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A Model of Farm Transition Planning for the U.S. Plains

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ABSTRACT

Farm transition planning continues to be a significant challenge for U.S. agricultural owner/producers. Past and ongoing research points to an aging farm population with little or no planning to transition farms to succeeding farming family members, despite documented goals of continued family ownership and operation. This study developed and analyzed alternative farm asset transition strategies using a representative farm for Oklahoma. The simulations considered equity issues, family living requirements, and cash flow pre- and post-transition. Strategies analyzed considered off-farm investments and life insurance tools to even bequests between an on-farm and an off-farm heir, and also modeled splitting inheritance into an operating entity that owns machinery and other operating assets and a landholding entity that leases real estate to the on-farm heir. The simulations assumed a 20-year transition period. Results indicate that early planning is essential for success. In addition, the use of life insurance tools and/or the implementation of equitable, but unequal treatment of heirs improve the likelihood of successful farm transition between generations.

KEYWORDS

farm transition planning,
intergenerational transfer

INTRODUCTION

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). However, successfully transferring the family farming operation across generations is a significant challenge for farm families (Boehlje & Eisgruber, 1972; Lobley, 2010; Mishra et al., 2010; Tauer, 1985). Wittman and Radakovich (2009) agreed that in developing a farm transition plan, long-term viability of the family operation should be of utmost importance. Research from the Family Business Institute indicated that family-owned and operated businesses have roughly a 30% success rate in transferring the assets and control of their business from the founding generation to the second generation, 12% make it from the second to the third generation, and a dismal 3% successfully transfer from the third to the fourth generation (Ferrell et al., 2013). In a 2009 survey of Minnesota farmers, nearly 90% of the respondents did not have an up-to-date farm transfer plan and nearly 60% 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 accounted for nearly 83% of total farm assets (USDA ERS, 2019). However, the value of those assets can only be realized if 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, servicing a large debt is challenging as real estate is an expensive, illiquid asset that generates low cash returns.

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 & El-Osta, 2008). This study develops and evaluates farm transfer strategies. Using a scenario of one on-farm and one off-farm heir, this model simulates the outcomes of alternative transfer strategies for a representative farm. The results demonstrate the need to begin farm transitioning as early as is financially possible in order to increase the likelihood of success.

METHODOLOGY

The model assumes farm owners (husband and wife) want to maximize the probability of successful farm transfer subject to maintaining their own retirement income and some measure of equity between heirs. A successful transfer is defined as an on-farm heir's ability to meet financial obligations for a 20-year time span while the parents maintain retirement income and an off-farm heir is treated equitably. Mathematically,

$$\begin{aligned} \max_{s \in S} \text{Prob}(\text{Net Cash Flow}_t | s > 0) \quad \forall 0 \leq t \leq 20 \\ \text{s.t. Retirement Income}_t | s > \underline{I} \quad \forall 0 \leq t \leq 20; \end{aligned} \quad (1)$$

Equity considerations.

In equation (1), *Net Cash Flow*_{*t*} is the successor's random net cash flows after debt servicing for 20 years post transition as a function of the transition strategy employed and *Retirement Income*_{*t*} is the retiring generation's annual income constrained to be greater than a floor \underline{I} . Equity considerations vary between strategies and are discussed later.

Assuming one full-time equivalent Oklahoma integrated cow-calf and crop farm, representative farm model was developed using data from Kansas Farm Management (KFMA, 2017) Southeast Association. Net farm income data from KFMA was used to determine trends and variability in farm income for the representative farm. Financial statements, including balance sheet information,

net farm income, and cash flows, were developed in a spreadsheet. The cash flow demands of each alternative strategy were calculated and subtracted from the available farm cash flow to determine its feasibility.

A Monte Carlo simulation was then utilized to incorporate variability in net farm income and cash flow by transition strategy.¹ The model determined whether the farm cash flows were sufficient to fund the cash flow demands of each transfer strategy. In years when cash demands are met, it was considered a success. Likewise, when funds were insufficient to meet the criteria for a strategy, it was considered a failure. The probability of success for each strategy was then calculated as the number of successful transitions divided by the total number of iterations.

