may be placed in.

Boehlje and Eisgruber (1972) state that increases in capital requirements, increases in owner/operator age, and the fact that the majority of farms are operated as sole proprietorships, have created challenging issues in transferring the family farm from one generation to the next. The authors develop an empirical model used for estate management that considers relationships between the creation and transfer of a farm and the uncertainty associated with the time of the preceding generation's death. One interesting approach of this article is to consider the parents' time of death in terms of a probability, not necessarily a predetermined time (Boehlje and Eisgruber 1972). This allows the analysis to be more realistic as one cannot accurately predict the time of death.

Employing this characteristic in future versions of my model will be considered. A case study on a representative Indiana farm was used to determine the effects of various transfer plans relating to the number of parents alive, the types of wills to use, and the size of the operation. They found that gifting parts of the operation during the planning process was part of the best estate management plan, regardless of the size of operation, even if it had taxable implications. Starting this transfer process during the preceding generation's lifetime may provide incentives for the heirs to continue their interest in the farm operation (Boehlje and Eisgruber 1972).

Policymakers can indirectly assist in farm transition planning by creating types of tax incentives to farmers who choose to sell or lease assets to young, beginning farmers (Kirkpatrick 2013). Various price and income support programs through government policy, like the new farm bill, can also help younger farms with little equity or cash reserves which could prove to be beneficial during and after a farm transition (Ferrell et al. 2013). Additionally, they suggest crop insurance may be a beneficial tool to new farmers to mitigate risk (Ferrell et al. 2013).

However, before any of these strategies can be implemented, there needs to be open and honest conversations between the farm owners and farm heirs about their expectations of the business transfer in order to set goals and develop an actual plan (Wittman and Radakovich 2009; Taylor and Norris 2000). If this is not done, dissention, disagreements, jealousy, and family turmoil may arise from those who do not feel like they were treated fairly (Mishra and El-Osta 2008; Taylor and Norris 2000). Not only is passing ownership, management, and control important, other intangible assets such as institutional knowledge are also extremely important and hold value to the future success

of the farm (Lobley 2010). The retiring generation should mentor and guide the farm successor to help ensure the success for both generation (Kirkpatrick 2013). Actions, not just conversations, should take place in order for plans to actually be created and implemented within the family business (Wittman and Radakovich 2009). Additionally, family and business goals should be clearly defined and written down so that all parties involved know what their role is and what expectations are agreed upon by all members involved (Wittman and Radakovich 2009). Putting the right people in the right positions with clearly defined roles can mitigate confusion and help the transition process (Wittman and Radakovich 2009). As Kirkpatrick states, "This process starts with the farm operators and successors identifying their values, vision, and goals surrounding retirement and farm succession."

The top three reasons farm transitions fail are: "1) Inadequate estate planning, 2) Insufficient capitalization, 3) Failure to prepare the next generation properly" (Spafford 2006). Because of the diversity in agricultural enterprises, each farming operation and family composition is unique, meaning no transition plans are exactly the same (Mishra et al. 2010; Wittman and Radakovich 2009). Kirkpatrick (2013) states there is a need for Extension educators to address these issues with farmers which would allow them to discover what steps are needed to fulfill their goals. Ferrell et al. (2013) agree that engaging in meaningful conversations with farm stakeholders is important and believe universities can help this process by developing easy-to-understand and use resources and tools. As Mishra and El-Osta (2008) claim, little empirical and theoretical work has been conducted in our field of economics about this issue. Mishra et al. (2010) suggest developing procedures and examples of various transition plans to use in assisting

families with these important decisions. Determining which farm asset transition strategies have the highest probability of success could help farm owners keep the family business within the family. This research will formulate various combinations of the farm transition strategies mentioned above and develop a decision tool to show the implications of each plan for reducing post-transitional financial and family stress by educating farm families on how they can start a successful transitional process that fits their individual needs.

CHAPTER III

DATA AND METHODS

A goal of this research is to provide educational examples to support farm transition educational efforts. Thus, a hypothetical, yet representative, Oklahoma farm was developed to simulate the effect of farm transition strategies and provide meaningful results that can be applicable to a target audience of farm operators. The representative farm provided a foundation for the empirical model. Using the representative farm model, alternative strategies were each simulated 500 times to determine the probability of success for each strategy, with each model consisting of a 20-year planning horizon for the representative farm.

Development of the Representative Farm

The Kansas Farm Management Association (KFMA) consists of 25 economists who are faculty members of Kansas State University's Agricultural Economics Department. "The economists work cooperatively with farm families to provide members with production and financial management information that can be used when making farm business and family decisions" (KFMA). KFMA compiles the data collected from the farms and reports summaries used for research and Extension purposes in exchange for the services provided by their economists. KFMA statewide services comprise six regions, or associations. Each association reports a whole-farm summary report.

The summaries report income, expenses, balance sheet information, land usage, acreage levels, and farm financial ratios. Essentially, this report is an average of all of the farms within that respective association. The KFMA summary database was used to develop the representative farm as it is the largest, most comprehensive data, and closest geographically to Oklahoma.

A commercially viable, 1.0 FTE farm was established using benchmark farm financial ratios, enterprise budgeting, and other farm-descriptive data from KFMA. Farm assets, liabilities, net worth, income, financial ratios, and acreage levels from the Southeast KFMA Association helped establish the representative farm size. The Southeast Association has 244 farms within its membership. It was chosen as the primary data source as its association's average balance sheet, income levels, and acreage levels were approximately the desired size of the model representative farm.

The representative farm was assumed to average $100,000 in net farm income each year. This level of net farm income was chosen due to the assumption of family living expense being approximately $70,000 per year based on the Southeast KFMA Association data (KFMA 2017). If there were to be a chance of financing any alternative farm transition strategy, there would need to be free cash flow after the deduction of family living expenses. A net farm income ratio and debt to asset ratio were calculated using the KFMA summary data. Approximations of these ratios were used to further the development of representative farm. Dividing annual net farm income by a net farm income ratio of approximately 15 percent indicated a total value of farm production of $660,000. Dividing the value of farm production by an asset turnover ratio of 20 percent provided a total farm assets value of $3,300,000. In order to operate the farm, some level

of equipment and buildings were needed to include in the balance sheet. A detailed analysis of equipment and buildings were not calculated. An equipment compliment of $500,000 and buildings worth $100,000 were assumed.

Off-farm income was also included under the assumption many farm operations have at least one family member who works off the farm, bringing in additional household income. Per capita income for Oklahoma of $44,356 was used in the model farm as an after-tax off-farm income (BEA 2017).

With average income levels determined, values for the farm balance sheet were developed. The enterprise mixture of the representative farm consisted of half of the farm income coming from cattle production with the other half coming from crop production. In terms of total value of production, cattle and crops (wheat, corn, soybeans) are historically the largest of Oklahoma's agricultural commodities (NASS 2018). To reach a broad audience of producers in Oklahoma, a 50/50 enterprise split was established.

With half of the income of the representative farm generated from cattle production, the model required a value of breeding livestock within the balance sheet. The $330,000 in gross income from cattle production was divided by an average price per head of $1,110. Cattle weights and prices were in part derived from the Oklahoma State Stocker Budget (Sahs 2019). It is assumed the operation weans calves at 500 pounds and then grazes them on wheat pasture until they reach approximately 750 pounds. The average sale price per head was determined by multiplying the cattle weight by a typical stocker cattle price of $148 cwt (Sahs 2019).

By dividing gross income from cattle production by the average price per head, it was determined 297 cattle are needed to reach this level of income. Given that some cows

do not calve each year due to health, fertility, and nutrition reasons, a calving percentage is used to determine the total number of cows to reach 297 weaned calves. It is assumed this operation has an 88 percent calving percentage (Sahs 2019). Multiplying this percentage by the number of calves sold determined a cow herd of 338 head. The herd size was then multiplied by an average cost per cow of $1,210 to reach a total breeding livestock value of $408,784 (AMS 2019). Combining the equipment values and breeding livestock values, the total value of "operating assets" is $908,784.

Next, the value of land was determined. By subtracting the value of equipment, buildings, and breeding livestock from the total assets, the remaining asset value of $2,291,216 was the value of land. Assuming an average price of $2,000 per acre based on the Oklahoma Regional Cropland and Pasture Value Survey from Oklahoma State University, the farm owns 1,146 acres of land, a mixture of pasture and cropland acres.

A more conservative stocking rate than Bidwell and Redfearn determined is used in the model (Bidwell and Redfearn 2017). Using seven acres per cow, total pasture acres needed equaled 2,365 (Bidwell and Redfearn 2017). Stocking rates can vary greatly across operations and within certain regions of the state. The Oklahoma State Cow-Calf Enterprise Budget (2019) has a stocking rate of ten acres per cow. Seven acres was chosen as this producer can take advantage of crop acres, by grazing residue and wheat grazing.

With half of the gross income generated from crop production, $330,000 was divided by an average gross income of $250 per acre from the Oklahoma State University Crop Budgets (Sahs 2019) to reach total crop acres at 1,320. Adding pasture acres and

cropland acres together, the farm consisted of 3,685 acres. Subtracting the 1,146 owned acres, the farm leased an additional 2,539 acres.

Based upon KFMA data, it is assumed the farm has a debt to asset ratio of 20 percent, which is then multiplied by total assets to reach a total debt amount of $660,000. Because farm debt is not broken into current and noncurrent debt, it is assumed debt is amortized at 5.5 percent interest for 21 years. To calculate available cash flows, principal and interest payments are calculated using a term of 21 years. When subtracting liabilities from assets, the owners' equity is found to be $2,640,000. Table 1 gives the farm balance sheet.

