SIMULATION OF FARM TRANSITION STRATEGIES

ACROSS MULTIPLE U.S. FARM PROTOTYPES

By

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Abstract: Approximately 30% of family-owned U.S. farms and ranches will survive a generational transition; when transitioning to subsequent generations, the likelihood of success continues to decline. Reed et al. (2019) simulated the effects of five commonly used farm transition strategies on a prototypical Oklahoma farm to determine the probability of successful transition under each strategy. This project expands upon Reed's work by creating seven additional prototypical farms to represent the predominant production systems and regions in US agriculture to determine how those same strategies impact each farm type by simulating each farm using the Reed model. The California specialty crops, Illinois corn, and Iowa hog operations all had very high rates of success. However, the Kansas wheat, Texas cattle, Georgia poultry, and Wisconsin dairy operations had significantly lower probabilities of success. A high asset-turnover ratio, as well as high net farm income, is an indicator for success, as the operation generates enough cash flow to meet the demands of most strategies. Federal and state tax structures will influence the rates of successful transition, as well as government payments to farming operations. Moving forward, many of the things that are held constant in this model can be changed to evaluate the outcome: the age of death of the primary operator, the number of heirs, and narrowing the scope of the prototypical farm.

INTRODUCTION

As decades have passed, the world has become a more urban society. There has been a shift in several generations moving off of farms and ranches to build careers and lives in cities and suburban areas. For heirs that do stay and run the farm (denoted as Farm Kid), it can be difficult to transition the operation from one generation to the next if a plan is not in place, and when the farm does move to the next generation, those that didn't come back to the farm (denoted as City Kid) feel entitled to a piece of it. A farm or ranch business has a huge asset base at stake when facing a transition, and how that transition is handled affects how the industry will be structured in the future. According to the Family Business Institute, only 30% of businesses will survive a transition from generation to generation[1]. Farmers and ranchers are not rising to the challenge of successfully transitioning, because for the most part, they don't even have a transition plan in place. According to a survey by Iowa State University in 2001, 50% of Iowa farmers had no estate plan and 71% hadn't named a successor[2]. In Minnesota, 58% of participants in a 2009 survey plan, and 89% didn't have an updated farm business transfer plan[3].

Many farmers and ranchers desire to keep their operation "in the family", and do not wish for it to be divided between heirs or sold. At the same time, the agriculture industry is

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[1] Ferrell, S. L., & Jones, R. (2013, March). Legal Issues Affecting Farm Transition. In *Data Development and Policy Analysis Conference, Washington, DC* (pp. 20-21). Available at http://agecon.okstate.edu/farmtransitions/files/Legal%20Issues%20Affecting%20Farm%20Transition.pdf

[2] Baker, J., Duffy, M. D., & Lamberti, A. (2001). Farm succession in Iowa. *Iowa State University, http://ro. uow. edu. au/cgi/viewcontent. cgi*.

[3] Hachfeld, G. A., Bau, D. B., Holcomb, C. R., Kurtz, J. N., Craig, J. W., & Olson, K. D. (2009). Farm transition and estate planning: farmers' evaluations and behavioral changes due to attending workshops. *Journal of Extension*, *47*(2), 1-7. Available at https://www.joe.org/joe/2009april/pdf/JOE_v47_2a8.pdf

seeing more consolidation, and for family farms to survive, there must be a smooth transition between generations. Many farms and agriculture operations have been in a single family for generations and may be lost due to poor transition planning. Farm families must move away from a place where they have built a life and see the livelihood that they built sold to another business or individual. Both Farm and City Kids lose a place to which they have strong emotional ties. Despite these concerns, such divisions often occur, since many farmers do not have a transition or estate plan in place, as evidenced by the statistics above. This can have the two-fold effect of not only breaking up family farms (and potentially the families themselves) but accelerating industry consolidation as assets from farms forced to be sold are acquired by larger operations.

Producers must understand not only the importance of succession planning, but also what transition strategies are feasible for their specific operation. Farm transition plans are not "one-size-fits- all," but must be individually applied to each operation. The United States agriculture industry is varied and diverse, differing in climate and successful products from region to region. The inner workings of an Illinois corn farm are very different from a California floriculture operation. An operation's financial situation, the family's goals, and several other factors determine a successful transition plan, and these pieces vary greatly from farm to farm and family to family.

Reed *et al.* simulated the effects of five commonly used farm transition strategies on a model Oklahoma farm to determine the probability of success for each strategy[4]. Farm

[4] Reed, G. J. (2019). *Assessing the Rate of Success of Alternative Farm Transition Strategies* (Master's thesis).

transition planning is not an issue that is specific to Oklahoma though. This study broadens the scope of Reed's model to include seven prototypical farms and agricultural operations across the country.

To address these concerns, this study sought to answer the question This was done to answer the research question at the core of this study: What are the probabilities of success for commonly used farm transition strategies across some of the most common US agricultural production systems? Providing feasible succession strategies for prototypical operations across the country would provide a foundation for similar operations to build transition plans with minimal negative impacts.

PROBLEM BACKGROUND AND REVIEW OF LITERATURE

Due to the nature of farming and ranching, the value of assets to be transferred from one generation to the next is very high. According to United States Department of Agriculture (USDA) Economic Research Service (ERS), total farm assets count for over 88% of the US farm balance sheet[5]. Land is a central asset to the operation of a farm or ranch, with a value that is only increasing as time goes on. Additionally, since the average age of a farmer is consistently rising and currently is 58 years of age, there are estimates that 70% of currently owned farm assets will be transferred to the next generation in the next 25 years[6]. Due to this, it is extremely important to have a transition plan in place to ensure the maintenance of the family operation. There are several reasons that farmers and ranchers do not have a feasible transition plan in place, including saying that they know how to divide their assets and don't need a will, already have a will that doesn't account for a transition plan, or that they will divide everything equally among heirs[7].

If the deceased does not have a will upon time of death, all assets will be divided among remaining family members according to the state's intestacy laws, which can result in less than optimal results for the succession of the farm[8]. Much of a farm's net worth is in land and buildings; the only way to obtain value from these assets is to sell them or operate on them[9]. If

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[5] Assets, Debt, and Wealth. (2020, February 5). Retrieved May 17, 2020, from https://www.ers.usda.gov/topics/farm-economy/farm-sector-income-finances/assets-debt-and-wealth/

[6] Hoeven, G. V. D. (2013). Farm Transition: Tough Tasks at Hand and Why Transfer Tax Isn't So Tough. *Choices*, *28*(316-2016-7649). Available at https://www.jstor.org/stable/10.2307/choices.28.1.09

[7] Curtis, K. (2006, December). Estate and Farm Transition Planning for Agricultural Producers. In *Proceedings of the 2006 Western Alfalfa & Forage Conference*. Available at https://alfalfa.ucdavis.edu/+symposium/proceedings/2006/06-285.pdf

[8] Van der Hoeven, supra, at 4.

[9] Reed et al., supra, at 2.

the Farm Kid wishes to keep operating the farm, then it will fall to that heir to purchase the land needed to continue operating from all other heirs. Having a farm transition plan in place prior to death of the primary operator(s) can ensure that the farm is maintained, and all heirs are compensated for inheritance.

Establishing a farm transition plan requires analyzing the current situation of the family and business, considering and examining the future, and then developing a plan for that future[10]. To determine where the business is currently, the family must set goals and analyze the family dynamics, physical resources, financial position, and managerial styles, as these differ from farm to farm. Which heirs, if any, plan to stay and work on the farm? At this point, the entire family affected by the transition plan must be involved in the discussion. Once the current situation is determined, goals must be set for the future. What does the family want for the farm? Curtis lists five basic goals in planning for the future: the transfer of ownership, reducing estate taxes, securing a financial future, developing management skills, and keeping the land in agriculture[11]. Indeed, Curtis states that the market value of land used for farming is typically much higher for non-agriculture uses, therefore increasing the value of selling the farm relative to continuing to operate.

Retirement planning is also an issue that must be considered when developing a succession plan. As mentioned above, the average age of a farmer is currently 58, which is very

[10] Marrison, D.L. (2007) *Planning for the Successful Transition of Your Agricultural Business.* The Ohio State University Extension, https://s30428.pcdn.co/wp-content/uploads/sites/2/2019/09/Planning-for-the-Successful-Transition.pdf

[11] Curtis, supra, at 2.

close to the average age of retirement of 64 for many Americans[12]. The agriculture industry is unique in that many operators plan to never retire or only partially retire. Based on a *FARMTRANSFERS* study cited by Kirkpatrick conducted in four southwestern counties in Wisconsin, 73% of those that responded plan to either semi-retire or never retire from farming and ranching[13]. Marrison suggests the main questions that must be asked are how much money does each family member need for retirement and what will the farm obligation be to retirees[14]? Mishra *et al.* observes when the farm is transferred to the next generation in return for services received, the parents expected to be provided for in retirement with support for living expenses[15]. Therefore, retirement planning is an essential part of a successful transition.

When building a farm transition plan, difficult but necessary discussions must take place, as this plan can decide the future of a farm operation. Due to the real estate-heavy asset base in farming, simply dividing the business equally among heirs may not ensure the successful maintenance of the business. Several things must be considered when constructing a plan, as Marrison points out, including the current situation and future needs and goals.

While several papers discuss tools for developing a transition plan and why it is needed, few give feasible strategies and an outline of how successful those strategies can be. Curtis gives strategies for estate planning, but doesn't evaluate how those strategies can pertain to

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[12] Munnell, A. H. (2015). The average retirement age–an update. *Notes*, *1920*, 1960-1980. Available at https://crr.bc.edu/wp-content/uploads/2015/03/IB_15-4_508_rev.pdf

[13] Kirkpatrick, J. (2013). Retired farmer-an elusive concept. *Choices*, *28*(316-2016-7668). Available at https://www.jstor.org/stable/pdf/choices.28.2.03.pdf

[14] Marrison, supra, at 3.

[15] Mishra, A. K., El-Osta, H. S., & Shaik, S. (2010). Succession decisions in US family farm businesses. *Journal of Agricultural and Resource Economics*, 133-152. Available at https://www.jstor.org/stable/pdf/23243041.pdf?refreqid=excelsior%3Ad0d50282625e434e2ddc658f945db454

different farms[16]. Similarly, Ferrell and Jones describe legal protections in place for farms in transition, such as estate tools, wills, and trusts[17]. Reed *et al*. evaluates the probability of success of farm transition strategies on a prototypical Oklahoma farm. This project broadens the application of Reed's model to production systems across the nation to provide a basis for succession planning for farmers with similar operations to those discussed here.

[16] Curtis, supra, at 5.
[17] Ferrell and Jones, supra, at 2.