Representative Farm Assumptions

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 must be free cash flow after the deduction of family living expenses. Net farm income and debt-to-asset ratios were calculated using KFMA summary data. Approximations of these ratios were used to further the development of the representative farm. Dividing annual net farm income by a net farm income ratio of 15% indicated a total value of farm production of \$660,000. Dividing the value of farm production by an asset turnover ratio of 20%² resulted in total farm assets of \$3,300,000. In order to operate the farm, some level of equipment and buildings needed to be included in the balance sheet. A detailed listing of equipment and buildings was not generated. An equipment complement of \$500,000 and buildings worth \$100,000 were assumed.

Off-farm income was also included given many farm operations have at least one family member who works off the farm. Per capita income for Oklahoma of \$44,356 was used in the model farm as an after-tax off-farm income (U.S. Dept. of Labor and Statistics BEA, 2019).

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, and soybeans) are historically the largest of Oklahoma's agricultural commodities (USDA NASS, 2018). We assumed a 50/50 enterprise split.

With half of the income of the representative farm generated from cow-calf production, the model required a value of breeding livestock within the balance sheet. Gross income from cattle of \$330,000 was assumed based on a cow herd of 338 cows (88% calving percentage), weaned calf weight of 500 pounds, and calves grazed on winter wheat to 750 pounds. Cattle weights and prices were derived from the Oklahoma State Stocker Budget (Sahs, 2019). Herd size was then multiplied by an average cost per cow of \$1,210 to reach a total breeding livestock value of \$408,784 (USDA AMS, 2019). Combining the equipment values and breeding livestock values, the total value of "operating assets" was \$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 assigned to land value. 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 owned 1,146 acres of land, a mixture of pasture and cropland acres.

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 of 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, the model assumed a debt-to-asset ratio of 20%, which is then multiplied by total assets to reach a total debt amount of \$660,000. Because farm debt was not broken into current and noncurrent debt, the model assumed debt is amortized at 5.5% interest for 20 years. After subtracting liabilities from assets, owners' equity was \$2,640,000. Table 1 gives the farm balance sheet. The KFMA data showed current assets were approximately equal to current liabilities. So, the model assumed current assets were used by the retiring generation to pay off current liabilities.

Representative Farm Family

The representative farm family consisted of Parents, Farm Heir, and Off-Farm Heir. It is assumed that everyone "lives on the averages," that is, 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), 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). Mom and Dad decide at 58 years old to plan for a farm transition, 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,

Table 1. Balance Sheet

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

the average age of male mortality, and Mom passes away at 81, the average age of female mortality (CDC, 2017). When Mom passes away, 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 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 his/her portion of the farm.

SUCCESS/FAILURE 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% 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 criterion functioned independently, that is, strategies failed if one of the following conditions occurred at any time during one iteration of the simulation.

1. *Farm debt to asset ratio* ≥ 0.60 . A debt to asset ratio indicates the proportion of assets financed by debt. Based on Doye's (2018) 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. *Three consecutive years of unpaid operating debt*. 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 operating debt paid off each year.

3. *Farm incurs operating debt to fund buyout*. Based on varying personal and family goals, 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. *Cash reserves of Mom and Dad* < 0 (*Scenario 5 only*). Discussions with agricultural lenders led to the conclusion that if Mom and Dad lack 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, preserving available cash flows leading up to and during retirement.

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 we assume Dad predeceased Mom). Given 64% of farmers and ranchers have no estate plan (Spafford, 2006), this scenario models the most common strategy employed by farm families since the intestacy statutes of many states divide the estate of the second-to-die spouse between the children of the marriage. In this scenario, Off-Farm Heir demands a buyout of his/her portion of the farm. Many heirs who are not actively involved in the family business want their inheritance in liquid assets (Ferrell et al., 2013).

Notably, this scenario also assumes the farm is debt free. In the Southeast KFMA Association data, farm operators over the age of 74 (on average) had sufficient funds in current assets to pay off existing farm debt, and Mom and Dad both die after this age in our analysis. Therefore, Farm Heir is purchasing one-half of total farm assets after the liquidation of a portion of current assets to pay off 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) a commercial loan from a third-party lender or
 (b) a seller financing/buy-sell agreement.