Table 1. Balance Sheet

Assets		**Liabilities**	
Breeding Livestock	$408,784	Long-Term Debt	$660,000
Equipment	$500,000	**Total Liabilities**	**$660,000**
Total Operational Assets	$908,784		
Buildings	$100,000	**Owner's Equity**	**$2,640,000**
Land	$2,291,216	**Total Liabilities and**	
Total Assets	**$3,300,000**	**Owner's Equity**	**$3,300,000**

Representative Farm Family

The representative farm family consists of Mom, Dad, Farm Heir, and Off-Farm Heir. It is also assumed that everyone "lives on the averages," i.e. that significant life events for each hypothetical family member occur at the average age of such event for the relevant demographic segment. Based on age data from the Centers for Disease Control and Prevention (2016), it is assumed that Mom and Dad have their first kid, Farm Heir, at age 26, the average age U.S. couples have their first child. Two years later, Off-Farm Heir was born when Mom and Dad are 28 years old, the average age of couples

when their second child is born (CDC 2016). The model assumes Mom and Dad decide at 58 years old to plan for a farm transition. This is the average age of the American farmer according to the 2012 Census of Agriculture (NASS 2012). By this point, Farm Heir is 32 and Off-Farm Heir is 30. Using the Centers for Disease Control and Prevention mortality data, Dad passes away at 76, the average age of male mortality, and Mom passes away at 81, the average age of female mortality (CDC 2017). When Mom passes away, the Farm Heir is 55 years old and Off-Farm Heir is 53 years old. This is important to note because, from the time Mom and Dad realize the need for a farm transition plan, there are only 18 years left before Dad passes away and 23 years left before Mom passes away. It is also worth noting that the 20-year planning horizon has not been completed before Dad, the principal operator, passes away. Assuming that the Farm Heir takes control of the farm at the end of the planning horizon, Farm Heir is now 52 years old and only has 24 years left to operate the farm before he passes away at the age of 76. If Mom and Dad had not developed a farm transition plan - forcing Farm Heir to buy out Off-Farm Heir's share - this leaves a short window to pay off Off-Farm Heir for their portion of the farm.

Conceptual Framework and Alternative Strategies

In years when available cash flow is insufficient to fund the annual strategy's cash flow demands, operating debt at 6.25 percent interest is used to pay the remaining balance of the strategy's cash flow demands (Schrammel 2019). As the model conducted its simulations of each strategy, it was provided three separate criteria used in determining a strategy's success. While the criteria are interrelated in terms of mathematical calculations, each criteria functioned independently, *i.e.* the model reported

a failure of that strategy if one of the following conditions occurred at any point during one iteration of the simulation, based on that specific criterion:

1. If the representative farm debt to asset ratio ever reaches 0.60.
    a. A debt to asset ratio indicates the proportion of assets financed by debt. Based on Doye's (2017) Farm and Ranch Stress Test, a debt to asset ratio of 0.60 or higher indicates the farm business is at elevated financial risk. Some lenders will not extend any additional credit when a farm is this highly leveraged (Schrammel 2019).
2. If the farm incurs three consecutive years of unpaid operating debt.
    a. Based on an interview with a local agricultural lender, if a farm incurs three consecutive years of unpaid operating debt, the lender would stop the line of credit (Schrammel 2019). Such a condition indicates the operating debt represents "stale credit" and the unpaid operating debt would either be transformed into intermediate debt or the lender would simply close the operating line of credit. Ideally, a lender wants any operating debt paid off each year.
3. If the farm ever incurs any operating debt.
    a. Based on varying personal and family goals, some families may want a transition plan that incurs no operating debt to fund the alternative strategy cash flow demand. In addition, some farmers may want to reserve access to these funds to maintain borrowing capacity for operating purposes.
4. Only for scenario 5, if the cash reserves of Mom and Dad ever fall below 0.

a. Discussions with agricultural lenders led to the conclusion that if Mom and Dad do not have sufficient funds to gift or finance their lifetime estate transfer strategy, this strategy fails (Schrammel 2019). This criterion is also in place to preserve financial security for Mom and Dad in their later years. This preserves their available cash flows leading up to and during retirement.

The probability of success is determined by:

$$\max_{\Omega} Probability\big(Net\ Cash\ Flow_i(Strategy_i)\big) > 0$$

$$\Omega \in Strategy\{1, \dots, 5\}$$

Strategy 1—Split Down the Middle: In this strategy, Farm Heir and Off-Farm Heir receive the entirety of the farm asset base in undivided interests upon Mom's death (recall that under the model's assumptions, Dad will predecease Mom). Given that one estimate suggests 64 percent of farmers and ranchers have no estate plan (Spafford 2006), this scenario would be the most common strategy actually employed by farm families since the intestacy statutes of many states would divide the estate of the second-to-die spouse among the children of the marriage. In this scenario, it is assumed Off-Farm Heir demands a buyout of their portion of the farm. Many such heirs who are not actively involved in the family business would want their inheritance in the form of a liquid asset (Ferrell et al. 2013).

Notably, this scenario also assumes both heirs are inheriting a debt-free farm. In the Southeast KFMA Association data, farm operators over the age of 74 had sufficient funds in current assets to pay off any existing farm debt, and Mom and Dad both die after this age. Therefore, Farm Heir is purchasing one-half of total farm assets after the

liquidation of a portion of current assets to pay off any existing farm debt. After this liquidation and payoff, Farm Heir is purchasing $1,650,000 in assets. The most likely means of accomplishing this would be either: A) commercial loan from a third-party lender or B) seller financing/buy-sell agreement.

Strategy 1(a) Commercial Loan: Assuming the Farm Heir can qualify for a loan to purchase their sibling's half of the farm (which is a significant assumption given the amount of debt incurred), three separate loans would be needed under the lending policies of many agricultural lending institutions: one for the equipment, one for the cattle, and one for the real estate. Interest rates, term lengths, and down payments were all determined by discussing a situation like this with an agricultural lender (Schrammel 2019). Current interest rates for cattle notes are around 5.75 percent interest for five years with 20 percent down. This requires a down payment of $40,878 and an annual payment of $38,554. Current interest rates for equipment notes are 5.75 percent interest for five years with 20 percent down. The equipment note requires a down payment of $50,000 and an annual payment of $47,157. A typical real estate note has a 6.5 percent interest rate for 20 years with 20 percent down. This requires a $239,122 down payment and an annual payment of $86,807. While these amounts are the individual annual payments, the first five years require a total annual payment of $172,518 when adding the three annual payments together. Farm heir would be required to make the 20 percent down payments at transition, totaling $330,000. In the model, Farm Heir uses operating debt to assist in covering the full debt payments when there are insufficient funds. Some lenders may not allow this transaction to happen if available cash flows are insufficient to cover annual payments, leaving operating debt to cover the remaining balance.

Strategy 1(b) Family Loan: In this scenario, Off-Farm Heir agrees to seller financing and combines all three loans into one note. This strategy allows one to see how a lower interest rate and longer term would affect the debt service for Farm Heir. This note has a 20-year term at the current Applicable Federal Rate (AFR) of 3.05 percent. The Applicable Federal Rate is the lowest interest rate money can be loaned to a family member without it being considered a gift. Assuming the same 20 percent down payment of $330,000, the annual payment is $89,135. Farm Heir makes the 20 percent down payment, and when available cash flows are insufficient to cover this amount, Farm Heir uses operating debt to pay the remaining balance.

Strategy 2—Grow to Equal: In *Strategy 2*, Farm Heir receives all the farm assets at Mom's death, while Off-Farm Heir receives a financial asset equal to the value of the farm. This approach compensates both heirs with equal values and maintains the farming base. In order to accomplish this goal, Mom and Dad are essentially trying to double their asset base over the 20-year planning horizon. This aggressive financial goal may prove to be an unrealistic solution. With a present asset value of $3,300,000, Mom and Dad must develop a financial asset to equal this amount. The most likely means of achieving the goals of *Strategy 2* are for Mom and Dad to either a) create a sinking investment fund or b) purchase a permanent coverage, second-to-die whole life insurance policy.

Strategy 2(a) Investment Fund: After discussing this option with financial planners, an annual investment payment of $104,642 at an after-tax, real rate of return of 4.55 percent for 20 years would yield a $3,300,000 investment portfolio (Kreger and Werth 2018). This strategy assumes a constant rate of return.

Strategy 2(b) Life Insurance: Under this strategy, Mom and Dad purchase a permanent coverage, a second-to-die whole life insurance policy at age 58. Because various factors such as age, health, and the insurance provider impact insurance premiums, numerous quotes for varying amounts of coverage were collected from three separate insurance companies. The quotes assumed Mom and Dad were non-smokers, and had no preexisting medical conditions. The premium quotes returned were used to calculate an "annual rate of return" for the policies, to be used as a proxy in determining the annual insurance premiums. The annual rates of return varied from 6 percent-29 percent, with an average of 11 percent and a mode of 9 percent. Using a 9 percent annual rate of return as a proxy, the annual insurance premium would require a cash flow demand of $64,503.

Life insurance out-performs the investment portfolios because it is in a tax-sheltered vehicle. Proceeds from life insurance policies are not taxable. The life insurance consistently yields lower cash flow demands due to tax drag associated with the investment portfolios. Tax drag is the loss in returns of an investment as a result of the taxation of the income.

Strategy 3—Estate Balancing: In *Strategy 3*, Mom and Dad place the farm operating assets and real estate in separate entities, respectively. An operating entity is a legally recognized entity that houses assets, such as an LLC. This particular operating entity consists of the breeding livestock and equipment. At Mom's death, Farm Heir receives ownership of the operating entity. Farm Heir and Off-Farm Heir receive equal interests in the land entity. The farm entity pays fair market value rents to the land entity, which distributes that income back to the Farm Heir and Off-Farm Heir (based on their

equal proportion of ownership, but has restrictions pertaining to the ability to sell interest in the land entity). Mom and Dad also create a financial asset to equal the value of the operating entity and give it to the Off-Farm Heir as their form of inheritance.

This particular strategy directly addresses the challenge of transferring farm land base. Separating the land base from the value of the financial asset needed to compensate Off-Farm Heir would lower the annual strategy cash flow demand and is more attainable. With a breeding livestock value of $408,784 and an equipment value of $500,000, the present farm operating asset value is $908,784. This is the amount needed to give Off-Farm Heir. As with *Strategy 2*, Mom and Dad could implement this strategy by a) creating a sinking investment fund or by b) purchasing a permanent coverage, second-to-die whole life insurance policy.

Strategy 3(a) Investment Fund: An annual investment payment of $28,817 at an after-tax, real rate of return of 4.55 percent for 20 years would yield a $908,784 investment portfolio. This strategy assumes a constant rate of return.

Strategy 3(b) Life Insurance: As outlined in the discussion of *Strategy 2(b)*, a 9 percent annual rate of return was used as a proxy to determine the annual insurance premium, which for a coverage amount of $908,784 would require payments of $17,764 per year. Life insurance consistently out-performs the investment portfolios due to the tax-drag of the sinking fund investment.