METHODOLOGY

Several farm financial indicators are needed to determine a feasible transition plan. The balance sheet for an operation provides a snapshot of the financial health of that business. One of these indicators, the net farm income ratio, can be determined from an operation's income statement. To build the model farms these balance sheets would represent, data from the United States Department of Agriculture's (USDA) Economic Research Service (ERS) were used to determine a representative farm from each region of the country. ERS divides the country into nine regions based on four sources: a cluster analysis of farm characteristics, old Farm Production Regions, USDA's Land Resource Regions, and the National Agricultural Statistics Service's (NASS) Crop Reporting Districts[18].

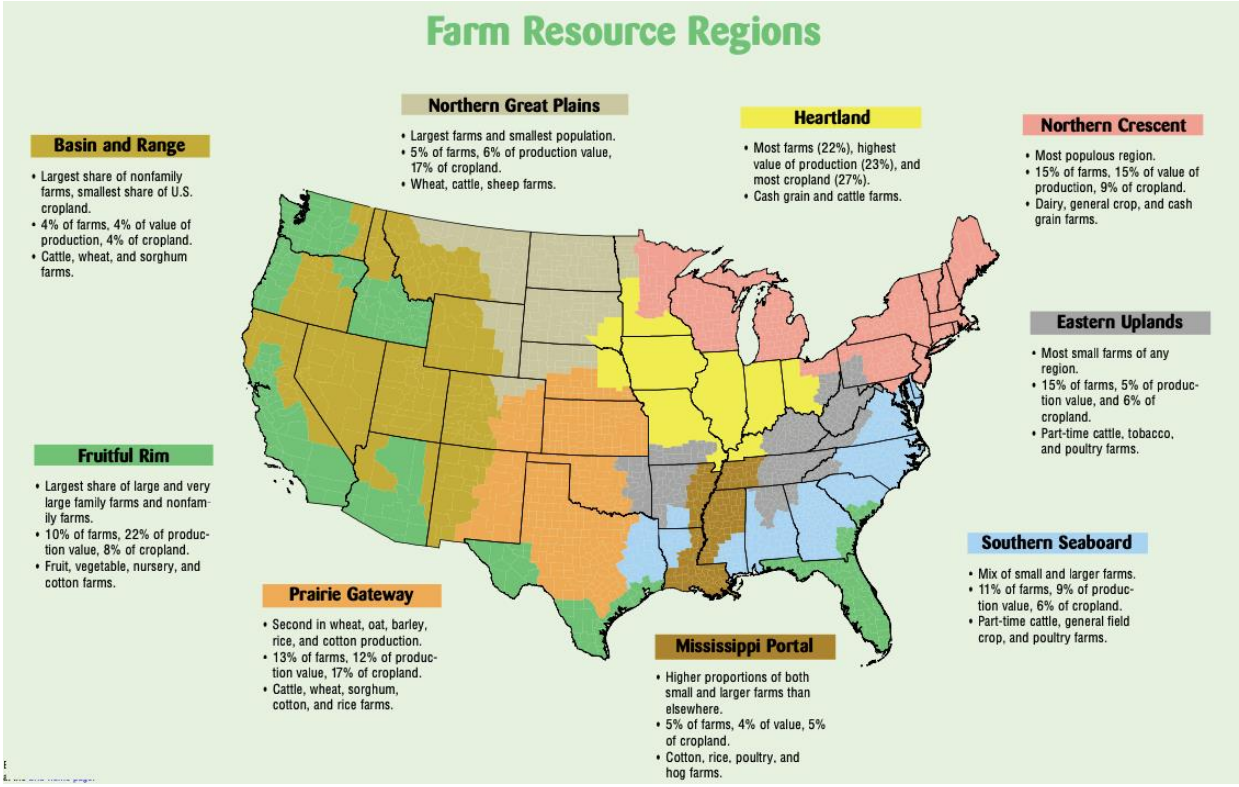
Clusters for the first of these sources are based on counties that produce the same commodities. Since the climate, soil, water, and topography needed for certain crops and livestock don't follow state lines, these "county clusters" reach beyond state boundaries[19]. Farm Production Regions, on the other hand, do follow state lines. As a result, unlike areas are grouped together as environments differ within a single state. More data have become available at the county level over the years, and regions need no longer be constrained by state lines. To construct USDA Land Resource Regions, similar farms that intersected with areas that had similar physiographic traits, soil, and climate were identified. These areas are then conformed to the boundaries of NASS Crop Reporting Districts (aggregates of counties). Using

[18] Heimlich, R. E. (2000). *Farm Resource Regions* (No. 33625). United States Department of Agriculture, Economic Research Service.

[19] Sommer, J. E., & Hines, F. K. (1991). *Diversity in US Agriculture*. US Department of Agriculture, Economic Research Service.

these regions and clusters as a base, the USDA created nine Farm Resource Regions: Basin and Range, Fruitful Rim, Northern Great Plains, Prairie Gateway, Heartland, Mississippi Portal, Northern Crescent, Eastern Uplands, and Southern Seaboard, as seen in Figure 1.

Figure 1. Farm Resource Regions, Heimlich



These areas served as the basis for developing an average farm for different regions of the country. Based on USDA ERS data, the top agriculture Using the 2018 Census of Agriculture, the USDA ERS determined the top agriculture commodities based on cash receipts are: cattle/calves, cash grains, dairy, poultry, hogs, and specialty crops[20]. The top agriculture producing states were also determined based on cash receipts: among these were California, Iowa, Texas, Kansas, Wisconsin, and Georgia[21]. As seen in Figure 1, the Fruitful Rim, which

[20] https://data.ers.usda.gov/reports.aspx?ID=17843
[21] https://data.ers.usda.gov/reports.aspx?ID=17844

comprises most of California, mainly produces specialty crops. Using the intersection of Farm Resource Regions, top agriculture commodities, and top agriculture states, representative agribusinesses were compiled: specialty crops (fruit, vegetables, and nuts) in California, hogs in Iowa, cattle in Texas, wheat from Kansas, dairy in Wisconsin, corn from Illinois, and poultry in Georgia.

Once these representative farm types were determined, balance sheets and income statements were obtained from the USDA's Agricultural Resource Management Survey (ARMS) using the Tailored Reports: Farm Structure and Finance tool[22]. These financial statements were filtered by report, subject, production specialty, state, and the year 2018. The reports selected were Farm Business Balance Sheet and Farm Business Income Statement. The subject was Farm Businesses, which included farms with an annual gross cash farm income over $350,000, or smaller operations where farming is the principal operator's primary occupation. Making this determination ensured that the data was from farms that primary sources of income and primary occupations for operators. The data were then filtered by production specialty, which showed data that classified farms based on the majority of the value of production. Once these categories were selected, the balance sheets and income statements could then be filtered by production specialty and state specifically for each prototypical operation, as seen by Tables 1 and 2.

[22] https://www.ers.usda.gov/data-products/arms-farm-financial-and-crop-production-practices.aspx?modal=17882

Table 1. 2018 USDA ARMS Balance Sheet

Balance Sheet	KS Wheat	CA Specialty	TX Cattle	GA Poultry
VARIABLE	2018 / Estimate			
Farms	2,006	24,402	63,413	2,413
Farm assets	$ 2,342,358	$ 5,022,572	$ 1,535,555	$ 1,623,054
Assets: Current	$ 58,284	$ 384,434	$ 96,598	$ 48,002
Assets: Livestock inventory	$ 9,180	$ 544	$ 68,866	$ 5,937
Assets: Crop inventory	$ 13,191	$ 43,894	$ 2,069	$ 2,618
Assets: Purchased inputs	$ 419	$ 6,860	$ 879	$ 844
Assets: Cash invested in growing crops	$ 2,797	$ 10,496	$ 328	$ 214
Assets: Prepaid insurance	$ 2,303	$ 4,278	$ 308	$ 2,194
Assets: Other	$ 30,394	$ 318,362	$ 24,148	$ 36,195
Assets: Non-current	$ 2,284,075	$ 4,638,139	$ 1,438,957	$ 1,575,053
Assets: Investment in cooperatives	$ 158	$ 12,533	$ 446	$ 547
Assets: Land and buildings	$ 2,024,672	$ 4,424,918	$ 1,319,386	$ 1,421,870
Assets: Farm equipment	$ 223,968	$ 200,198	$ 71,883	$ 136,888
Assets: Breeding animals	$ 35,277	$ 490	$ 47,242	$ 15,748
Farm liabilities	$ 126,879	$ 378,026	$ 32,308	$ 405,536
Liabilities: Current	$ 80,068	$ 94,857	$ 14,370	$ 81,071
Liabilities: Notes payable within one year	$ 61,286	$ 35,100	$ 9,591	$ 35,262
Liabilities: Current portion of term debt	$ 10,900	$ 31,800	$ 2,704	$ 32,618
Liabilities: Accrued interest	$ 3,570	$ 10,502	$ 907	$ 11,770
Liabilities: Accounts payable	$ 4,312	$ 17,455	$ 1,167	$ 1,421
Liabilities: Noncurrent	$ 46,811	$ 283,169	$ 17,938	$ 324,465
Liabilities: Non-real estate	$ 28,997	$ 34,999	$ 5,053	$ 24,390
Liabilities: Real estate	$ 17,815	$ 248,170	$ 12,885	$ 300,075
Farm equity	$ 2,215,479	$ 4,644,546	$ 1,503,247	$ 1,217,518

Table 2. 2018 USDA Arms Balance Sheet

Balance Sheet	IA Hogs	WI Dairy	IL Corn
VARIABLE	2018 / Estimate		
Farms	3,963	8,375	14,276
Farm assets	$ 3,284,964	$ 2,859,722	$ 3,699,803
Assets: Current	$ 436,949	$ 252,096	$ 500,890
Assets: Livestock Inventory	$ 141,668	$ 33,913	$ 4,732
Assets: Crop Inventory	$ 129,654	$ 122,165	$ 301,640
Assets: Purchased inputs	$ 33,172	$ 15,495	$ 48,792
Assets: Cash invested in growing crops	$ 8,031	$ 1,281	$ 5,420
Assets: Prepaid insurance	$ 6,314	$ 3,531	$ 5,636
Assets: Other	$ 118,110	$ 75,713	$ 134,671
Assets: Non-current	$ 2,848,015	$ 2,607,626	$ 3,198,913
Assets: Investment in cooperatives	$ 11,971	$ 28,690	$ 21,794
Assets: Land and buildings	$ 2,321,312	$ 1,980,236	$ 2,687,268
Assets: Farm equipment	$ 465,101	$ 341,485	$ 483,749
Assets: Breeding animals	$ 49,632	$ 257,215	$ 6,101
Farm liabilities	$ 986,632	$ 630,432	$ 563,959
Liabilities: Current	$ 272,028	$ 169,722	$ 245,019
Liabilities: Notes payable within one year	$ 146,098	$ 82,198	$ 159,245
Liabilities: Current portion of term debt	$ 77,719	$ 58,355	$ 41,536
Liabilities: Accrued interest	$ 28,153	$ 18,038	$ 15,592
Liabilities: Accounts payable	$ 20,058	$ 11,131	$ 28,645
Liabilities: Noncurrent	$ 714,605	$ 460,710	$ 318,941
Liabilities: Non-real estate	$ 77,910	$ 84,155	$ 62,942
Liabilities: Real Estate	$ 636,695	$ 376,555	$ 255,999
Farm Equity	$ 2,298,332	$ 2,229,289	$ 3,135,843

Reed's model provides 5 different transition strategies that are commonly used:

Strategy 1—Split Down the Middle: In this scenario, the two heirs receive all of the farm in undivided interests once Mom dies (given Reed's assumptions, Dad will precede Mom in death). Given that a large percentage of farmers have no estate or transition plan, this is the most commonly employed strategy. The intestacy laws of several states hold that the estate will be divided evenly among the children or heirs. Under this scenario, Reed assumes that the

City Kid demands a buyout of their share. The most likely means of Farm Kid accomplishing this would be: a) to obtain a commercial loan from a third-party lender or b) seller financing, or more precisely in these scenarios, a long-term payment agreement for the purchase of City Kid's interest in the farm assets by Farm Kid.