Strategy 1(a) Commercial Loan: Assuming Farm Heir qualifies 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 are needed: one for the equipment, one for the cattle, and one for the real estate. Interest rates, term lengths, and down payments were all determined in consultation with an agricultural lender (Schrammel, 2019). Assuming a cattle loan at 5.75% interest for five years with 20% down, a down payment of \$40,878 is required with an annual payment of \$38,554. An equipment note at 5.75% interest for five years with 20% down requires a down payment of \$50,000 and an annual payment of \$47,157. A real estate mortgage at 6.5% interest rate for 20 years with 20% down requires a \$239,122 down payment and an annual payment of \$86,807. 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% 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 offers seller financing with one loan covering all assets. This strategy demonstrates how a lower interest rate and longer term affects the debt service for Farm Heir. The note has a 20-year term at the current applicable federal rate (AFR) of 3.05%. (The applicable federal rate is the lowest interest rate at which money can be loaned to a family member without it being considered a gift.) Assuming a 20% down payment of \$330,000, the annual payment is \$89,135. Farm Heir makes the 20% 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 must 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% for 20 years yields \$3,300,000 (Kreger & 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 nonsmokers 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 to 29%, with an average of 11% and a mode of 9%. Using a 9% annual rate of return as a proxy, the annual insurance premium would require a cash flow demand of \$64,503.³

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 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 bequeath it to Off-Farm Heir.

This strategy directly addresses the challenge of transferring farmland base. Separating the land base from the value of the financial asset needed to compensate Off-Farm Heir lowers annual cash flow demand and is more likely to succeed. With a breeding livestock value of \$408,784 and an equipment value of \$500,000, the present farm operating asset value is \$908,784 and is the amount needed to bequeath to Off-Farm Heir. As with Strategy 2, Mom and Dad 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% for 20 years yields 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% 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 again outperforms 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 to bequeath to Off-Farm Heir.

This strategy was proposed 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 reduction in the value left to Off-Farm Heir. Second, 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 annual cash flow demand. In this case, 69% 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 pay off Off-Farm Heir. This strategy can be accomplished in two ways: (a) sinking investment fund or (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% 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% 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 delayed 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 emotional ties and living on the farm (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 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 his/her 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% 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, gifts Mom and Dad grant to Farm Heir are included in the cash flow demand. As Farm Heir receives larger portions of income, fewer gifts are needed 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 that 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 Farm Heir's, operating entity payments from Farm Heir, Social Security benefits, and farm income distributions assure minimum income requirements. 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, they collect \$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 distributed based on proportion of ownership to the Farm Heir and Off-Farm Heir. Mom and Dad are not investing funds to grow a financial asset that would be used to compensate Off-Farm Heir as a form of inheritance. Excess net cash flow Mom and Dad may have at the end of the transition would be split between Farm Heir and Off-Farm Heir, net gifts Farm Heir received over the years to help fund this transition.

RESULTS

Excel spreadsheets were used to calculate net cash flow over a 20-year planning horizon, subject to each strategy's cash flow demands and sources. Using a Monte Carlo simulation, farm income is randomly drawn from a normal distribution for each year of the simulation. VBA⁴ was then used to 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 criterion.

Strategy 1(a) Commercial Loan: Farm Heir purchasing Off-Farm Heir's undivided one-half interest in the farm assets poses a challenge, as

Table 2. Probability of Success by Strategy and Criterion

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%

* Not applicable to this strategy.

shown by the low success rates in Table 2. This is more striking when considered 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 the 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 operating 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 payments of \$172,518. At \$100,000 in annual net farm income, the farm business does not generate sufficient funds to cover debt service requirements.

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% down, a payment of \$330,000 is needed. As with Strategy 1(a), 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.

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 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). Mom and Dad must double 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. Strategy 2(a) proves to be the second most challenging and unsuccessful strategy to transfer the farm.