Strategy 4—Sweat Equity Recognition/Discount: Strategy 4 mirrors *Strategy 3* in that the farm operating assets and real estate are placed in separate entities. Upon Mom's death, Farm Heir receives the operating entity, and Farm Heir and Off-Farm Heir receive equal interests in the land entity. The operating entity pays fair market value rents to the

land entity, which is then equally distributed back to Farm Heir and Off-Farm Heir (based on their equal proportion of ownership, but has restrictions pertaining to the ability to sell interest in the land entity). However, the two strategies differ in the amount of inheritance Off-Farm Heir receives. In this strategy, Mom and Dad create a financial asset to equal one-half the value of the operating entity and give it to the Off-Farm Heir as their inheritance.

This strategy was selected for two reasons. First, the intent is to recognize the time, management, labor, and capital Farm Heir has invested in the farm to help it grow by granting Farm Heir greater value relative to Off-Farm Heir. Essentially, this is a discount in the amount of value given to Off-Farm Heir. Secondly, as the real estate value encompasses such a large portion of the farm asset base, separating land value from the value of the financial asset needed to compensate Off-Farm Heir lowers the annual strategy cash flow demand and is more attainable. In this case, 69 percent of the value of farm assets are in real estate. With a breeding livestock value of $408,784 and an equipment value of $500,000, the present farm operating asset value is $908,784. Dividing this asset value in half yields a value of $454,392. This is the amount needed to give Off-Farm Heir. This strategy can be accomplished in two ways: a) sinking investment fund or by b) permanent coverage, second-to-die whole life insurance policy.

Strategy 4(a) Investment Fund: An annual investment payment of $14,409 at an after-tax, real rate of return of 4.55 percent for 20 years would yield a $454,392 investment portfolio. This strategy assumes a constant rate of return.

Strategy 4(b) Life Insurance: At age 58, a permanent coverage, a second-to-die whole life insurance policy is purchased. As with the previously-discussed strategies, a 9

percent annual rate of return was used as a proxy to determine annual premiums, which for this strategy amounted to $8,882. Again, the life insurance yields a lower cash flow demand relative to the investment fund due to the tax drag associated with the investment fund.

Strategy 5—Lifetime Farm Business Transfer: Up to now, the strategies discussed are at-death transfers. Next, lifetime farm business transfers are evaluated to determine whether the lifetime transfer provides a more financially-viable path for all stakeholders in comparison to at-death transfers.

One of the reasons some farm owners wait until death to transfer the farm is due to delaying retirement. Farmers often delay retirement for a variety of reasons. It can be difficult for farm owners to distance themselves or retire from the farm since personal and business lines are often blurred, partly due to living on the farm and its emotional ties (Mishra et al. 2010). Their unwillingness to discuss and consider their emotional ties as being part of their decision to delay retirement can conflict with their goal of wanting their family farm to stay within the family and continue to grow (Kirkpatrick 2013).

Strategy 5 is a gradual transfer of ownership and management from one generation to the next. This allows both generations to actively work together while living to aid in the continuity of the operation. As with *Strategy 3* and *Strategy 4*, farm operating assets are placed in an operating entity, with a separate entity holding the farmland. Each year, the Farm Heir receives a salary of $42,000 from the farm. Farm Heir then purchases shares of the operating entity with their salary. With each additional share purchased, Farm Heir receives a larger portion of the farm income as well as responsibility for a larger portion of the existing debt payments. With an operating entity

value of $908,784, transferring 5 percent of the farm each year for 20 years would require annual payments of $45,439. In years when the Farm Heir is unable to make the full payment, Mom and Dad gift the difference. In *Strategy 5*, any gifts Mom and Dad may grant to Farm Heir is considered this strategy's cash flow demand. As Farm Heir receives larger portions of income, Mom and Dad are not required to gift as much in the later years of the transition since Farm Heir is receiving a larger distribution of farm income and has set aside reserve funds in years of above average income.

Mishra and El-Osta (2008) suggest a good farm transition plan should consider retirement incomes for the preceding generation. Baker et al. (2000) found, of the farmers who plan to retire, many expected their retirement income to come from continued operation of the farm. Kirkpatrick (2013) found that Social Security is the most common form of retirement income.

In Mom and Dad's later years of the transition when their farm income distributions are smaller than that of Farm Heir's, but operating entity payments from Farm Heir, Social Security benefits, and farm income distributions help preserve a quality of life. Assuming Mom's off-farm income was an annual salary of $44,356 and Dad paid on average $15,300 in self-employment tax each year, this would allow them to draw $45,141 per year in Social Security benefits starting at age 66 (Hobbs 2019).

After the transition, Farm Heir and Off-Farm Heir receive equal interests in the land entity. The farm entity pays fair market value rents to the land entity, which is then equally distributed back based on their proportion of ownership to the Farm Heir and Off-Farm Heir.

Mom and Dad are not investing any funds to grow a financial asset which would be used to compensate Off-Farm Heir with a form of inheritance. Any excess funds from net cash flow Mom and Dad may have at the end of the transition would then be split between Farm Heir and Off-Farm Heir, net any gifts Farm Heir received over the years to help fund this transition.

Empirical Model

In order to determine the feasibility of each strategy, the available cash flow must be calculated based on the farm financial characteristics. Below is a system of equations used to reach net cash flows.

(1) $Net\ Farm\ Income = Net\ Farm\ Income\ Before\ Interest\ Deductions - Interest\ Expense$

(2) $Self\ Employment\ Tax = 0.153 * Net\ Farm\ Income$

(3) $Adjusted\ Gross\ Income = Net\ Farm\ Income - Self\ Employment\ Tax$

(4) $Taxable\ Income = Adjusted\ Gross\ Income - 24{,}000 - (0.20 * Net\ Farm\ Income) - (0.50 * Self\ Employment\ Tax)$

(5) $Federal\ Income\ Tax = Taxable\ Income * Married\ Filed\ Joint\ Tax\ Rate$

(6) $Cash\ Flow = Net\ Farm\ Income + Off\ Farm\ Income - Family\ Living\ Expense - Federal\ Income\ Tax - Principal\ Payments$

(7) $Net\ Cash\ Flow = Cash\ Flow - Alternative\ Stategy\ Cash\ Flow\ Demand$

Because interest expense is deducted to calculate net farm income, farm debt was amortized over the planning horizon to determine annual principal and interest payments. Because Dad is self-employed, he must pay self-employment tax each year. Net farm

income is multiplied by 15.3 percent to compute self-employment tax. Subtracting the self-employment tax from net farm income yields adjusted gross income. This is used to determine Mom and Dad's taxable income. Because Mom and Dad are filing joint tax returns, a standard deduction of $12,000 per person ($24,000 per couple) is deducted. Additionally, according to the current tax law, 20 percent of net farm income and 50 percent of any self-employment tax paid is also deductible. Subtracting these three deductions from adjusted gross income yields taxable income. The federal income tax is then calculated based on the Married Filing Joint tax bracket Mom and Dad fall into based on their level of taxable income.

With taxes calculated, net cash flow can be calculated. Adding net farm income and off-farm income together, subtracting family living expense, federal income taxes, and principal payments on debt yields available cash flow. This is the available cash used to fund each respective farm transition strategy.

For *Strategy 5,* these calculations only slightly differ as 85 percent of any Social Security (SS) benefits Mom and Dad receive are taxed as ordinary income. The equation below illustrates the equation for taxable income including SS benefits.

(8) $$Taxable\ Income = Adjusted\ Gross\ Income + (0.85 * Social\ Security\ Benefits) - 24{,}000 - (0.20 * Net\ Farm\ Income) - (0.50 * Self\ Employment\ Tax)$$

Net farm income data from 2005-2017 was taken from the KFMA Southeast Association. Income was converted to real terms using a CPI index from the Bureau of

Labor Statistics, with 2017 as the base year. Mean income was $122,778 with a standard deviation of $50,484. The standard deviation was divided by the mean to calculate the coefficient of variation of 0.4112. This coefficient was then multiplied by average income of the representative farm to determine the standard deviation of net farm income. With an average income of $100,000 and a standard deviation of $41,118, a Monte Carlo simulation is used to determine a normally-distributed farm income each year. This means that every year of the 20-year planning horizon has a new, randomly drawn farm income.

Applying variability in net farm income translates to variability in available cash flow. This cash flow is used to fund the demands of each respective alternative strategy. Using Visual Basic for Applications (VBA) within Excel, each alternative strategy is simulated 500 times. Each failure within one 20-year iteration is reported by a 1. Adding the number of failed simulations and dividing by the total number of iterations provides the probability of failure. Subtracting this number from 1 yields the probability of success.

If a strategy causes the farm to reach a debt to asset ratio of 0.60 or more in any particular year over the 20-year planning horizon, that iteration is deemed a failure for that criterion. If, for example, 100 of the 500 iterations of the simulation generate a failure, that strategy has an 80 (400/500) percent probability of success.

If a strategy causes the farm to incur three or more consecutive years of operating debt to fund the strategy over the 20-year planning horizon, that iteration run is deemed a failure, based on the second criterion. If, for example, 50 of the 500 iterations of the

simulation encounter a failure, that strategy has a 90 (450/500) percent probability of success.

If a strategy causes the farm to incur any operating debt at any point during the 20-year planning horizon, that iteration run is deemed a failure, based on the third criterion. If, for example, 200 of the 500 iterations of the simulation encounter a failure, that strategy has a 60 (300/500) percent probability of success.

Lastly, specifically for *Strategy 5*, if the cash reserves of Mom and Dad fall below zero, that iteration is deemed a failure based on criterion 4. For example, if they do not have sufficient funds to gift Farm Heir the required amount to cover the remaining balance of the entity payment any year during the transfer process, that iteration is deemed a failure. If, for example, 25 of the 500 iterations of the simulation encounter a failure, that particular strategy has a 95 (475/500) percent probability of success.

Finally, to determine how the probability of success would change by varying average income levels, a sensitivity analysis was conducted for each strategy by ranging net farm income from $60,000-$140,000 per year and recalculating the probability of successful transitions. The same coefficient of variation (0.4112) was used to calculate standard deviations for each income level. The new mean incomes and standard deviations were then used to generate new normally distributed, random draws in income. The model is then simulated in the same manner as before.