Strategy 1(a)—Commercial Loan: Using the assumptions from Reed's model, three separate loans would be needed: one for equipment, one for livestock, and one for real estate. In the model, Farm Kid used operating debt to cover full debt payments when funds are not sufficient. According to Reed, some lenders may not allow the loan to happen if available cash flows cannot cover annual payments, which leaves operating debt to cover the remaining balance.

Strategy 1(b)—Family Loan: Using this strategy, City Kid agreed to seller financing, combining the aforementioned three loans into one note. In Reed's model, this note has a 20-year term length at a rate of 3.05%, the Applicable Federal Rate. This rate is the lowest money can be loaned to a family member without it being a gift. As in Strategy 1(a), the Farm Kid uses operating debt to pay the remaining balance when cash flows are insufficient.

Strategy 2—Grow to Equal: In this scenario, the Farm Kid receives all farm assets upon Mom's death, and City Kid gets a financial asset of equal value. This allows both heirs to be equally compensated while maintaining the farm. To get to this point, Mom and Dad are basically trying to double their asset base, and this aggressive goal may prove to be unrealistic. The most likely means of achieving Strategy 2 are for the parents to either a) create a sinking investment fund or b) purchase a permanent coverage, second-to-die whole life insurance policy.

Strategy 2(a)—Sinking Investment Fund: Reed's model builds the investment profile based on transferable asset value, a future value goal, and a 4.55% investment rate of return for 20 years. The transferable asset value is the difference between the farms total assets and total liabilities. The future value goal is found by multiplying the number of City Kids by the transferable asset value. *Strategy 2(b)—Life Insurance:* For this strategy, the parents purchase a permanent coverage, second-to-die whole life insurance policy at age 58 (the average age of a farmer). The quotes used in Reed's model assumes that Mom and Dad were non-smokers, with not preexisting medical conditions. This strategy consistently outperforms Strategy 2(a) because the proceeds from life insurance policies are not subject to income tax (while proceeds from the sale of the investment fund in Strategy 2(a) are subject to income tax, a phenomenon known as "tax drag"), resulting in lower cash flow demands.

Strategy 3—Estate Balancing: Mom and Dad place the farm operating assets and real estate in separate entities in this scenario. For the purposes of the model, it is assumed the operating assets are placed in a limited liability company (LLC) taxed as a partnership, and that the real estate assets are placed in a revocable living trust. After the death of the second-to-die spouse (presumed to be Mom), the Farm Kid receives ownership of the operating entity, and both Farm Kid and City Kid are given undivided ½ interests in the land trust. The operating/farm entity pays rent to the land entity. This payment is then distributed back to On-Farm and City Kid. Additionally, the parents give the City Kid a financial asset of equal value to the operating entity as their estate gift. Again, to achieve this, Mom and Dad could a) create a sinking investment fund or b) purchase a permanent coverage, second-to-die whole life insurance policy.

Strategy 3(a)—Investment Fund: As in Strategy 2(a), the exact dollar amounts related to the investment fund differ from farm to farm depending on total assets and liabilities. The real rate of return remains at 4.55% for 20 years.

Strategy 3(b)—Life Insurance: As discussed in Strategy 2(b), the parents purchase a permanent coverage, second-to-die whole life insurance policy, which outperforms the investment fund as it is sheltered from taxes.

Strategy 4—Sweat Equity Recognition/Discount: This scenario is similar to Strategy 3 as operating assets and real estate are placed in separate entities, with the operating entity going to Farm Kid and both heirs given undivided ½ interests in the land entity. However, Strategies 3 and 4 provide a different amount of inheritance to the City Kid. Mom and Dad create a financial asset that is one-half the value of the operating/farm entity received by Farm Kid to give to City Kid. This recognizes the sweat equity (time, management, labor, and capital) invested by the Farm Kid to help grow the farm by giving the Farm Kid a higher value compared to the City Kid. To create the financial asset given as inheritance to the City Kid, the parents can a) create a sinking investment fund or b) buy a permanent coverage, second-to-die whole life insurance policy.

Strategy 4(a)—Investment Fund: Assuming a constant rate of return, Reed's model uses a transferable asset value and future value goal at a real rate return of 4.55% for 20 years.

Strategy 4(b)—Life Insurance: Similar to the previous strategies, a permanent coverage, second-to-die life insurance policy is bought.

Strategy 5—Lifetime Farm Business Transfer: All previous strategies occur at the death of Mom (assumed to be the second spouse to die in all scenarios). This scenario evaluates if a

lifetime farm business transfer provides a more financially feasible plan for all stakeholders compared to at-death transfers. As evidenced by the average age of a farmer, farmers and ranchers often delay retirement for several reasons. Strategy 5 illustrates a gradual transfer of the farm between generations, placing operating assets and land in separate entities, much like Strategies 3 and 4. Every year, Farm Kid receives a salary from the farm, and purchases shares of the operating entity with their salary. As shares are purchased, this heir gets a larger portion of the farm income and responsibility for debt payments. When Farm Kid cannot make the full payment for purchasing shares, the parents gift the difference. These gifts are considered in this scenario's cash flow demand, according to Reed's model; gifts made during Dad and Mom's lifetimes are recorded and in the final distribution of Dad and Mom's estates, those lifetime gifts are deducted from any estate gift made to Farm Kid. As a result, Farm Kid and City Kid receive equal amounts of true gifts, although Farm Kid will receive the operating assets of the farm through his or her purchase of LLC membership units. Again, as in Strategies 3 and 4, both heirs receive equal interests in the land entity, with the operating entity paying rent to the land entity, with that rent then distributed equally to all heirs. It is important to note that in Strategy 5, the parents receive a smaller portion of the farm income as time goes on since they own a diminishing proportion of the farm operating entity. Their retirement income shifts from being primarily funded by farm income distributions to payments for farm operating entity LLC units, proceeds from the investment of those payments in non-farm assets, and Social Security benefits.

With the parents not investing anything to grow a financial asset for City Kid's inheritance, those excess funds can then be used to compensate City Kid.

Once the balance sheets and income statements were obtained, farm assets, liabilities, and net farm income for each farm were put into the Reed model. Using the liabilities and assumed loan rates, a debt profile was built, with rates and term lengths based on the Reed model. Machinery and equipment debt had a beginning balance pulled from non-real estate liabilities on the balance sheet, with the interest rate set at 5.75% and a term length of 5 years. The beginning balance for land debt was pulled from real estate liabilities; the rate was 6.50% with 20 years until maturity. Current liabilities, including notes payable within one year, current portion of term debt, accrued interest, and accounts payable were paid off with an interest rate of 6.25% and a term length of 5 years. The sum total for all beginning balances, annual payments, interest payments, principal payments, and remaining principal was calculated to determine cash flow in each transition scenario. In years when cash flow was not enough to fund that scenario's demands, operating debt with an interest rate of 6.25% was used to pay the remaining balance. This payment process for existing is separate from payments on operating loans used in some strategies where Farm Kid is functionally buying assets from City Kid.

The prototypical farm family consisted of Mom, Dad, Farm Kid, and City Kid. Reed's model assumed that significant life events happened at the average age based on Centers for Disease Control and Prevention data. Net farm income data from 2003-2018 was taken from USDA ARMS data, which was then converted to real dollars using a CPI index from the Bureau of Labor Statistics, with 2018 as the base year. The mean income and standard deviation were determined, then divided to calculate the coefficient of variation. The coefficient was then multiplied by the average income of the farm to produce the standard deviation.

Table 3. Net Farm Income in 2018 Dollars

Year	CPI	CA Specialty	GA Poultry	IL Corn	IA Hogs	KS Wheat	TX Cattle	WI Dairy
2003	1.36	$199,498	$229,015	$102,981	$284,163	$40,755	$71,414	$78,393
2004	1.32	$224,359	$77,212	$147,141	$571,686	$29,491	$63,482	$88,449
2005	1.28	$244,968	$103,473	$92,852	$480,334	$23,831	$32,211	$88,774
2006	1.24	$242,444	$95,911	$155,089	$338,439	$36,847	$25,924	$64,734
2007	1.20	$341,281	$57,177	$227,008	$395,565	$94,108	$15,132	$111,141
2008	1.20	$238,734	$75,897	$231,057	$185,649	$88,503	$12,615	$97,603
2009	1.16	$228,794	$52,763	$118,961	$220,198	$63,922	$1,090	$36,688
2010	1.15	$324,076	$105,576	$225,151	$339,818	$66,257	$1,731	$99,494
2011	1.11	$342,595	$102,169	$247,813	$348,356	$64,850	$36,160	$135,568
2012	1.09	$350,584	$133,648	$217,602	$387,857	$101,389	$34,655	$133,853
2013	1.08	$385,010	$73,506	$360,388	$499,820	$79,259	$38,400	$111,965
2014	1.07	$396,646	$167,247	$204,494	$186,673	$30,547	$46,072	$148,107
2015	1.06	$429,417	$82,996	$138,025	$219,484	$1,865	$35,117	$134,175
2016	1.04	$494,175	$102,665	$233,112	$326,944	$105,590	$30,143	$132,907
2017	1.02	$390,370	$133,016	$232,989	$276,100	$32,453	$11,582	$14,151
2018	1.00	$282,890	$93,855	$256,973	$264,395	$32,329	$14,448	$120,015
Average		$319,740	$105,383	$199,477	$332,843	$55,750	$29,386	$99,751
Coefficient of Variation		0.2689	0.4053	0.3478	0.3407	0.5643	0.6819	0.3751
Std. Dev.		$85,980	$42,714	$69,381	$113,385	$31,458	$20,026	$37,414

With that standard deviation and the average net farm income, a Monte Carlo simulation was used to determine a random, normally-distributed farm income each year. As these simulations were conducted, three separate failure criteria were provided to determine the scenario's success: if the farm's debt to asset ratio ever reached 0.60, if the farm incurred three consecutive years of unpaid operating debt, and if the farm ever incurred any operating debt. A fourth criteria was added for the fifth strategy: the likelihood of success if the cash reserves of Mom and Dad ever dropped below 0. The probability of success for all strategies was calculated by the number of successful transitions divided by the total number of iterations.