Strategy 2(b) Life Insurance: Strategy 2(b) mirrors Strategy 2(a) in that 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 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 mechanisms used to reach the same value of nonfarm asset value. At age 58, Mom and Dad purchase a second-to-die, whole life insurance policy with a coverage amount of \$3,300,000. Over 20 years, the annual insurance premium is \$64,503. With an average net farm income of \$100,000 per year, this payment is more attainable than the previous options but still has a low probability of success.

Strategy 3(a) Investment Fund: Strategies 3(a) and (b) diverge 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 consisting 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 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 criterion, 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 criterion, 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. In Figure 1, when increasing farm income level to \$140,000 per year, both criteria are met in 100% of the simulations. As farm operators become more profitable, this option quickly becomes more successful.

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

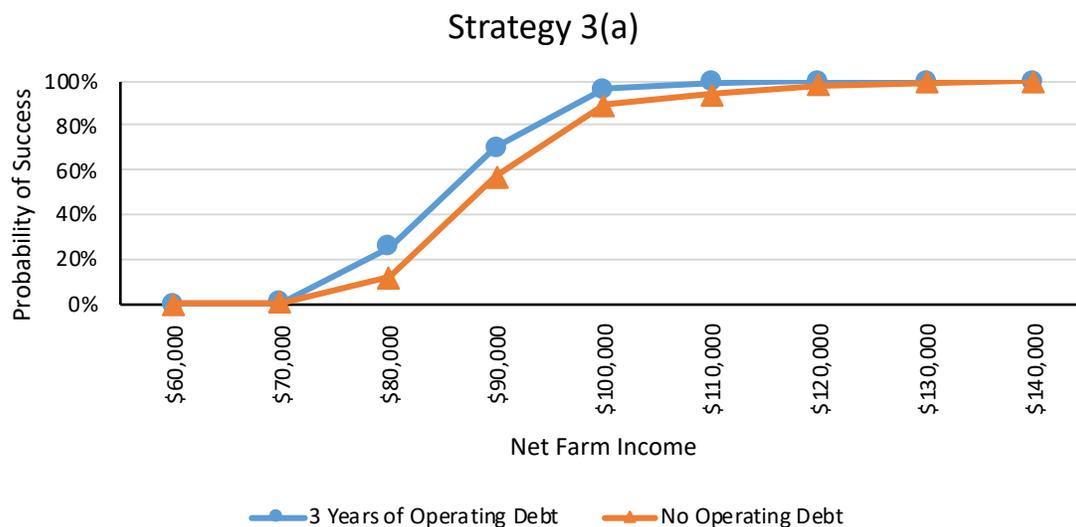


Figure 1. Probability of success for Strategy 3(a) with varying farm income levels.

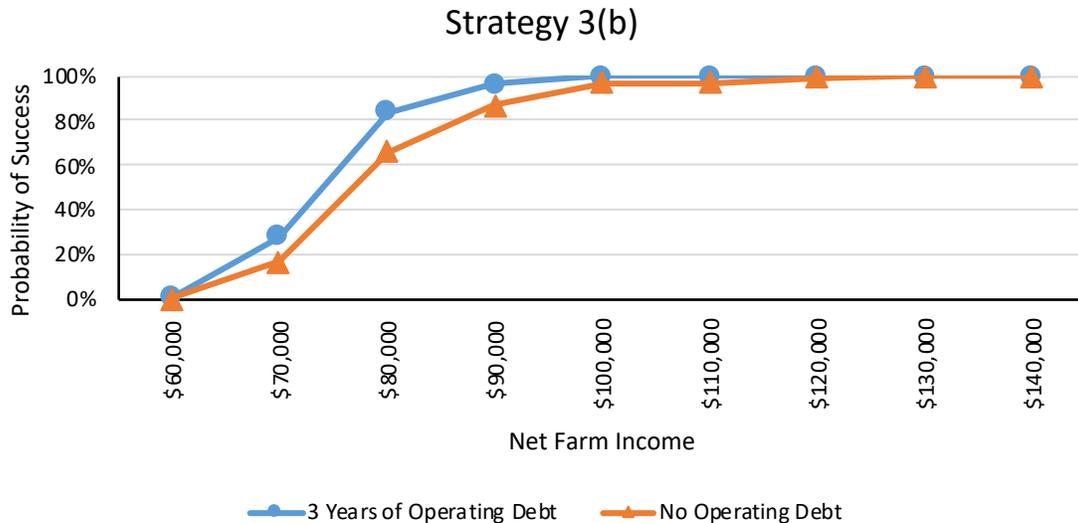


Figure 2. Probability of success for Strategy 3(b) with varying farm income levels.