CHAPTER IV

RESULTS

Excel spreadsheets were used to calculate net cash flow over a 20-year planning horizon, subject to each alternative strategy's cash flow demand. Using a Monte Carlo simulation, farm income is randomly drawn from a normally distribution for each year of the simulation. VBA was then used repeat the random draws 500 times. By dividing the number of successes by the total number of iterations, a probability of success was determined for each alternative strategy. Table 2 presents the probability of success for each strategy under each criteria.

Table 2. Alternative Strategies' Probability of Success

Strategy	D/A Ratio < 0.60	Op. Debt < 3 years	No Op. Debt	Cash Reserves >0
1(a)	1%	0%	0%	N/A
1(b)	100%	4%	0%	N/A
2(a)	100%	0%	0%	N/A
2(b)	100%	1%	1%	N/A
3(a)	100%	96%	89%	N/A
3(b)	100%	100%	97%	N/A
4(a)	100%	100%	97%	N/A
4(b)	100%	100%	99%	N/A
5	100%	N/A	N/A	99%

Strategy 1(a) Commercial Loan: Farm Heir purchasing Off-Farm Heir's undivided one-half interest in the farm assets poses a challenge, as shown by the low success rates in Table 2. This is more striking when considering in the first scenario.

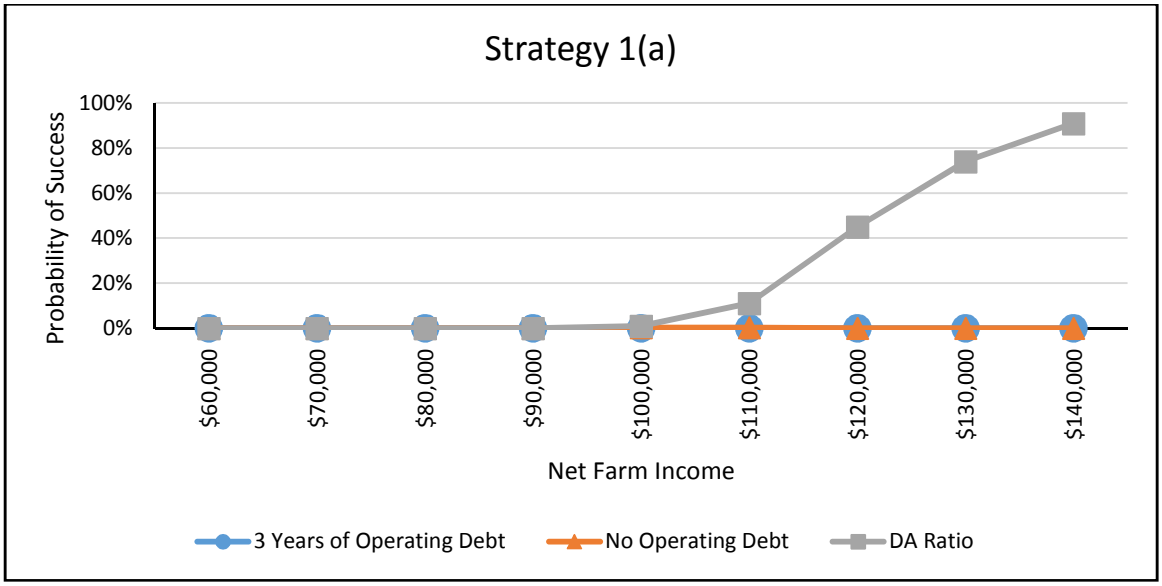
At transfer, this scenario requires a 20% down payment for one half of asset values. When combining cattle, equipment, and real estate down payments, Farm Heir must pay a total of $330,000 at transfer. Even if there are sufficient funds to cover such a large down payment, this strategy proves to be infeasible if relying on the farm to generate sufficient cash flow to service the annual debt payments. Farm Heir must rely on savings or use an operating line of credit. An annual cattle note payment of $38,554 for five years, an annual equipment note payment of $47,157 for five years, and an annual real estate payment of $86,807 for 20 years is then required. Summing these individual annual payments, the first five years require total annual payment of $172,518. At $100,000 in annual net farm income, the farm business does not generate sufficient funds to cover debt service requirements.

The results in Table 2 show the farm the farm exceeds a debt to asset ratio of 0.60 99 percent of the time. The farm is at financial risk of defaulting on their loans nearly every time. The farm is simply too highly leveraged (and note: it is assumed that both heirs are inheriting a debt-free farm as described in Chapter 3). When using an operating line of credit to assist with the debt payments, there is a 0% probability of having fewer than three consecutive years of unpaid operating debt. There is also a 0% probability of implementing the strategy without incurring no operating debt. As lines of credit differ across lending institutions, some farm owners may not have access to a line of credit, or

would rather preserve these funds to use solely for operations. From Table 2, *Strategy 1(a)* proves to be completely infeasible.

The sensitivity analysis for this strategy determined increasing the income levels increased the probability of success in terms of staying below the 0.60 debt to asset ratio threshold, but did not affect the probability of success when considering operating debt criteria levels. Figure 1 presents the results of this sensitivity analysis.

Figure 1. Probability of Success for Strategy 1(a) with Varying Income Levels



Strategy 1(b) Family Loan: As with *Strategy 1(a),* farm assets are bequeathed to Farm Heir and Off-Farm Heir in undivided interests. This time a family loan, or a buy-sell agreement, is used instead of a commercial lender, and all debts have been combined into one note. It is once again assumed existing debt has been paid off and that Farm Heir is purchasing $1,650,000 in assets. Assuming 20 percent down, a payment of $330,000 is needed. Even if there are sufficient funds to cover such a large down payment, this strategy proves to be infeasible if relying on the farm to generate sufficient cash flow to

service the long-term annual debt payments. When there are insufficient funds to make the down payment, operating debt is used to pay the remaining balance. At the AFR of 3.05% for 20 years, this requires a payment of $89,135 from Farm Heir to Off-Farm Heir each year.

Purchasing Off-Farm Heir's portion of the assets is still challenging. Farm Heir is once again purchasing farm assets with no attendant debts, but the farm business does not consistently generate sufficient funds to cover debt service at an average net farm income level of $100,000.

The results in Table 2 show the farm will never reach the debt to asset ratio threshold of 0.60 in the simulation. Although the farm immediately starts at a debt to asset ratio of 0.50 ($1,650,000÷$3,300,000), the additional amount of operating debt used to help fund the debt payments never increases the total debt amounts to $1,980,000, the amount required to reach at 0.60 debt to asset ratio. Based solely on this criteria, this strategy is a success.

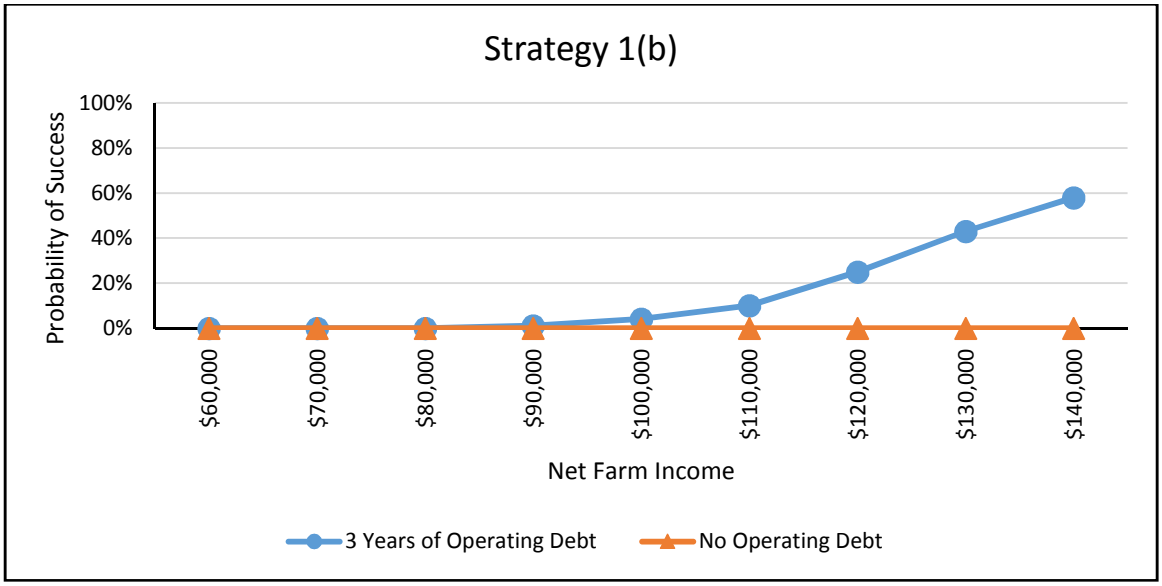
However, that success rate is deceiving. When using an operating line of credit to assist the debt payments, there is only a 4% probability of having fewer than three consecutive years of unpaid operating deb. This means 96% of the time, the line of credit could no longer be used to help fund the buyout since it should be paid off at the end of each year. An agricultural lender would likely freeze the line of credit and transfer any existing operating debt to intermediate debt (Shrammel 2019). There is also a 0% probability of success for not incurring any operating debt with this strategy. A new owner wanting to purchase the sibling's portion of the farm assets would need to have access to a line of credit for this scenario to work. However, even if they had access to

the funds, it would only be helpful in financing this strategy 4% of the time. Based off of the statistics in Table 2, *Strategy 1(b)* proves to be almost as infeasible as *Strategy 1(a)* if the goal is to keep the operation in tact after transition.

The sensitivity analysis showed while increasing income levels corresponded with an increase in the probability of having fewer iterations with three or more consecutive years of unpaid operating debt, it did not affect the probability of incurring no operating debt. It is worth noting even with income levels 40 percent above the assumed income, *Strategy 1(b)* still only has a 58 percent chance of success based on the three consecutive years of unpaid operating debt criterion.

Note: because the debt to asset criteria was successful 100% of the time, it is not included in the graph for *Strategy 1(b)* or any subsequent graphs.