DATA AND ANALYSIS

Reed's transition simulation model calculated net cash flow over a 20-year planning horizon, which changed with each strategy's cash flow demand. Farm income was randomly selected from a normal distribution using a Monte Carlo simulation for each year. VBA then repeated the random draws 500 times. Dividing the number of successes by the total number of iterations gave a probability of success for each strategy.

California Specialty Crops: Table 2 illustrates the probability of success of each strategy under each criterion for a California specialty crops operation. There is a 100% chance of successful transition under all criteria for all variations of Strategies 2-5. Based on the three-year operating debt criterion, success drops to 85%. Based on the zero operating debt criterion, Strategies 1(a) and 1(b) always fail.

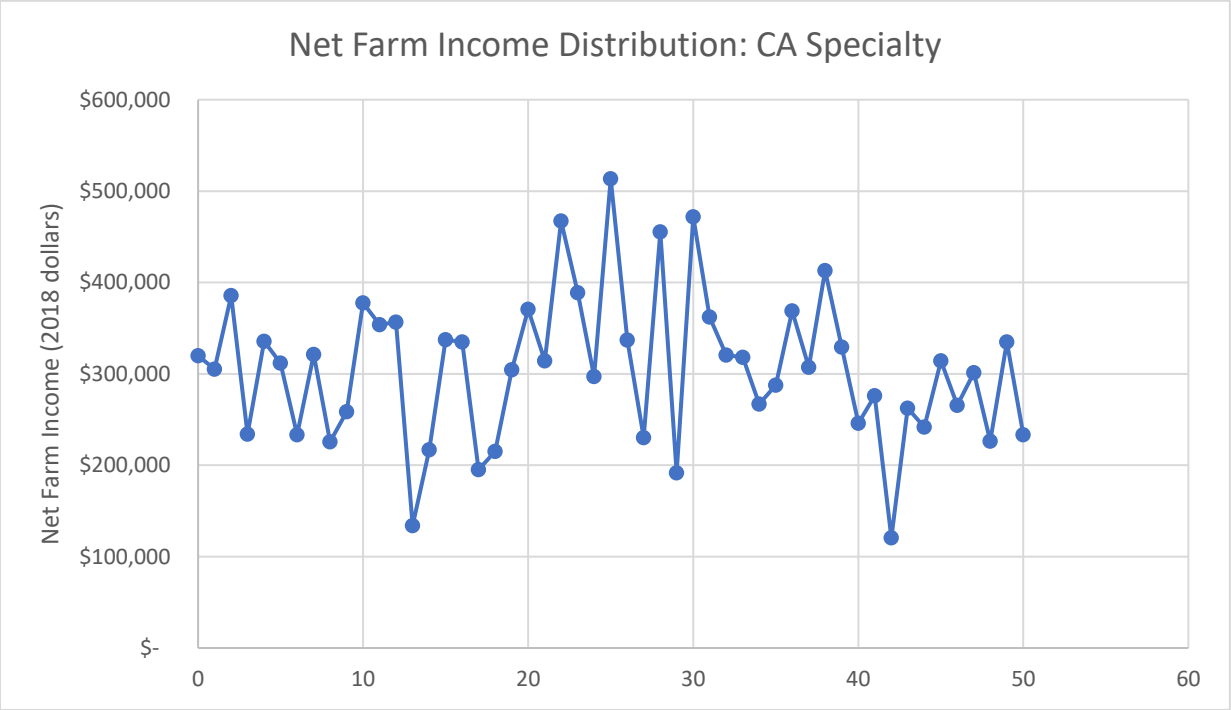
Table 4. Alternative Strategies' Probability of Success: CA Specialty Crops

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	100%	85%	0%	NA
1(b)	100%	100%	0%	NA
2(a)	100%	100%	100%	NA
2(b)	100%	100%	100%	NA
3(a)	100%	100%	100%	NA
3(b)	100%	100%	100%	NA
4(a)	100%	100%	100%	NA
4(b)	100%	100%	100%	NA
5	100%	NA	NA	100%

Under Strategy 1, the Farm Kid essentially must buy City Kid's portion of the farm using a commercial loan or family loan while paying off existing debt. In Strategy 1(a) specifically, a 20% down payment for one-half of the asset value is required. After combining livestock, equipment, and real estate down payments, Farm Kid has to pay a total down payment of

$462,615 upon transfer. After the first year, that payment drops to $179,615, and in year 6 drops to $160,636. However, the asset-turnover ratio for this operation is relatively strong; the assets generate enough cash flow to service any debt incurred in Strategies 1(a) and 1(b). Over the years 2003 to 2018, the average net farm income ranged from $199,498 to $494,175, leaving a margin of safety that allows debt to be paid off with relative ease. The distribution of the net farm income using the Monte Carlo simulation can be seen in Figure 2.

Figure 2. Monte Carlo Net Farm Income Distribution: CA Specialty Crops



In Strategies 2(a) and 2(b), Mom and Dad give the Farm Kid the farm assets, and create a financial asset of equal value for the City Kid, whether through a sinking fund investment or by purchasing a second-to-die, whole life insurance policy. Effectively doubling the parents' asset base, this scenario succeeded under all criteria. For Strategy 2(a), Mom and Dad make an annual payment of $134,706 into a sinking fund investment for 20 years, resulting in an ending balance of $4,248,124, which will be given to City Kid. For Strategy 2(b), Mom and Dad pay an

annual insurance premium of $83,036 for 20 years, ending in a balance of $4,248,124 to be given to City Kid in lieu of an interest in the farm assets. The farm generates enough cash flow for the parents to make these payments while also paying off debt.

In Strategies 3(a) and 3(b), the farm operating assets and real estate are placed in separate legal entities. Upon transfer, Farm Kid receives the operating entity, and City Kid gets an asset that is equal to the operating asset entity in value. Both kids receive an undivided ½ interest in the land entity. The farm asset entity pays fair market rent to the land trust, which is then distributed equally to Farm Kid and City Kid. To build the financial asset to be given to City Kid, Mom and Dad must either build a sinking fund investment or purchase a second-to-die, whole life insurance policy that will be equal to the projected value of the operational assets, $166,233. Under the sinking fund investment, Mom and Dad annually pay $5,271, and under the life insurance policy, pay an annual premium of $3,249. Again, the operation generates enough cash flow during Mom and Dad's lifetimes to support these payments.

Strategy 4 resembles Strategy 3 in that operating assets and real estate are placed in separate entities, with Farm Kid inheriting the operating assets and both kids receiving an undivided, ½ interest in the land entity. However, where Strategy 4 differs is that City Kid receives a financial asset equal to half the value of the operating asset. This effectively gives the Farm Kid an inheritance of higher value, recognizing the sweat equity they have put into the farm. Under Strategy 4(a), the parents can build the financial asset to give to City Kid by paying $2,636 into a sinking investment fund annually. Under Strategy 4(b), Mom and Dad purchase a second-to-die, whole life insurance policy, paying an annual premium of $1,625. Both strategies result in a financial asset valued at $83,117.

Under Strategy 5, operating assets and land are placed into separate entities, with the Farm Kid receiving a fixed salary of $42,000 from the farm entity. Each year, Farm Kid purchases shares of the entity, and receives a gift from the parents when those payments can't be made. However, for this operation, that gift is never made, as the Farm Kid has enough to pay the $8,312 payments each year. As a result, Farm Kid and City Kid both receive an undivided, ½ interest in the land entity and equally share the remaining balance of Mom and Dad's estates when Mom passes away.

The California operation had a very strong performance in each scenario. This was due to relatively low operating assets, which could be easily covered by net farm income when Farm Kid was paying for them. Additionally, the operation had a very efficient asset-turnover ratio, with the asset base generating enough cash flow that the parents could easily afford to build a separate financial asset for City Kid.

Georgia Poultry: Georgia poultry was not as successful as successful as the California operation in several scenarios; although all scenarios had a 100% chance of success even when the debt-to-asset ratio reached over 0.6, Strategies 1(a), 1(b), 2(a), and 2(b) saw instances of failure, as seen in Table 5.

Table 5. Alternative Strategies' Probability of Success: GA Poultry

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	100%	55%	0%	NA
1(b)	100%	98%	0%	NA
2(a)	100%	99%	96%	NA
2(b)	100%	100%	99%	NA
3(a)	100%	100%	100%	NA
3(b)	100%	100%	100%	NA
4(a)	100%	100%	100%	NA
4(b)	100%	100%	100%	NA
5	100%	NA	NA	100%

Farm Kid purchasing City Kid's portion of the operation is not advisable when using a commercial loan unless the debt-to-asset ratio stays under 0.6. The asset base does not generate enough cash flow to meet the demands of paying off existing debt as well as paying off the commercial loan and operating debt. In Strategy 1(a), the Farm Kid must pay a total down payment (livestock, equipment, and real estate loans) of $158,044 upon transfer, $66,573 after the first year, and $51,618 starting year 6 and lasting until year 20 after transfer. Several years, the farm business does not generate sufficient funds to cover this cash flow demand.