of not having three or more consecutive years of operating debt and incurring no operating debt. In Figure 2, when increasing the income level to \$130,000 per year, both criteria are met in 100% of the simulations.

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 criterion, this strategy is a success.

When using an operating line of credit to assist with the annual investment payments, the

simulations yielded more successful results than many of the other strategies. Curiously, this strategy yielded the same results as Strategy 3(b). This is due to similar cash flow demands. 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 the amount of debt is minimal. The risk associated with this strategy is substantially lower than in the previous strategies. Sensitivity analysis revealed increasing farm income level to \$120,000 per year resulted in both operating debt criteria meeting 100% of the simulations, as in Figure 3.

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.

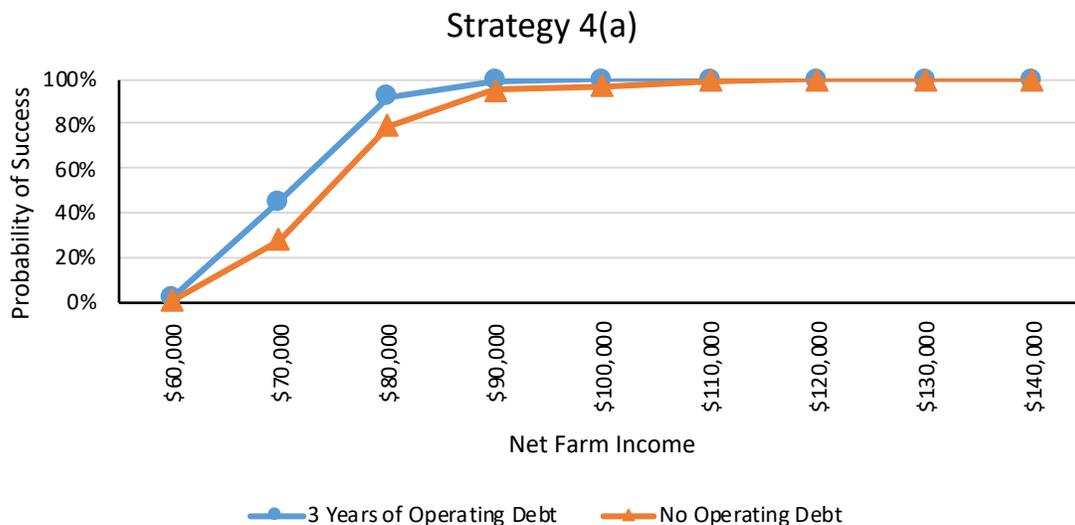


Figure 3. Probability of success for Strategy 4(a) with varying farm income levels.

Table 2 shows the farm never reached a debt to asset ratio of 0.60. The additional amount of operating debt used to help fund the annual insurance premiums never increased the total debt above \$1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based on this criterion, this strategy is a success.

When using an operating line of credit to assist with the annual insurance premium, this strategy yielded some of the best results. There was a 100% probability of fewer than three consecutive years of unpaid operating debt. When focusing on the option of financing this strategy without incurring any additional debt, there was a 99% probability of success. This means that 1% of the time, the farm may have to incur some level of operating debt, but the amount of debt is minimal. Our simulations show this strategy is low risk. In Figure 4, sensitivity analysis revealed both operating debt criteria are met 100% of the time when increasing farm income to \$120,000.

Strategy 5 Lifetime Farm Business Transfer: Strategy 5 also proved to have a high probability of success. Mom and Dad do not incur additional debt to fund the transfer. Therefore, the operating debt criteria are not applicable to this situation. Also, Mom and Dad do not invest additional funds to grow a financial asset that would be used for Off-Farm Heir's inheritance. 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. Depending on the random draw, gifts are only required in the first nine years of this scenario, with an average around \$8,000 and ranging from \$3,000 to \$26,000. 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 already received \$160,523, he/she inherits \$294,520 in cash. Off-Farm Heir inherits the remaining balance of \$455,043.