Figure 2. Probability of Success for Strategy 1(b) with Varying Income Levels



Strategy 2(a) Investment Fund: In *Strategy 2(a)*, farm assets are given to Farm Heir while Mom and Dad create a financial asset to equal the value of the farm. This financial asset serves as Off-Farm Heir's inheritance while Farm Heir inherits all of the farm assets. For farm owners who are set on giving each heir equal amounts of inheritance, this option proves to be nearly as challenging as *Strategy 1(a).* This is due to the fact that Mom and Dad are doubling their asset base over the 20-year planning horizon. This proves to be a tremendous financial burden. With the present farm asset value at $3,300,000 and an after-tax, real rate of return of 4.55% for 20 years, the annual investment payment required is $104,642. With net farm income of $100,000 per year, the farm business does not generate sufficient funds to service this payment.

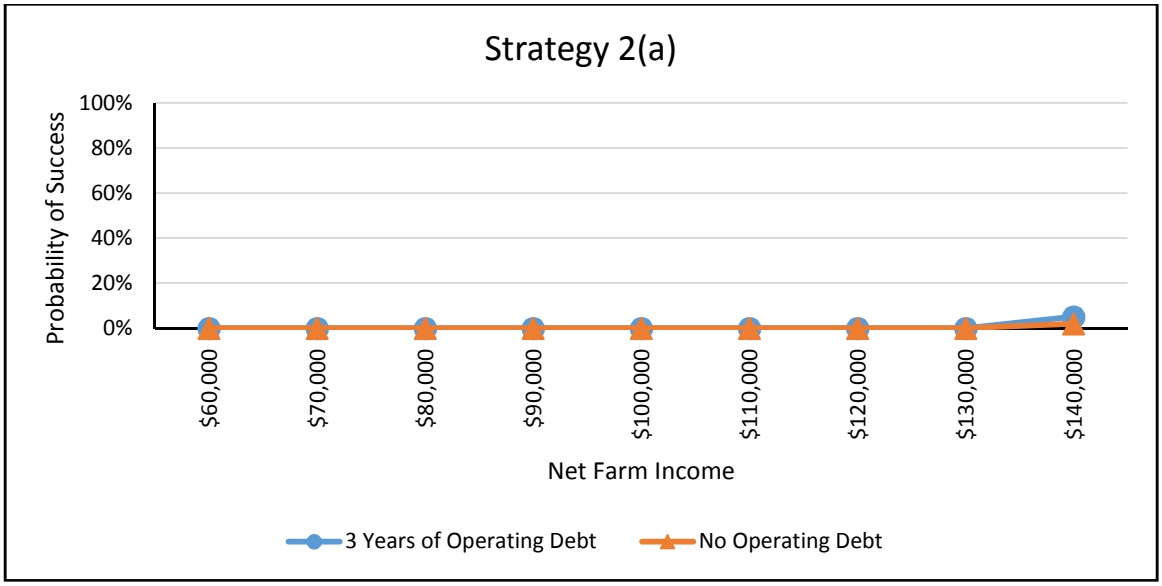
The results in Table 2 show the farm will never reach a debt to asset ratio threshold of 0.60 in any of the simulations. Mom and Dad are paying off their long-term debt throughout the 20-year planning horizon (as they do in each of the following strategies, as well). The additional amount of operating debt used to help fund the annual investment payments never increases the total debt amount to $1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based solely on the debt to asset ratio criteria, this strategy is a success.

When using an operating line of credit to assist with the annual investment payments, the statistics are much different. There is a 0% probability of having fewer than three consecutive years of unpaid operating debt. Based on these results, there is also a 0% probability of success for not incurring any operating debt. Based off of Table 2, *Strategy 2(a)* proves to be the second most challenging and unsuccessful strategy to

transfer the farm. At $100,000 in annual net farm income, the farm business does not generate sufficient funds to cover the annual investment payment.

The sensitivity analysis showed increasing the income level to $140,000 per year had a negligible effect. The probability of success of having fewer iterations with three or more consecutive years of operating debt and incurring no operating debt slightly increased but not enough to warrant recommending this strategy to any farm operators.

Figure 3. Probability of Success for Strategy 2(a) with Varying Income Levels



Strategy 2(b) Life Insurance: Strategy 2(b) mirrors *Strategy 2(a)* in that farm assets are given to the Farm Heir while Mom and Dad create a financial asset to equal the value of the farm. This financial asset serves as the Off-Farm Heir's inheritance while the Farm Heir inherits the farm assets. For farm owners who are set on giving each heir equal amounts of inheritance, this option proves to be nearly as challenging as *Strategy 2(a)*.

This strategy differs by the use of the mechanism used to reach the same value as before. At age 58, Mom and Dad purchase a second-to-die, whole life insurance policy

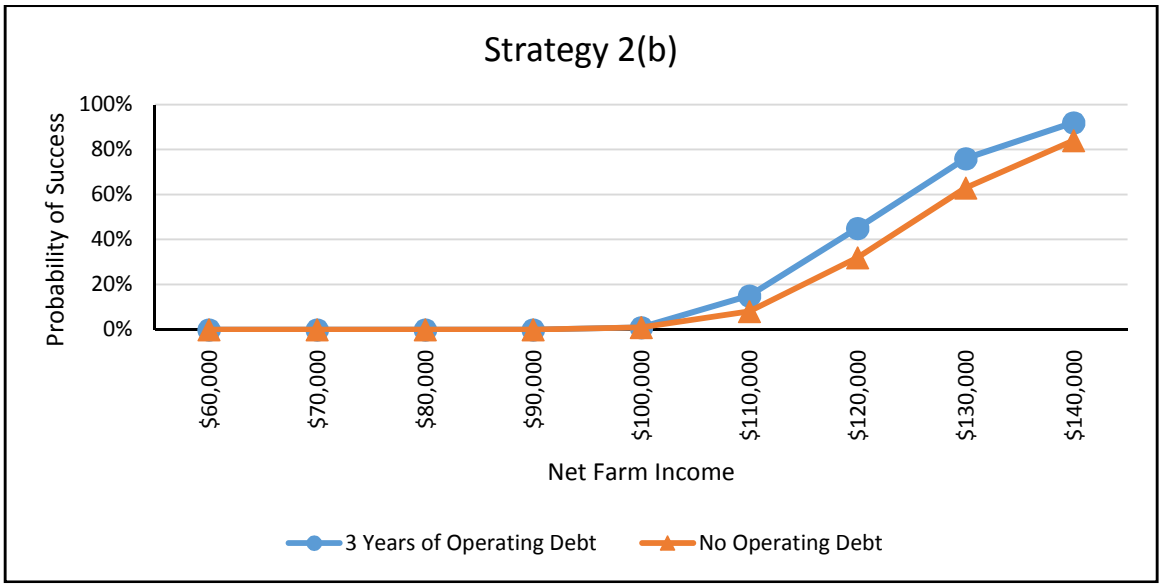
with a coverage amount of $3,300,000. Mom and Dad pay into the life insurance policy for 20 years, which requires an annual insurance premium of $64,503. With an average net farm income of $100,000 per year, this payment is more attainable than the previous options but still poses formidable challenges.

Table 2 shows the farm will never reach a debt to asset ratio of 0.60 based on the simulation. The additional amount of operating debt used to fund the annual insurance premium never increases the total debt amount to $1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based on this criteria, this strategy is a success.

When using an operating line of credit to assist with the annual insurance premium, the statistics are much different. There is a 1% probability of having fewer than three consecutive years of unpaid operating debt. There is also a 1% probability of success for not incurring any operating debt. The difference between the two strategies is the financial asset used to reach the desired amount. At its current level of $100,000 in annual net farm income, the farm business does not generate sufficient funds to cover the annual insurance premium.

Sensitivity analysis reveals that, although the current level of net farm income proves to be insufficient to fund this strategy's cash flow demand 99% of the time, increasing the level of income unsurprisingly increases the probability of success based on the operating debt criteria. Once the income reaches $140,000 per year, the probability of success reaches over 80%. If a farm owner is entrenched in choosing this strategy, increasing their profitability would increase their probability of success.

Figure 4. Probability of Success for Strategy 2(b) with Varying Income Levels



Strategy 3(a) Investment Fund: Strategy 3 diverges significantly from the approaches of *Strategy 1* and *Strategy 2*. In *Strategy 3(a)*, the farm operating assets and real estate are placed in separate entities. Farm Heir receives the operating entity, which consists of breeding livestock and equipment. Farm Heir and Off-Farm Heir receive equal interests in the land entity, but have restrictions pertaining to the ability to sell their interest in the land entity. The farm entity pays fair market value rents to the land entity, which are then equally distributed back to Farm Heir and Off-Farm Heir. Mom and Dad create a financial asset to equal the value of the operating entity and give it to Off-Farm Heir as a portion of their inheritance.

Strategy 3 moves closer to a feasible transfer strategies, since it functionally separates the land base from the value of the financial asset to give Off-Farm Heir. With a breeding livestock value of $408,784 and an equipment value of $500,000, the present

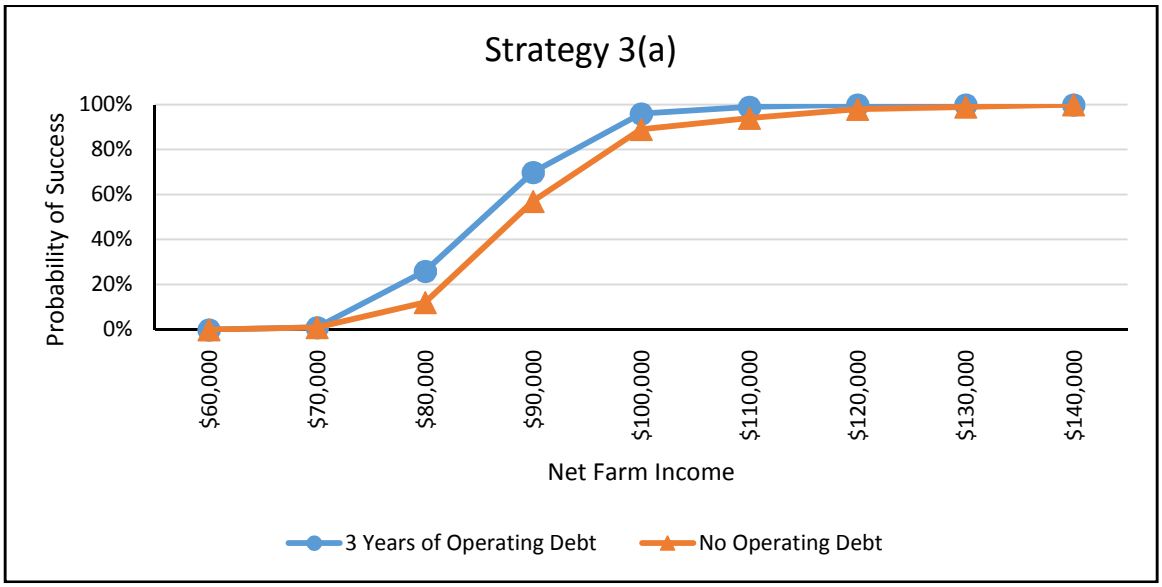
farm operating asset value is $908,784. Using an after-tax, real rate of return of 4.55% for 20 years, the annual investment payment required is $28,817.