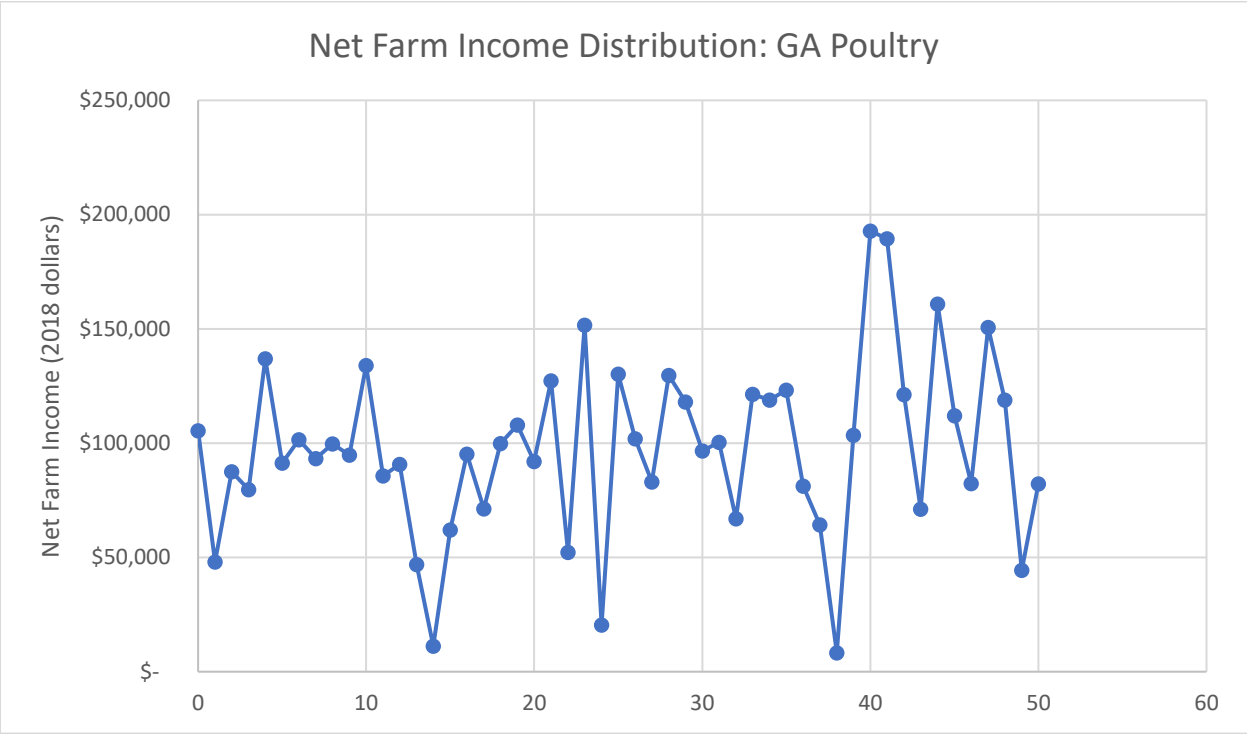
Strategy 1(b) fares better under the three-year operating debt criterion, but stills sees 0% chance of success under the zero debt criterion. With the family loan, the Farm Kid will pay $158,044 as a 20% down payment, and $42,689 in subsequent years with an interest rate of 3.05%. This lower cash flow demand results in a higher rate of successful transition

Strategies 2(a) and 2(b) see very high levels of success, though not perfect. In Strategy 2(a), the parents make an annual payment to a sinking fund investment of $37,256. Using this strategy, there is a 99% chance that the farm has less than 3 consecutive years of unpaid operating debt, and a 96% chance of successfully implementing the strategy with no operating debt. In Strategy 2(b), Mom and Dad purchase a second-to-die, whole life insurance policy and pay an annual premium of $22,965. Both strategies result in a value of $1,174,907 being given to the City Kid, and generally, the operation generates enough cash flow for these demands to be met.

Strategies 3(a) and 3(b) always succeed based on this model. To provide the City Kid with an asset base equal to the farm entity that Farm Kid is inheriting, the parents either create a sinking investment fund (paying $4,255 annually) or purchase a second-to-die, whole life

insurance policy ($2,623 annual premium). In both strategies, though the net farm income varies, as seen in Figure 3, there is enough cash flow to make debt payments and build the financial asset.

Figure 3. Monte Carlo Net Farm Income Distribution: GA Poultry Farm



Under Strategies 4(a) and 4(b), the operation generated enough cash flow to make debt payments and build a financial asset equal to half of the operating entity, succeeding 100% of the time under all criteria. In Strategy 4(a), the parents paid $2,127 annually to a sinking fund investment, resulting in an asset worth $67,092. In Strategy 4(b), Mom and Dad paid a $1,311 premium annually for a second-to-die, whole life insurance policy, also resulting in a financial asset for City Kid worth $67,092. With these low payments, the operation generated enough cash flow to provide a margin of safety that allowed payments to be made with relative ease.

In Strategy 5, similar to the California operation, as Farm Kid purchased shares of the operating entity at $6,709, there were sufficient funds to cover those payments. No gift had to be made to cover Farm Kid, resulting in Farm Kid and City Kid receiving an equal share of the parents' estate and the land entity after Mom died.

Georgia's lower net farm income resulted in higher failure rates for variations of Strategies 1 and 2, but because of low operating assets, Strategies 3, 4, and 5 were always successful. Farm Kid was able to meet the lower cash flow demand that came from purchasing the operating entity in Strategy 5, and the parents had enough cash flow to build an asset that City Kid would inherit in Strategies 3 and 4.

Illinois Corn: As evidenced by Table 6, an Illinois corn farm had high rates of success with all strategies, except for Strategy 1 under the zero-debt criterion. If the debt to asset ratio stays below 0.6, the farm sees a 100% probability of successful transition in all strategies.

Table 6. Alternative Strategies' Probability of Success: IL Corn

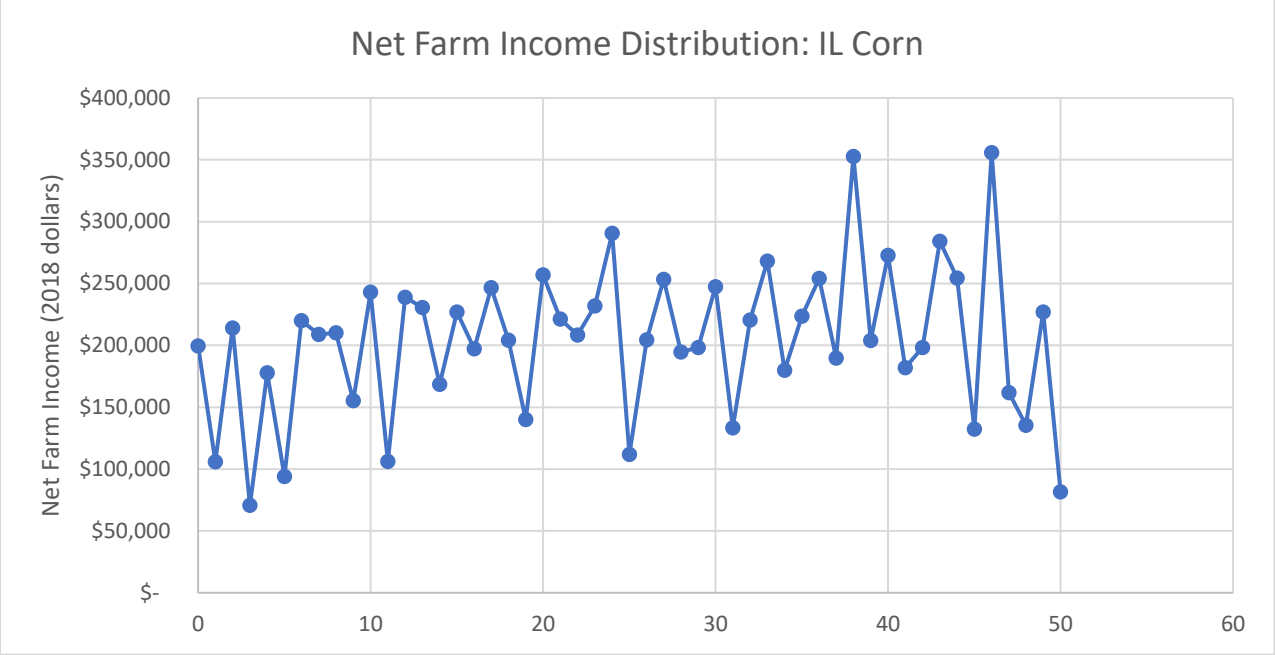
Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	100%	72%	0%	NA
1(b)	100%	100%	0%	NA
2(a)	100%	100%	99%	NA
2(b)	100%	100%	100%	NA
3(a)	100%	100%	100%	NA
3(b)	100%	100%	100%	NA
4(a)	100%	100%	100%	NA
4(b)	100%	100%	100%	NA
5	100%	NA	NA	100%

Under Strategy 1(a), the operation sees no chance of successful transition if any operating debt is incurred. With a summation of livestock, equipment and real estate down payments, the Farm Kid would have to pay a 20% down payment of $318,185 upon transfer,

$144,201 for the first five years, and $97,555 for the next 15 years. While the transition has a good chance of succeeding using Strategy 1(a), other strategies would be better advised, especially if any operating debt is incurred. If the Farm Kid utilizes a family loan per Strategy 1(b), the chances for success under the three-year operating debt criterion increase to 100%, but stay at 0% under the zero-debt criterion. Under that criteria, the operation does not have enough cash flow to meet the demands of the family loan while still operating, even with a lower annual payment of $85,944 each year after Mom passes on.

Strategy 2(a) almost always succeeds under all criteria, with an exception of a 1% chance of failure under the zero-debt criterion. Using Strategy 2(b) proves to be even more successful, with a 100% probability of success under all circumstances. The operation provides enough cash flow for the parents to essentially double their asset base, creating a financial asset worth $2,617,891 to give to City Kid. They do this by creating a sinking fund investment, paying $83,012 annually, or purchasing a second-to-die, whole life insurance policy, paying an annual premium of $51,171. These annual payments are relatively low, given the average net farm income in 2003 to 2018 ranged from $92,852 to $360,388. Under the Monte Carlo simulation of net farm income, seen in Figure 4, the operation provided a margin of safety that allowed for payments to be made to the financial asset for the City Kid and for debts to be paid.

Figure 4. Monte Carlo Simulation of Net Farm Income: IL Corn Farm



Both variations of Strategy 3 also saw a 100% success under all criteria. The relatively high net farm income allowed for enough reserves after debt payments to create a sinking fund investment or purchase a life insurance policy. Both had a value of $431,640, with annual payments to the sinking fund equaling $13,687 and annual premiums for the insurance policy equal to $8,437. The parents are easily able to create a financial asset that is of the same value as the operating entity that Farm Kid gets, as total operating assets are relatively low.

Strategies 4(a) and 4(b) were successful in all situations, and resulted in City Kid receiving a financial asset, either a sinking fund investment or life insurance policy, that was worth half of the operating entity that Farm Kid receives. Before transition, the farm generates enough income to cover an annual investment payment of $6,844 or an annual insurance premium of $4,219. Both payments are low enough that there is a wide margin of safety used to make these payments and principal and interest payments on any debt.

As with the previous operations, the value of the operating entity is low enough that the salary paid to Farm Kid in Strategy 5 is enough to cover his annual purchase of shares of the operating entity of $21,582. Due to this, the Farm Kid and City Kid receive equal interests in both what is left of Mom and Dad's estate and the land entity. The farm generates enough cash flow to provide income to Mom and Dad as they phase out of the business and Farm Kid as he gradually takes over.

The low operating asset base provides for a high level of success in strategies where the Farm Kid receives the operating asset entity and City Kid receives a financial asset. The farm's net income is enough to provide sufficient funds for debt payment and creation of additional assets for inheritance.