Table 2 shows the farm never reached a debt to asset ratio of 0.60 based on simulations of average net farm income of \$100,000 per year. Mom and Dad did not incur additional debt to fund the transfer. Mom and Dad, as well as Farm Heir, paid off their respective proportion of long-term debt throughout the 20-year transfer. The total debt did not reach \$1,980,000, the amount required to reach a 0.60 debt to asset ratio. Based on this criterion, this strategy is a success.

Mom and Dad's cash reserves were gifted to Farm Heir in years with insufficient funds to pay the full annual entity payment and bequeathed to both heirs at the end of the transition. Table 2 shows there was a 99% probability cash reserves were greater than zero. So, Mom and Dad's cash

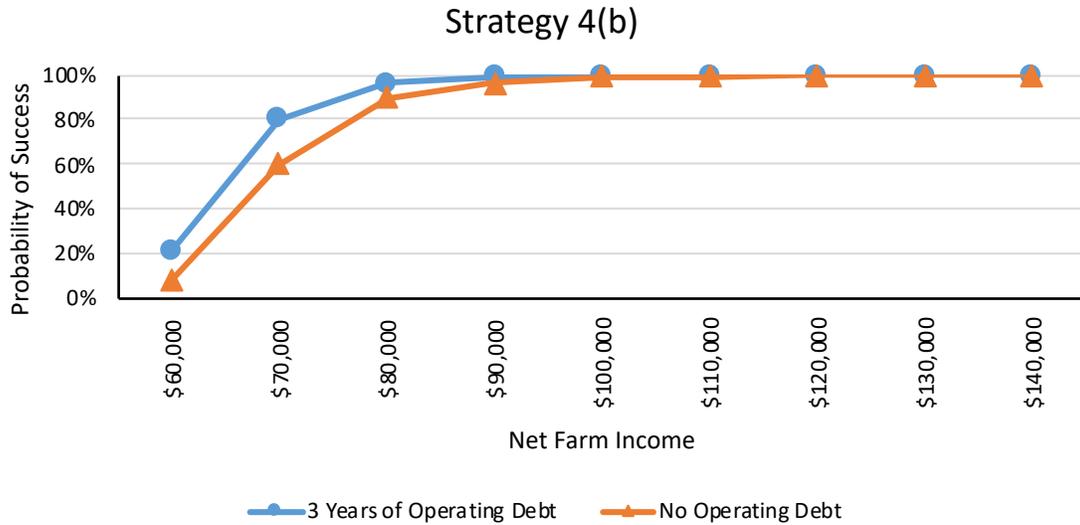


Figure 4. Probability of success for Strategy 4(b) with varying income levels.