The lower demands to fund this strategy lead to higher predicted success rates. Table 2 shows the farm will never reach a debt to asset ratio of 0.60 based on the simulation. The additional amount of operating debt used to help fund the annual investment payments never increases the total debt amount to $1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based on this criteria, this strategy is a success.

When using an operating line of credit to assist with the annual investment payments, the statistics show more attainable results. There is a 96% probability of having fewer than three consecutive years of unpaid operating debt. While there is still a 4% chance of not meeting this criteria, this may be a risk some farm owners are willing to take if this strategy aligns with their goals. When focusing on the option of financing this strategy without incurring any additional debt, there is an 89% probability of success.

Increasing the income levels certainly increased the probability of success of not having three or more consecutive years of operating debt and incurring no operating debt. When increasing the income level to $140,000 per year, both criteria are met 100% of the time. As farm operators become more profitable, this option quickly becomes more successful.

Figure 5. Probability of Success for Strategy 3(a) with Varying Income Levels



Strategy 3(b) Life Insurance: Strategy 3(b) mirrors *Strategy 3(a)* except the financial asset given to Off-Farm Heir is a life insurance policy. At age 58, Mom and Dad purchase a second-to-die, whole life insurance policy for $908,784. Mom and Dad pay into the life insurance policy for 20 years, which requires an annual insurance premium of $17,764. With an average net farm income of $100,000 per year, this payment is more attainable than several of the previous options. Life insurance yields a lower cash flow demand due to the tax drag associated with the investment fund.

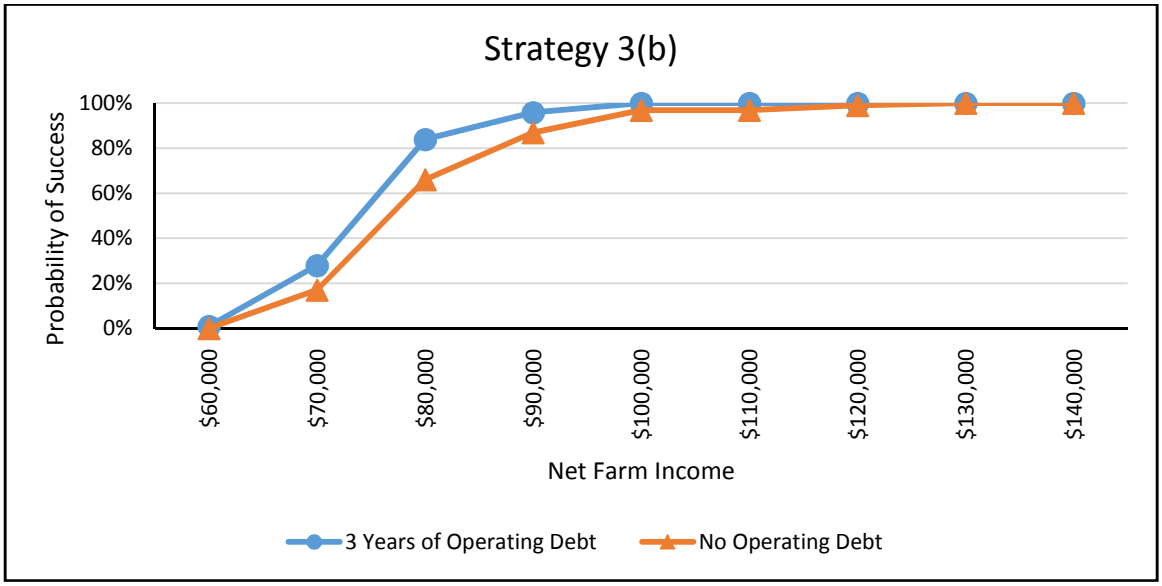
The results in Table 2 indicate the farm will not reach a debt to asset ratio of 0.60 100% of the time. Mom and Dad are paying off their existing long-term debt and not incurring additional operating debt to help fund the annual insurance premiums. Based on this criterion, this strategy is a success.

When using an operating line of credit to assist with the annual insurance premium, the statistics yield even more successful results. There is a 100% probability of

having fewer than three consecutive years of unpaid operating debt. When focusing on the option of financing this strategy without incurring any additional debt, there is a 97% probability of success. The risk associated with this strategy is greatly reduced when compared to the previous strategies and may align with many operators' risk preference.

Sensitivity analysis shows increasing the income levels certainly increased the probability of success of not having three or more consecutive years of operating debt and incurring no operating debt. When increasing the income level to $130,000 per year, both criteria are met 100% of the time.

Figure 6. Probability of Success for Strategy 3(b) with Varying Income Levels



Strategy 4(a) Investment Fund: Strategy 4(a) mirrors *Strategy 3(a)* in that the farm operating assets and real estate are placed in separate entities, respectively. This is a more attainable transfer strategy, due to separating the land base from the value of the financial asset needed to give Off-Farm Heir and reducing the proportionate value of the gift to Off-Farm Heir with respect to the value of operating assets. With a breeding

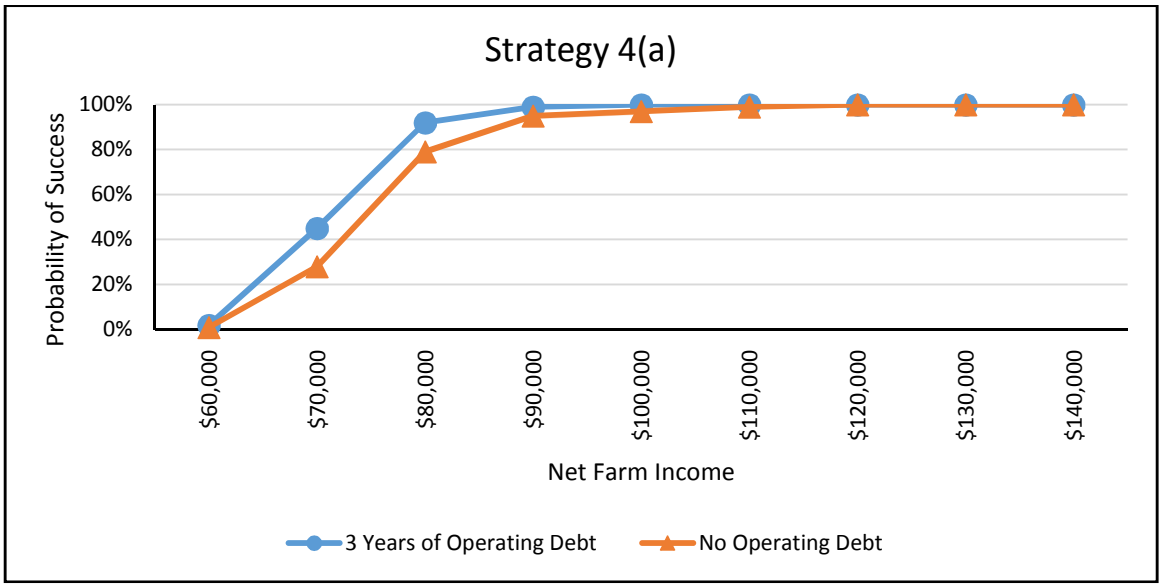
livestock value of $408,784 and an equipment value of $500,000, the present farm operating asset value is $908,784. Dividing this asset value in half yields a value of $454,392. Using an after-tax, real rate of return of 4.55% for 20 years, the annual investment payment required is $14,409. With an average net farm income of $100,000 per year, financing this strategy is more manageable.

Table 2 shows the farm will never reach a debt to asset ratio of 0.60 based on the simulation. The additional amount of operating debt used to help fund the annual investment payments never increases the total debt amount to $1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based on this criteria, this strategy is a success.

When using an operating line of credit to assist with the annual investment payments, the statistics yield more successful results than many of the other strategies. Curiously, this strategy yielded the same results as *Strategy 3(b).* This could be due to both strategies having relatively close cash flow demands when compared to the other strategies. There is a 100% probability of having fewer than three consecutive years of unpaid operating debt. When focusing on the option of financing this strategy without incurring any additional debt, there is a 97% probability of success. This means that 3% of the time, the farm may have to incur some level of operating debt, but is minimal. The risk associated with this strategy is greatly reduced when compared to the previous strategies.

Sensitivity analysis revealed increasing the income level to $120,000 per year meant both operating debt criteria are met 100% of the time.

Figure 7. Probability of Success for Strategy 4(a) with Varying Income Levels



Strategy 4(b) Life Insurance: As with the comparison of *Strategies 3(a)* and *3(b), Strategy 4(b)* differs from *Strategy 4(a)* in that *Strategy 4(b)* employs a life insurance policy to provide a gift to Off-Farm Heir. At age 58, Mom and Dad purchase a second-to-die, whole life insurance policy for $454,932. Mom and Dad pay into the life insurance policy for 20 years, which requires an annual insurance premium of $8,882. With an average net farm income of $100,000 per year, financing this strategy is more manageable. It provides the lowest cash flow demand when compared to the previous options. As mentioned earlier, life insurance consistently out-performs the investment portfolios due to the tax-drag.