Iowa Hogs: Similar to the previous farms, the Iowa hog farm saw very high levels of success. Except for both variations of Strategy 1 when operating debt was incurred and Strategy 1(a) under the 3 year operating debt criterion, each strategy had 100% probability of successful transition, as seen in Table 7. With a very strong asset-turnover ratio, the asset base generated enough cash flow to service any debt incurred in Strategies 2-5.

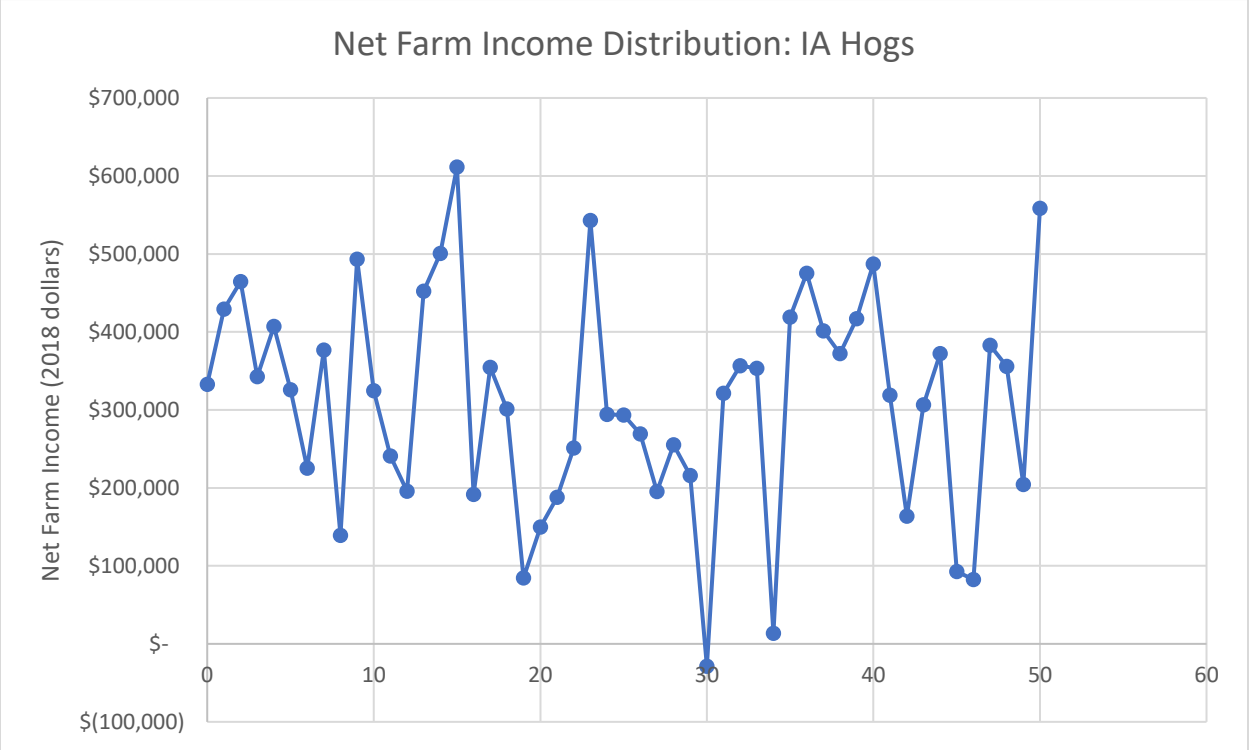
Table 7. Alternative Strategies' Probability of Success: IA Hogs

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	100%	99%	0%	NA
1(b)	100%	100%	0%	NA
2(a)	100%	100%	100%	NA
2(b)	100%	100%	100%	NA
3(a)	100%	100%	100%	NA
3(b)	100%	100%	100%	NA
4(a)	100%	100%	100%	NA
4(b)	100%	100%	100%	NA
5	100%	NA	NA	100%

In Strategy 1(a), the Farm Kid buys out City Kid, using a commercial loan to finance purchasing the rest of the operation. Once Farm Kid got the farm, they would have to pay a total down payment of $297,771, which includes a 20% down payment for livestock, equipment, and real estate. For the first five years, the annual payment for all debts is $146,177, and drops to $84,270 once the equipment and livestock loans are paid off. This strategy worked every time if the debt to asset ratio stayed below 0.6, and worked 99% of the time under the 3-year operating debt criterion. However, there was no chance of success if any operating debt was incurred. In Strategy 1(b), which had a 100% probability of success under two of the three criteria, the demanded cash flow drops, as the annual payment for a family loan drops to $80,430 at 3.05% interest each year after the initial down payment of $297,771.

A high net farm income allows Strategies 2(a) and 2(b) to be feasible. From 2003-2018, net farm income (in 2018 dollars) ranged from $185,649 to $571,686. Based on the net farm income distribution seen in Figure 5, there would be enough of a margin of safety that the parents would be able to make payments. The parents must build a financial asset that is $1,991,080 in value, equal to the value of the farm that Farm Kid receives. Using Strategy 2(a), the sinking fund investment, Mom and Dad pay $63,136 each year to build the fund. Under Strategy 2(b), the second-to-die, whole life insurance policy, the parents pay $38,919 each year in insurance premiums. Both strategies demand a low enough cash flow that Mom and Dad have enough income to cover each payment and debts.

Figure 5. Monte Carlo Simulation of Net Farm Income: IA Hog Farm



In Strategy 3(a) and 3(b), the operating and land assets are placed into separate entities. Farm Kid receives the operating entity and ½ undivided interest in the land entity. The City Kid receives ½ undivided interest in the land entity, as well as a financial asset that is equal to the projected value of the operating entity, either a sinking fund investment or a life insurance policy. To create the sinking fund investment, the parents must pay $18,344 annually to have an ending balance of $578,491 after 20 years. To have the same balance under a life insurance policy, the parents must pay an annual premium of $11,307. Because the value of the operating assets is relatively low, the cash flow generated from the business easily covers the payments needed to create a financial asset equal to the value of those assets. Due to this, these two strategies always succeed.

The same reason also allows Strategies 4(a) and 4(b) to have a 100% probability of success. With the value of the financial asset of City Kid only needing to be worth half of the operating asset entity, payments to the sinking fund investment and whole life insurance policy are significantly lower. In Strategy 4(a), Mom and Dad must pay $9,172 each year to have a value of $289,246 after the 20-year planning horizon. For Strategy 4(b), the parents purchase a second-to-die, whole life insurance policy, paying $5,654 annually in insurance premiums to build the same value.

Due to the relatively low value of operating assets, Strategy 5 shows a 100% probability of success. With Farm Kid's salary, they are able to make the $28,925 payments each year for the operating entity without a gift from Mom and Dad. Thus, Farm Kid and City Kid each receive an equal share of the parents' estate when Mom passes on, and a undivided ½ interest in the land entity.

The Iowa operation had a very strong performance in each scenario. This was due to relatively low operating assets, which could be easily covered by net farm income when Farm Kid was paying for them. Additionally, the operation had a very efficient asset-turnover ratio, with the asset base generating enough cash flow that the parents could easily afford to build a separate financial asset for City Kid.

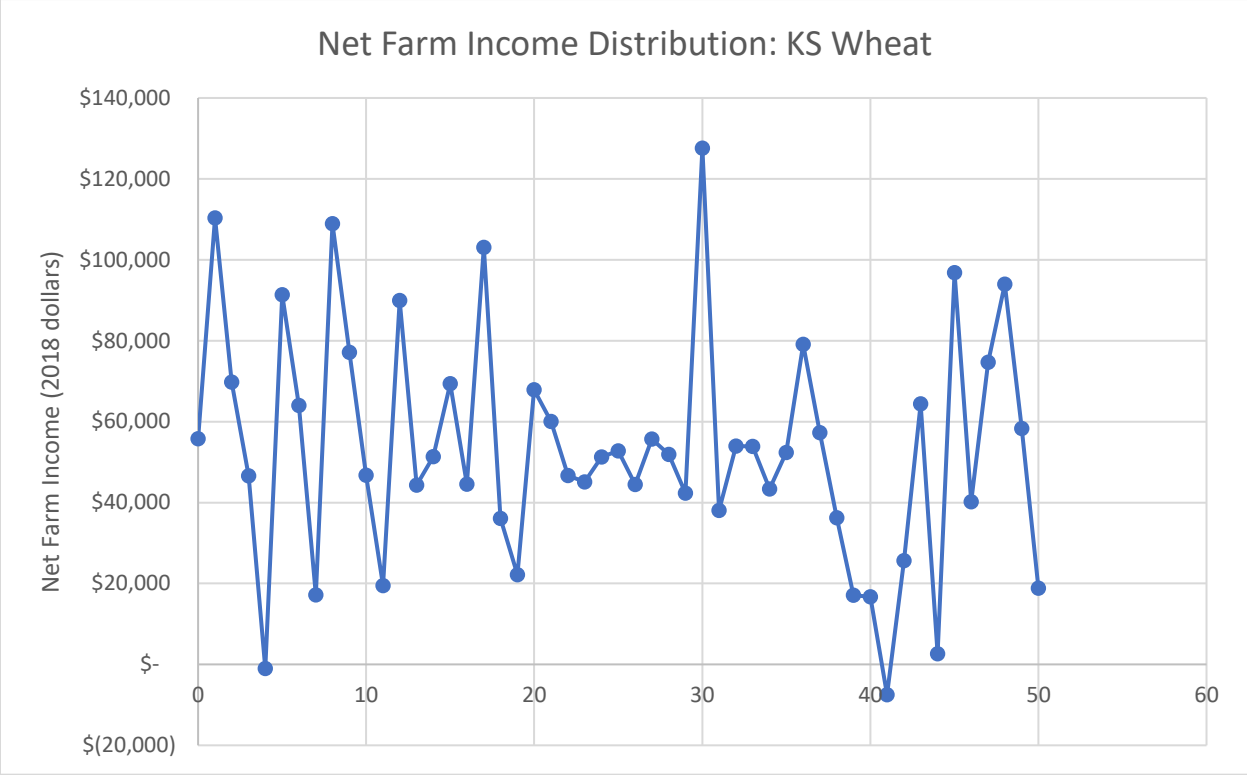
Kansas Wheat: The Kansas wheat operation had significantly lower chances of success under all strategies. As seen in Table 8, Strategy 1(a) has virtually no chance of success. The very low net farm income kept strategies from succeeding consistently under the three-year operating debt and zero operating debt criterion.