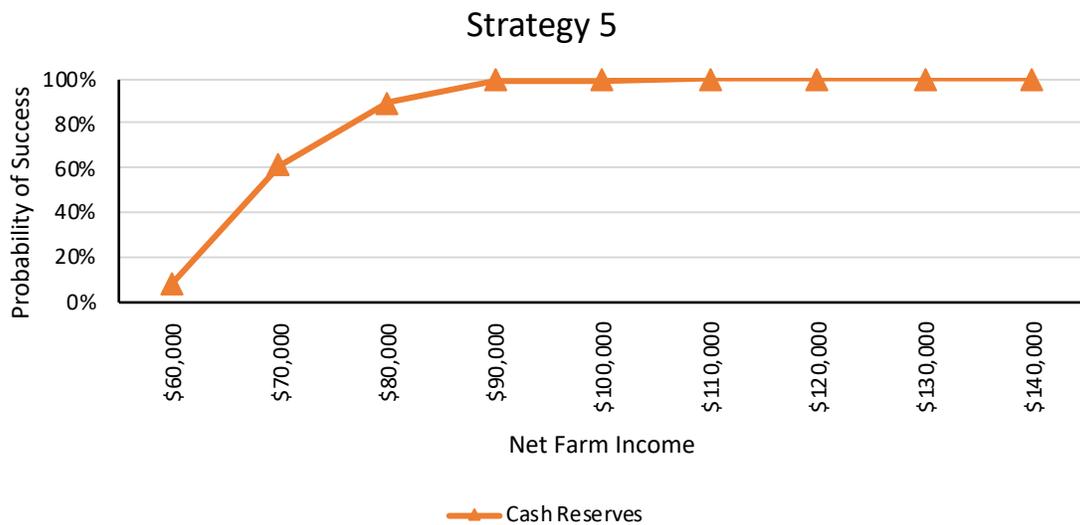


Figure 5. Probability of success for Strategy 5 with varying income levels.

reserves were always positive. While the previous strategies require annual payment, Strategy 5 annual payments were variable, requiring fewer gifts. Sensitivity analysis showed, unsurprisingly, increasing the income levels increased the probability of success of having cash reserves greater than 0. When increasing farm income level to \$110,000 per year, criterion 4 is satisfied with certainty.

CONCLUSIONS

The need for farm transition planning is well documented. However, studies show relatively few farm

owners are prepared for the transfer of farm assets to succeeding generations. This study developed and analyzed strategies for transferring the assets of a representative farm to a farming heir and treating a nonfarming heir equitably. If the retiring generation's goal is to pass on an intact, viable farming or ranching business to an operator-owner heir, equal treatment of a nonfarming heir creates substantial financial challenges to a successful transition. The approach used here considered using an off-farm financial asset or a second-to-die life insurance policy as means of creating a bequest for the nonfarming heir. Some strategies also considered

splitting farm assets into operating and real estate segments, with the on-farm heir receiving the operating assets and splitting the ownership real estate assets between on-farm and off-farm heirs. Real estate was then rented to the on-farm heir.

Equity considerations proved to be the most challenging issue for successful transition. An equal division of assets between on-farm and off-farm heirs likely fail our criteria for a successful transfer. Rather, equitable but unequal division of assets had higher probabilities of success in our simulations. Under this approach, the on-farm heir's contributions to farm income was rewarded with a salary used to purchase shares in the business. Over time, the share of income increased as the on-farm heir's share of the business grew, leading to purchases of more shares.

The use of off-farm investments to create a pool of wealth as the bequest to the non-farm heir proved to be infeasible. Essentially, this approach required doubling the net worth of the farm by investing in a sinking fund. However, the cash flow demands needed to build the required off-farm wealth were more than the farm enterprise could generate while maintaining the income requirements of the current farming generation. Alternatively, the use of life insurance to treat the nonfarming heir equitably was likely to succeed in some of our strategies. Life insurance proceeds are nontaxable, reducing cash flow demands relative to sinking funds.

When combining equitable but not equal, a split between operating assets and real estate, and using a life insurance policy, this study found farm transfer can succeed with a high degree of confidence. However, these strategies were analyzed assuming a 20-year transition period. For many farm families, the time remaining to implement a succession plan is already less than that window. The average age of the principal farm operator is 57.5 (USDA NASS, 2018) with a life expectancy of 25.7 years (Arias & Xu, 2017). So, about one-half of farm families have less than 26 years to complete farm transition. In many of these situations, it will be exceedingly difficult to pass an intact, financially viable business on to a succeeding generation.

The key implication of these results is that time is of the essence. The sooner a farm transition plan is developed, the more time stakeholders have to actively work toward 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 toward 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.

ACKNOWLEDGMENTS

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NOTES

1. Means and variability of net farm income and cash flow were taken from Southeast KFMA data 2005–2017 (KFMA, 2017).

2. Longer term averages of net farm income ratio and asset turnover ratios were higher than the values used. However, the values assumed are closer to more recently observed values and are more conservative than historical averages.

3. Life insurance outperforms the investment portfolios because it is in a tax-sheltered vehicle. Life insurance consistently yielded lower cash flow demands due to tax drag associated with the investment portfolios.

4. VBA is an integral programming tool for Microsoft applications, including Excel.

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