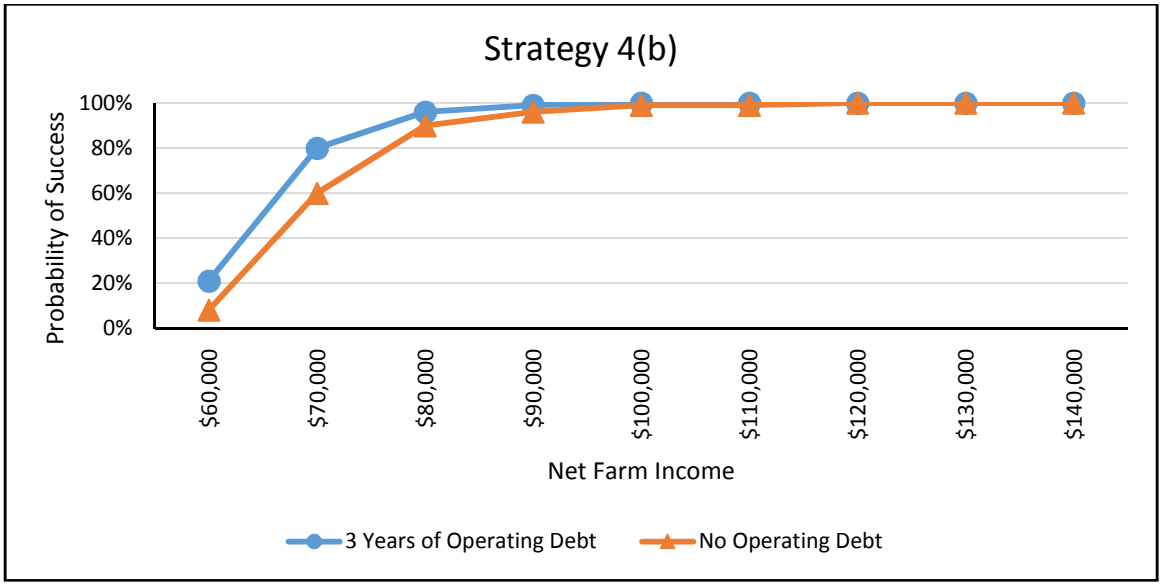
Table 2 shows the farm will never reach a debt to asset ratio of 0.60 100% based on the simulation. The additional amount of operating debt used to help fund the annual insurance premiums never increases the total debt amount to $1,980,000, the amount

required to reach a 0.60 debt to asset ratio. Based on this criteria, this strategy is a success.

When using an operating line of credit to assist with the annual insurance premium, the statistics yield some of the best results. There is a 100% probability of having fewer than three consecutive years of unpaid operating debt. When focusing on the option of financing this strategy without incurring any additional debt, there is a 99% probability of success. This means that 1% of the time, the farm may have to incur some level of operating debt, but is minimal. The risk associated with this strategy is greatly reduced when compared to the previous strategies.

Sensitivity analysis reveals both operating debt criteria are met 100% of the time when increasing the income level to $120,000.

Figure 8. Probability of Success for Strategy 4(b) with Varying Income Levels



Strategy 5 Lifetime Farm Business Transfer: Strategy 5 proves to be another strategy with a high probability of success. Mom and Dad are not incurring any additional debt to fund the transfer. Therefore, the operating debt criteria are not applicable to this situation. Also, Mom and Dad are not investing any additional funds to grow a financial asset which would be used for Off-Farm Heir's inheritance. Any excess funds Mom and Dad may have at the end of the transition would be split between Farm Heir and Off-Farm Heir, net any gifts Farm Heir received over the years to help fund this transition.

On average, Mom and Dad gifted $160,523 to Farm Heir over the 20 year transition. At the end of the transition, Mom and Dad had on average $749,564 remaining in savings. By adding these two numbers together and dividing by two, each heir should receive $455,043 in order to get equal amounts of cash. Because Farm Heir has already received $160,523 they inherit $294,520 from the cash reserves. Off-Farm Heir will inherit the remaining balance of $455,043.

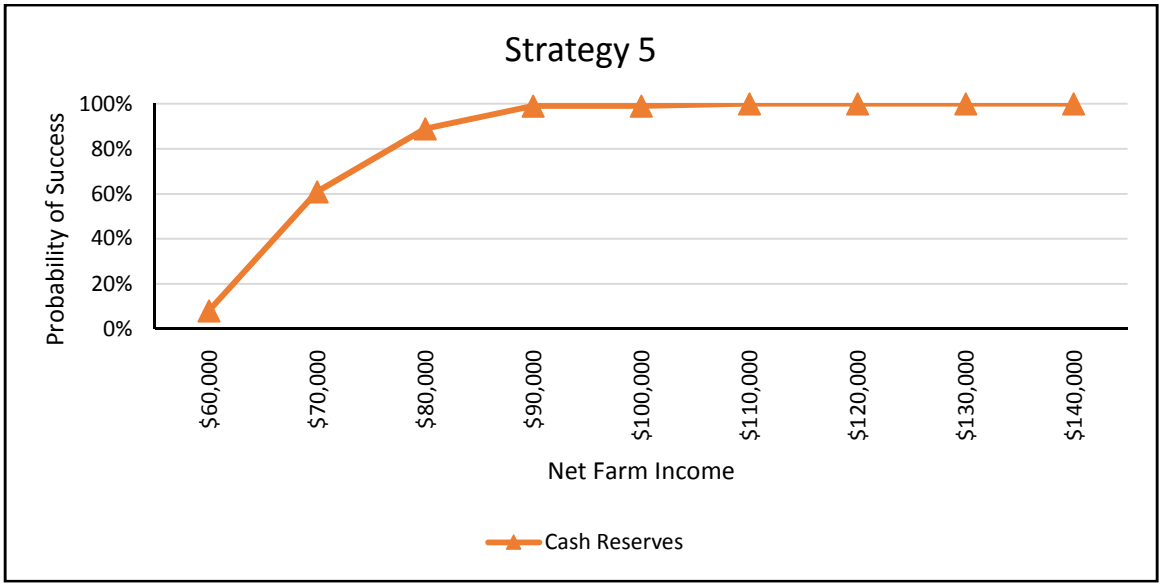
Table 2 shows the farm will never reach a debt to asset ratio of 0.60 based in any simulation with net farm income at $100,000 per year. This is because Mom and Dad do not incur any additional debt to fund the transfer. Mom and Dad, as well as Farm Heir, are paying off their respective proportion of long-term debt throughout the transfer. The total debt never reaches $1,980,000, the amount required to reach at 0.60 debt to asset ratio. Based on this criteria, this strategy is a success.

Mom and Dad's cash reserves are used to gift to Farm Heir in years when there are insufficient funds to pay the full annual entity payment and are used to compensate both heirs at the end of the transition. Table 2 shows there is a 99% probability of success

their cash reserves will never be less than 0. This means that 1% of the time, Mom and Dad have insufficient funds to gift the required amount to farm heir due to variability in farm income. The higher success rates with *Strategy 5* are associated with not incurring any operating debt. They are also partly due to the variable amount of gifts. The previous strategies require annual payments every year. With *Strategy 5*, annual payments are variable and require fewer payments in the forms of gifts.

Sensitivity analysis showed, unsurprisingly, increasing the income levels increased the probability of success of having cash reserves greater than 0. When increasing the income level to $110,000 per year, criterion 4 is met 100% of the time.

Figure 9. Probability of Success for Strategy 5 with Varying Income Levels



CHAPTER V

CONCLUSIONS

Strategy 1—Split Down the Middle: Based on the results, *Strategy 1* is not an advisable solution, no matter what variation is employed. Simulation of this strategy was meant to demonstrate the results of strategy that is likely the modal strategy used by farm families due to two factors: (1) the fact that over 60 percent of farm families have no estate plan and thus functionally chose this strategy by allowing intestacy laws to govern the distribution of their assets and, and (2) many farm families express a desire to treat their heirs equally. However, this strategy also was simulated to show farm owners how *not* to transfer the farm if they truly care about seeing it succeed into the future after they pass it on. When the annual debt payments triggered by a strategy are more than the farm's average annual income, the plan is destined for failure. Part of this problem is associated with a large portion of the farm asset base consisting of land. While producers need land to operate, its transfer poses a challenge as it is an extremely illiquid and costly asset that generates low returns, as compared to other assets.

Strategy 2—Grow to Equal: Strategy 2 proves to be as challenging as *Strategy 1*. As would be expected, this is an aggressive investment option and a tremendous financial burden. This is due to Mom and Dad trying to double their asset bases over the planning horizon. For an operation the size of the modeled farm, it may simply be infeasible to

give both heirs inheritances of equal value while keeping the farm asset base intact. In short, the farm business does not generate sufficient funds to cover the cash flow demand of this strategy. If Mom and Dad wish to take an aggressive approach to doubling their asset base and are concerned about the farm succeeding into the future, perhaps investing in the growth of the farm to make it more profitable and potentially increase cash flow provides a more prudent strategy.

Strategy 3—Estate Balancing: This strategy shows that taking a different approach to the transfer of the farm land assets (*i.e.* an approach that does not require a "repurchase" of the land) allows for a strategy with a more attainable cash flow demand. Although this strategy does not differentiate between the relative contributions of Farm Heir and Off-Farm Heir to grow the asset base over the years, it does have a higher probability of success. For parents who equate "equal" and "equitable," this may be their preferred strategy if it aligns with their family and business goals.

Strategy 4—Sweat Equity Recognition/Discount: The difference in *Strategy 3* and *Strategy 4* is the recognition of Farm Heir's contribution to the farm. A distinction between "equal" versus "equitable" is explicitly made here by the amounts of inheritance both heirs receive. This is accomplished by giving Off-Farm Heir a discounted inheritance when compared to *Strategy 3*. Although it may be discounted, they will still receive a portion of the rental payments paid each year by the operating entity (managed by Farm Heir) to the land entity. Conversely, Farm Heir is, in a way "subsidizing" their rental payments through the distributions he or she receives from the land entity. As with *Strategy 3*, *Strategy 4* illustrates the cash flow demand reductions realized by not requiring a "repurchase" of a portion of the land assets from Off-Farm Heir. *Strategy 4*

also increases the probability of future success of the farm by reducing the effective cost paid for access to the farm land.