Table 8. Alternative Strategies' Probability of Success: KS Wheat

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	3%	0%	0%	NA
1(b)	100%	5%	0%	NA
2(a)	100%	0%	0%	NA
2(b)	100%	28%	13%	NA
3(a)	100%	96%	83%	NA
3(b)	100%	98%	86%	NA
4(a)	100%	98%	89%	NA
4(b)	100%	98%	87%	NA
5	100%	NA	NA	97%

Strategy 1(a) had dismal results for this operation. Only three percent of the time did the debt-to-asset ratio stay below 0.6. This farm is at risk of defaulting on their loans nearly every time. When using an operating line of credit, it is impossible to have fewer than three consecutive years of unpaid operating debt. There is also a 0% chance of implementing this strategy without incurring no operating debt. Strategy 1(a) is infeasible for this operation. However, under Strategy 1(b), the debt-to-asset ratio stays below 0.6 100% of the time. Under the three-year operating debt criterion, there is only a 5% probability of success, and under the zero-debt criterion, there is no possibility of success. The farm simply doesn't generate enough cash flow for Farm Kid to purchase City Kid's share in the farm. Under Strategy 1(a), the 20% down payment for all loans upon the transfer of the farm is $229,310, drops to $98,817 for the first five years, and is $73,501 every year after that. These payments are well above the average income for 2003-2018, and generally are higher than the net farm income distribution seen in Figure 6.

Figure 6. Monte Carlo Simulation of Net Farm Income: KS Wheat Farm



Strategy 2(a) can only work if the debt-to-asset ratio stays above 0.6. The farm has a very weak asset turnover ratio of 0.059, and does not generate much cash flow even though it has a decent operating asset value. Therefore, the parents cannot afford to make payments to a sinking fund investment. In order to be of equal value to the farm that the Farm Kid receives, the financial asset must equal $2,166,217, meaning the parents must pay $68,690 annually. This depletes their cash reserves and net farm income is not enough to make up the difference, so this strategy is not feasible. Strategy 2(b) is successful in very few cases, as the parents make a lower annual payment to a whole life insurance policy of $42,342. Several years, this cannot be covered by the generated cash flow, and has a very low rate of success.

Both variations of Strategy 3 are much more successful than previous strategies. Since the parents only need enough cash flow to create a financial asset equal to $239,428, the value of the operating entity that Farm Kid inherits, annual payments are lower. Under Strategy 3(a), the parents annually pay $7,592 into a sinking fund investment. Under Strategy 3(b), Mom and Dad pay an even lower annual premium of $4,680. Both strategies have high probabilities of success, though not perfect.

Strategy 4(a) has a similar rate of success to Strategy 3(b). The parents now only have to build a financial asset for City Kid that is half the value of the operating asset going to Farm Kid. Mom and Dad pay $3,796 to a sinking fund investment annually to build a value of $119,714 after 20 years. Strategy 4(b) results in the parents paying an annual insurance premium of $2,340 for a second-to-die, whole life insurance policy. The lower value of the farm's operating assets contributes to this strategy's success.

Due to the low value of the operating asset entity, Strategy 5 works well. The salary paid to Farm Kid allows them to purchase shares of the farm entity at $11,971 annually. Since they are able to cover these payments, Mom and Dad do not have to gift remaining funds, and Farm Kid and City Kid receive an equal share of Mom and Dad's estate, and an undivided, ½ interest in the land asset.

This operation's low asset turnover ratio and net farm income contribute to the lower success rates of transition strategies. There simply isn't enough cash to meet the demands of the strategies and debt payments. Several years, the farm may lose money. Although not impossible to have a successful transition, it could be difficult, and requires a thorough evaluation.

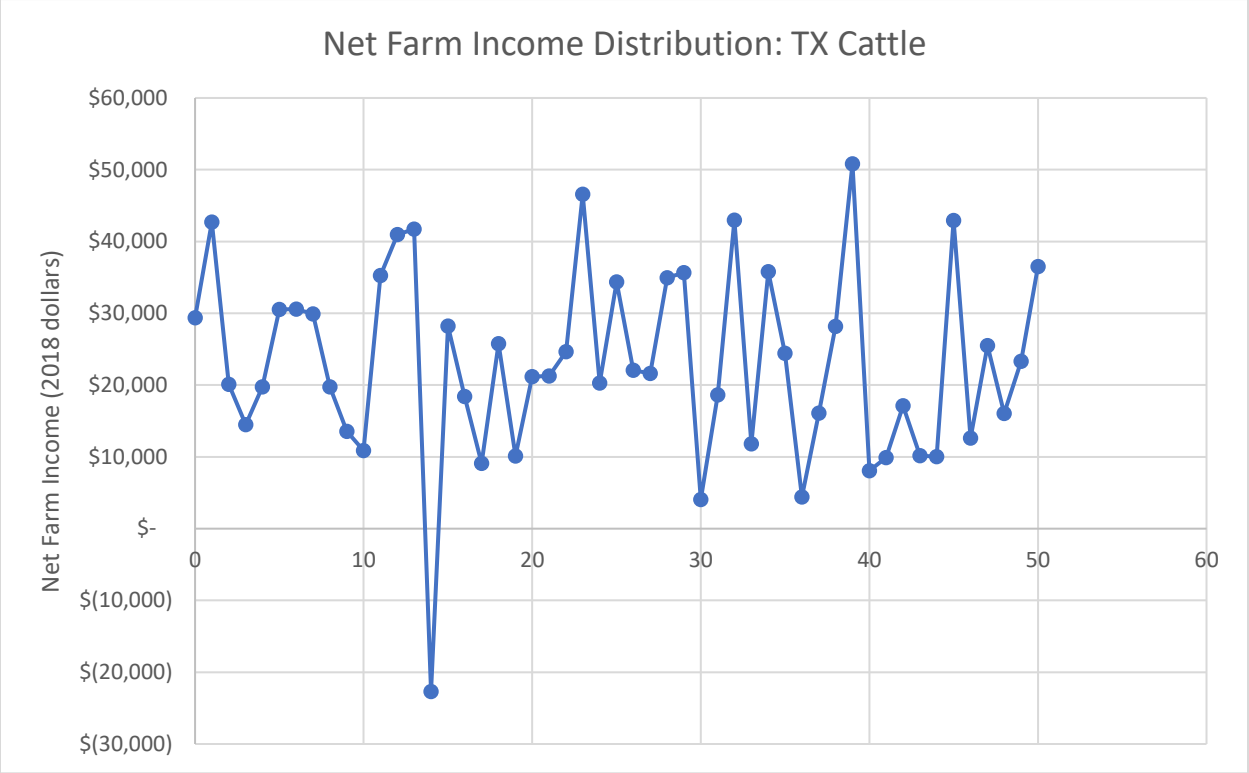
Texas Cattle: As with the Kansas farm, the Texas cattle operation has a weak asset turnover ratio of 0.099, resulting in lower probabilities of success. Strategy 1(a) is not feasible under any circumstances and creating a financial asset equal to the value of the farm for City Kid proves extremely difficult, as seen in Table 9.

Table 9. Alternative Strategies' Probability of Success: TX Cattle

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	0%	0%	0%	NA
1(b)	100%	0%	0%	NA
2(a)	100%	0%	0%	NA
2(b)	100%	1%	1%	NA
3(a)	100%	97%	88%	NA
3(b)	100%	99%	93%	NA
4(a)	100%	100%	94%	NA
4(b)	100%	99%	94%	NA
5	100%	NA	NA	99%

Furthermore, the low average net farm income, illustrated in Figure 7, contributes to difficulty in successfully transitioning. Using Strategy 1(a), Farm Kid must pay a down payment of $150,738 for livestock, equipment, and real estate loans upon receiving the farm, which is well above the average net farm income. For the next five years, annual payments equal $65,627, then drop to $47,897 for the next 15 years. This high debt amount cannot be paid with the cash flow that the operation generates, resulting in Strategy 1(a) having no success. Strategy 1(b) fares little better. The debt-to-asset ratio stays below 0.6 100% of the time, but always fail the other two criteria. Even though the annual payment for this strategy is $40,715 after the initial down payment with an interest rate of 3.05%, neither of these strategies are feasible.

Figure 7. Monte Carlo Simulation of Net Farm Income: TX Cattle Ranch



Strategies 2(a) and 2(b) result in little to no chances of success. The ranch doesn't generate enough cash flow to meet the demands of creating a financial asset of equal value to the operation. Under Strategy 2(a), Mom and Dad would have to pay $46,774 annually to a sinking fund investment to reach a value of $1,475,050 after 20 years. Under Strategy 2(b), Mom and Dad would have to pay an annual insurance premium of $28,832. The ranch doesn't generate enough cash flow to meet these demands, despite being well leveraged.

Both variations of Strategy 3 prove to be very successful due to a lower cash flow demand. Now only having to generate a financial asset equal to the value of the operating entity, $182,938, the parents had an easier time building the sinking investment fund and affording the whole life insurance policy. In Strategy 3(a), Mom and Dad only had to pay $5,801 annually into the fund, and under Strategy 3(b), they paid an even lower premium of $3,576.

Strategies 4(a) and 4(b) prove to be even more successful. Under Strategy 4(a), there is only a 6% chance of implementing the strategy with incurring operating dept. Due to the parents building a financial asset worth half of the farm entity, annual payments to the sinking investment fund are only $2,900. If Mom and Dad purchase a second-to-die, whole life insurance policy as in Strategy 4(b), they will pay annual premiums of $1,788, with a comparable rate of success.

Strategy 5 sees a very high rate of success, but not 100% as compared to other operations. The operating asset entity has a relatively low value, resulting in a low value of shares. As Farm Kid purchases shares each year, he pays $9,147, which his salary can easily cover, especially as he receives dividends from the operating entity as time goes on. Since Mom and Dad don't have to gift funds to Farm Kid to help with the purchase of shares, Farm Kid and City Kid share the remainder of Mom and Dad's estate, as well as the land entity.

The low net farm income and high land asset value of the Texas operation are the downfall for Strategies 1 and 2. The operation does not generate enough cash flow to afford to pay off any land debt, leading to a very poor rate of success when Farm Kid must add that asset into their payments. However, the low value of operating assets is what leads Strategies 3, 4, and 5 to succeed, as the financial asset given to City Kid requires less cash flow, and Farm Kid is able to afford to purchase the farm entity piece by piece.