Strategy 5—Lifetime Farm Business Transfer: The lifetime farm business transfer proved to be one of the more successful strategies. Mom and Dad are able to slowly remove themselves from the operations while still maintaining a comfortable quality of life and steady stream of cash flows. A gradual shift of ownership allows for a gradual shift of management, institutional knowledge, and decision making while all parties are alive. It also recognizes the contributions of Farm Heir to continue the family business. Off-Farm Heir is given a portion of the land entity after the transition, which allows for a stream of cash flow in the form of rental payments, as well as a portion of any cash reserves Mom and Dad have left when they pass. This strategy may mitigate conflicts between Farm Heir and Off-Farm Heir since Farm Heir has purchased the operating entity, instead of Mom and Dad giving it to them. Farm Heir has outright earned what they now own whereas Off-Farm Heir has not; however, Off-Farm Heir still receives a substantial gift, a considerable portion of which may be highly liquid, tax free, and comes with no "strings" connecting it to the operation of the farm.

Implications

One key factor to take away from this study is that time is of the essence. The sooner a farm transition plan is developed, the more time all stakeholders have to actively work towards the agreed-upon goal. Extended planning horizons would allow for strategies with lower cash flow demands, due to the time value of money. However, the families need to have agreed-upon goals before choosing a plan. This is a major consideration when deciding what strategy to employ. All parties involved need to be

actively working towards the same solution. “1) Finding time to complete the process; 2) difficulty developing farm, family, and personal goals; and 3) lack of family consensus and disagreement among heirs,” were the top three barriers Hachfeld et al. (2009) found farm families encountered when developing a transition plan. The sooner the process is started, the more time the family has to work through these issues.

When comparing the results, strategies that separated the land base from the value of the financial asset created to give Off-Farm Heir yielded a higher probability of a successful transition based on the chosen criteria. This is due to land generating low annual cash returns (Ferrell et al. 2013; Boehlje and Eisgruber 1972). Strategies that require repurchases of land or financial assets that include its value are more challenging to accomplish. However, separating the land base must be properly conducted utilizing the correct legal mechanism such as a trust or LLC. Putting restrictions on the ability to sell interest in the land entity is needed to ensure stakeholders do not sell their shares to realize its cash value. Although Off-Farm Heir receives a portion of annual rental payments paid to the land entity, they are making a concession by not having the ability to sell their portion of the land.

While this research does provide information about some of the available options farm owners have to transfer the farm, this model does not replace attorneys, accountants, financial planners, or insurance companies. This model was developed for educational and Extension purposes with the hope of seeing see a higher percentage of farm owners not only recognize the need to develop a comprehensive transition plan, but also take action in implementing the plan. While the representative farm may not look like every

operation in Oklahoma, its enterprise mixture and size will hopefully reach a broad range of people.

As the model progresses and becomes more flexible in terms of user-defined inputs, Extension educators will have the opportunity to use this decision tool when discussing family and business goals with farm owners. Seeing the results from this research will hopefully allow farm owners to initiate the required conversations about farm transitioning and encourage them to take action by implementing some form of transfer strategy (other than intestate succession when there is no transition plan in place). Numerous farm families may benefit financially across generations as a result of the information provided by this research.

After many discussions with attorneys, financial planners, agricultural lenders, economists, tax specialists, and private consultants, these strategies were selected to show how some commonly used options often fail, as well as develop a set of strategies with a given likelihood of success (Hobbs 2019; Houle 2019; Kreger and Werth 2018; Schrammel 2019; Wittman 2019). However, there is not a one-size-fits-all solution to farm transition planning. This research evaluated the probability of a set of alternative strategies, when in reality there can be more options on how to transfer a family farm depending on personal and business goals.

Limitations

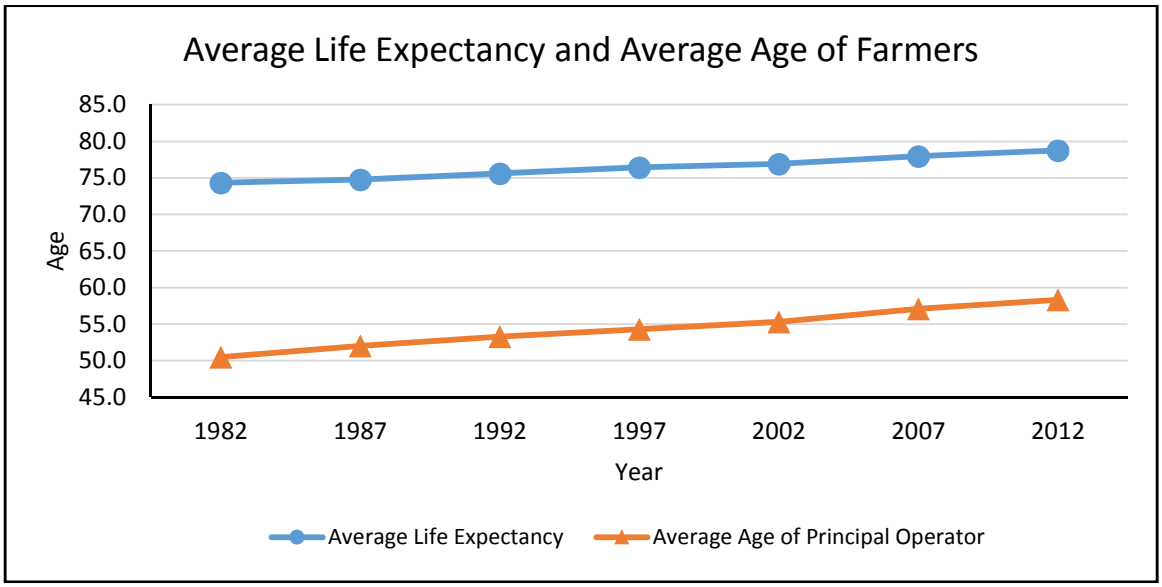
If any of the term lengths, interest rates, rates of return, health characteristics, ages, or years of planning horizon were to change in any of the alternative strategies, their cash flow demands would change as well. This could have an impact on the probability of success, depending on the magnitude of the change. Life insurance quotes,

for example, are based on individual policy-holder characteristics as well as proprietary information for each insurance company. While a proxy rate of return was used to calculate the annual premiums, actual insurance quotes should be sourced from a life insurance provider.

Age at the time of initiating the transfer process or age at time of death are also two assumptions used in this model that could have major effects on the outcomes if they were to change. Had Mom and Dad started the process earlier in life, "time is on their side" allowing more time to reap the benefits of compound interest, which could lower the annual cash flow demand of each strategy. On the other hand, waiting until after 58 years old to initiate a plan could prove to be more challenging and raise the annual cash flow demand of each strategy.

Because time of death is uncertain, greater financial considerations may need to be considered in terms of providing financial security for Mom and Dad's retirement years if they live past the average age of mortality. Figure 10 presents a graph illustrating the average life expectancy in the U.S. and the average age of the American farmer. While the increase in age has been steady, the average age of the farmer is increasing slightly faster than the average life expectancy. People are continuing to live longer, which could have implications on the length of the planning horizon and cash flow demand of each strategy.

Figure 10. Average U.S. Life Expectancy and Average Age of Farmers



A representative farm was used to test these strategies on in hopes of the results being applicable to broad range of farm owners in Oklahoma. These results are intended to assist in educational and Extension purposes. While many justifiable assumptions were made in developing the representative farm, results from this simulation could vary if the model was simulated using data from an actual Oklahoma farm. If any of the assumptions, ratios, or numbers used to develop the farm were to change, the representative farm size would change as well which would in turn change the outcomes of the strategies.

One off-farm income salary was used in the model. Some operators may have one or more family member who make more or less than the assumed $44,356 annual salary. Also, with Oklahoma's large energy sector, many farmers receive royalties from oil, natural gas, and wind energy production. This additional source of income could help finance any of the aforementioned strategies.

The variability in farm income was calculated using aggregate farm income data from KFMA. While this was the closest farm income data available, in reality, every producer operates at a different level of efficiency. Some farmers are more profitable than others. Also, the variability in farm income was a normally distributed, random draw each year. However, history has shown farm income is more cyclical in nature. For example, the 1970's experienced increased returns to agriculture, followed by the farm financial crisis of the 1980's. Incorporating cyclical income variability should be considered for future development.

Depreciation expense was not included in the model, although breeding livestock and equipment are depreciable operating assets. Depreciation expense is deducted from value of farm production to determine net farm income. This model varies net farm income, not value of farm production, therefore depreciation was not taken into the mathematical calculations. It is assumed the representative farm sells depreciated operating assets and purchases new operating assets to replace them. The sale of assets causes depreciation recapture and is taxed as ordinary income. However, any depreciation recapture the farm incurs is offset by depreciating the equivalent amount of the newly purchased assets utilizing Section 179 of the IRS Code.

This was a static simulation of one farm with one set of family members: Mom, Dad, Farm Heir, and Off-Farm Heir. Changing the number of heirs to the farm is a major consideration for future versions of this model. For example, if Farm Heir had two off-farm siblings and was forced to buy out their portion of the farm, Farm Heir has gone from buying out one-half of the farm to two-thirds of the farm. This would equate to larger loans and payments to accomplish this goal. It is suspected that increasing the

number of heirs would have caused this process to be more challenging in terms of financing the strategies covered in this research.

Although there are limitations to the model outlined above, many of these limitations provide opportunities for future development and research. Now that the model has been established, some considerations in further developing this decision tool would be:

1. Vary the number of heirs (on-farm and off-farm)
2. Make the time of death for all stakeholders uncertain and random (within some given parameters)
3. Include a level of risk associated with investment portfolios and not assume a constant rate of return
4. Incorporate a more cyclical distribution of income, instead of the normally distributed, random draw each year
5. Create more user-defined inputs such as government payments, crop insurance, energy royalties, and other sources of income so producers can more accurately simulate these strategies

One question this research does not address is how a farm transition would need to be structured when there are multiple heirs wanting to return to the farm. Future research should not only employ the changes outlined above, but also develop strategy that encompasses this scenario. This approach may involve more investment in growing the farm asset base instead of an off-farm financial instrument to increase the farm size to hopefully generate more cash flow. Another question that is not addressed is how a farm transition would need to be structured when there are no heirs either wanting to return to

the farm or available to pass it down to. With the capital intensive nature of agriculture, it can be difficult for some young people who were not born into a family of farmers and ranchers to start a farm or ranch. Perhaps there is an opportunity here for farm owners with no heirs and young people eagerly wanting to be involved in production agriculture to reach an agreed upon farm transition plan beneficial to both parties.

Exploring other farm transition strategies and determining their probability of success, other than the set discussed in this research, may provide more options for farm owners that align with their individual goals and risk preferences.

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