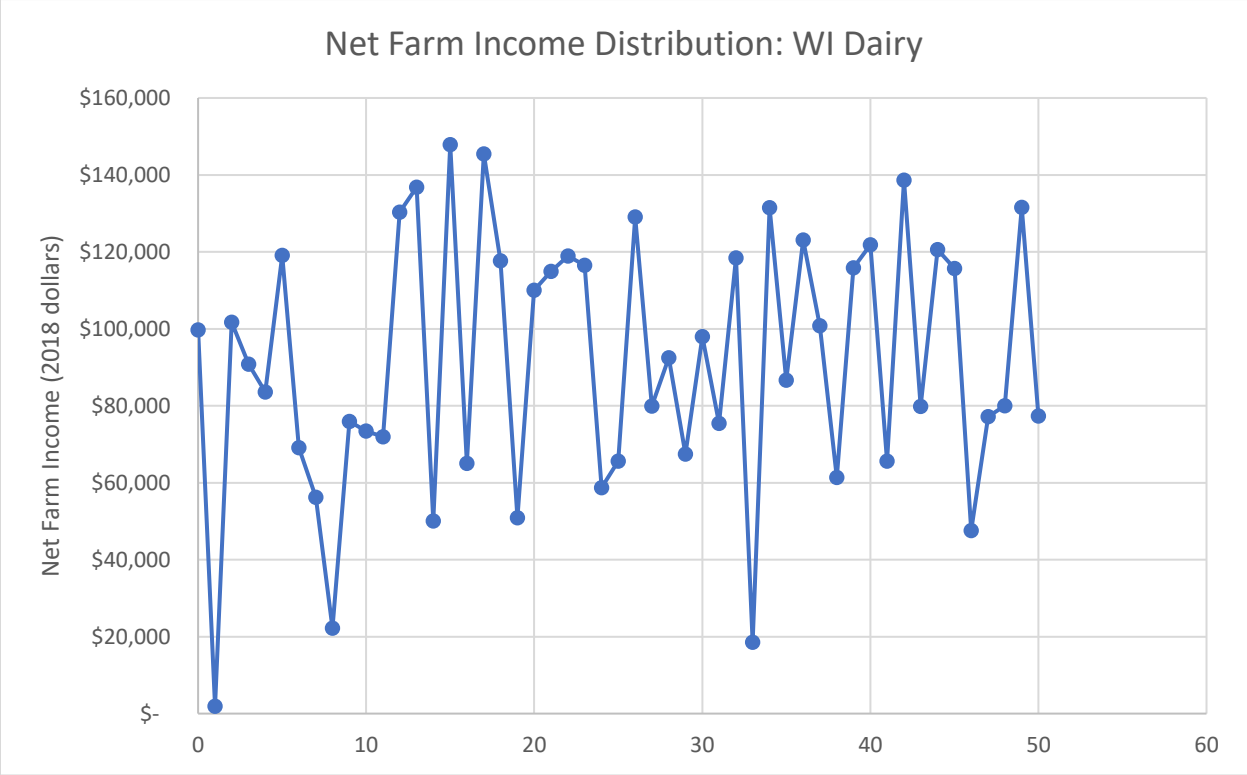
Wisconsin Dairy: The only strategy that has a 100% probability of succeeding for the Wisconsin dairy is Strategy 5. All other strategies have instances of failure, as seen in Table 10. The debt-to-asset ratio stays under 0.6 100% of the time in all strategies, but the three-year operating debt and zero debt criteria are not always met.

Table 10. Alternative Strategies' Probability of Success: WI Dairy

Strategy	D/A Ratio < 0.6	Op. Debt < 3 years	No Op. Debt	Cash Reserves > 0
1(a)	100%	0%	0%	NA
1(b)	100%	84%	0%	NA
2(a)	100%	33%	16%	NA
2(b)	100%	85%	66%	NA
3(a)	100%	98%	94%	NA
3(b)	100%	99%	97%	NA
4(a)	100%	99%	96%	NA
4(b)	100%	100%	99%	NA
5	100%	NA	NA	100%

Strategy 1(a) is the least advisable option for this operation, as there is no chance of transitioning successfully with less than three consecutive years of unpaid operating debt or implementing the strategy without incurring no debt. The high value of total assets proves insurmountable for Farm Kid, and when taking out a commercial loan, the operation doesn't generate enough income to make payments. The summation of livestock, equipment, and real estate down payments upon transition is $261,285; for the next five years, those payments equal to $131,552. After that, the payments drop to $71,888 each year. As seen by Figure 8, the net farm income can vary wildly, and isn't reliable in producing sufficient funds to make these payments and remain operational. Strategy 1(b) sees a higher rate of success under the three-year operating debt criterion, but still a 0% probability of success under the zero debt criterion. The family loan requires the same initial down payment, but then the annual payments drop to $70,575 with a 3.05% interest rate.

Figure 7. Monte Carlo Simulation of Net Farm Income: WI Dairy



Strategy 2(a) sees a low rate of success under both operating debt criteria, though not zero. The operation is too high of value for the parents to be able to double their asset base by creating a financial asset through a sinking fund investment. To reach a value of $1,982,417 after 20 years, Mom and Dad must invest $62,862 each year. This cash flow demand cannot be met by the operation, and therefore this strategy is not feasible. Strategy 2(b), however, sees higher level of successes. To achieve the same value, the parents instead pay an annual insurance premium of $38,749. Though not perfect, the strategy outperforms Strategy 2(a).

With lower annual payments to an additional financial asset, both variations of Strategy 3 have very high probabilities for success. Now only having to build an asset worth $548,458, the value of the farm entity that Farm Kid is receiving, the operation generates enough income for Mom and Dad to make annual payments of $17,391 to a sinking fund investment or annual

premiums of $10,720 to a whole life insurance policy. Both Farm Kid and City will receive an undivided, ½ interest in the land entity, and the operating entity will pay fair market rent to the land entity.

Strategies 4(a) and 4(b) also see high probabilities of successful transition. To create a financial asset that is worth half of the operating entity, worth $274,229, Mom and Dad make annual payments to either a sinking fund investment or a second-to-die, whole life insurance policy. Under Strategy 4(a), Mom and Dad make an annual payment of $8,696 to a sinking fund investment. With Strategy 4(b), Mom and Dad pay an annual insurance premium of $5,360. Since these payments are relatively low, the operation generates enough income that the parents can meet these cash flow demands.

Strategy 5 was the only consistently successful transition strategy. As the Farm Kid purchases shares of the operating entity that gives him a salary, they supplement that salary with earnings from the entity, which increases as they purchase more shares. Each year, Farm Kid purchases $27,423 worth of the farm entity each year. Farm Kid's salary covers this payment, so Mom and Dad never have to gift any remaining funds. As a result, Farm Kid and City Kid receive equal shares of Mom and Dad's estate after Mom passes, and an undivided, ½ interest in the land entity.

With a very strong asset base, the rates of success for the Wisconsin operation vary. When Farm Kid must buy City Kid out of their portion of the entire operation, Farm Kid is doomed to fail. The operation does not generate enough cash flow to meet those demands. However, the lower cash flow demanded when building a financial asset equal to the whole value or half the value of the operating entity results in a higher probability of success.

CONCLUSION

As expected, Strategies 1(a) and 1(b) had varying levels of success over all farms. This strategy would be implemented if no transition planning was done before the death of Mom, resulting in Farm Kid and City Kid receiving undivided, ½ interests in the farm, and Farm Kid having to "repurchase" the land asset from City Kid. This lack of planning was overall not a feasible option for any operation, though it will happen for the over 60% of farm families that do not build a succession plan. Intestacy laws will govern this transition, and the simulations suggest it will not be a successful one.

On the contrary, when just a little bit of planning is done, there are much higher rates of success. When Mom and Dad create a financial asset for City Kid, give the farm entity to Farm Kid, and split the land entity between the two, there are much higher probabilities of the farm staying intact and both heirs receiving their inheritance. The operation is not able to generate enough cash flow to allow Farm Kid to buy City Kid out once Mom and Dad have passed, but it can meet the demands of creating a sinking fund investment or purchasing a second-to-die, whole life insurance policy while Mom and Dad are still alive.

Before the simulation, Strategies 3, 4, and 5 were expected to be "indestructible"; all operations were expected to be able to meet these lower cash flow demands. This was not the case for the Wisconsin, Texas, and Kansas operations. The California, Georgia, Illinois, and Iowa operations all saw 100% probability of success across the board for these strategies, but the Wisconsin, Texas, and Kansas operations broke that mold. The low asset turnover ratio for Texas and Kansas proved their undoing. The operations could not generate cash from the asset base efficiently enough for payments to be made in any scenario. Additionally, the low net farm

income for Texas and Kansas contributed to the failure to make payments. Wisconsin's high total asset value make Strategies 1 and 2 difficult, as there is not enough cash flow to meet the demands of these strategies. However, most of the asset value lies in land, so when the operating and land assets are placed into separate entities, transition will be more successful, as was expected.

Farm transition planning can be a burden, especially in the area of taxes, income and estate specifically. Van der Hoeven discusses how federal tax structure affects farm transition planning[23], and estate taxes vary from state to state. Although none of these prototypical farms reach the $11.58 million threshold for estate taxes in 2020, that threshold is subject to change, and can be changed easily. Since farming and ranching are heavily dependent on land and real estate taxes, this is something for legislators to consider when considering tax structures. Successfully keeping the farm in the family through transition phases will hold off consolidation in the agriculture industry.

This model has its limitations. Many things are held constant, that in real life are very subject to change. What would happen if there is no Farm Kid, and the primary operator wishes to give the farm to a non-related heir? How can the off-farm heirs still receive an inheritance unrelated to the farm? This model also assumes the average for each farm. These prototypical farms may not look like any one farm. Research could be further done into what the benchmark is for a typical operation in a given state; for example, what would the probability of success

[23] Van der Hoeven, supra, at 1.

look like under these strategies if applied to an aquaculture operation in Washington? A problem is also posed if multiple heirs come back to the farm.

The main conclusion that can be drawn from this project is that a little planning can go a long way in all circumstances. Farm families that start building an estate plan before transfer have a much higher chance of maintain the farm throughout generations. This model, though, cannot replace the need for an attorney, an accountant, financial planner, or insurance company. If anything, this model demonstrates the need for these professions and a family discussion to transition smoothly from one generation to the next. Additionally, this model only takes into account the transition of assets in the operation; there is still family dynamics, management transition, and numerous other pieces of the transition planning process that must be considered.

Keep in mind that the representative operations are prototypes for operations across the country. They may not be identical to any one operation but can be similar enough to provide a basis to start a transition plan. This model held the age of death, life events, and number of heirs constant. What would the probability of success look life if there were more heirs, or if the age of death changed? Van der Hoeven lists four "D's" that operators have no control over and can significantly impact the fate of the operation: death, disease, disability, and disaster[24]. No one plans for these things to happen and can derail even the best transition plan. Additionally, it is often said that behind every good farmer is a wife who works in town; off-farm income is variable and can help increase the chance of a successful transition plan.

[24] Van der Hoeven, supra, at 4.

Government payments also factor into many farms and ranches' cash flow; adding that into the model would affect the chances for success and help meet the cash flow demands of several strategies.

Though it may be succinct, the overarching lesson from this research is clear: transitioning a business between generations can be a difficult task, but with a little planning, can be made much easier.