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The Impact of the Timing of the Intergenerational Farm Transfer Initiation on the Terminal Wealth in the Business: Simulation Model

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THE IMPACT OF THE TIMING OF THE INTERGENERATIONAL FARM TRASNFER INITIATION ON THE TERMINAL WEALTH IN THE BUSINESS: SIMULATION MODEL

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This study presents a conceptual framework and empirical farm-level model of wealth creation and accumulation of the farm business and incorporates the changes in life-cycle patterns in farmer productivity and consumption of the older and younger generation. This method provides a vehicle to analyze the timing of farm transfer initiation and its impact on the terminal wealth in the business and the likelihood of the firm's future continuity.

The results of a representative large grain farm (more than $250,000 in gross sales, and $4 million in real estate) in Iowa confirm that the timing of a transfer is determined by two major tradeoffs: 1) between the younger generation's productivity and consumption withdrawals and 2) between the firm's growth and transfer taxes. Given the age difference of the two generations (older and younger) used to populate the model and their respective consumption levels, the firm has experienced a growth reduction during the planning horizon. Therefore, the gain in productivity is much lower compared to the loss of equity associated with additional consumption withdrawals.

Transfers made sooner in the life cycle are not encouraged when no off-farm income is available and/or tax savings do not offset the firm's reduced growth resulted from an increase in consumption withdrawals. The preferred timing strategy is responsive to the following factors: 1) availability of off-farm income (or level of equity withdrawals for younger generation's consumption), 2) the type of transition strategy (proactive or regular), and 3) expected future farmland prices.

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CHAPTER 1: INTRODUCTION

Recently the aging U.S. farmer population and the future of family farms have been often discussed by academics, farming communities, lending institutions and policy-makers. The 2012 Census of Agriculture indicates that about a third of all U.S. farmers are beyond the traditional retirement age of 65 years old. The same group is attributed to own about 29 percent of the real estate in the farm sector. An additional 29 percent of farmers fall in the age group of 55 to 64, and own about 32 percent of farm real estate. This evidence indicates that potentially more than half of U.S. farmers will exit agriculture in the next 20 years. This number of retirements potentially triggers a shift in ownership and management on an unprecedented scale in the farm sector (61 percent of total real estate in the sector or $1.04 trillion) (USDA Agricultural Census 2012, USDA Farm Income Team 2016).

Without appropriate transition planning these wealth transfers may be taxed at as much as a 40 percent rate placing a significant financial burden on the business and its continuity. Given the current wealth positions of many farm businesses, if the transfer is not managed appropriately, it could result in the loss of personal wealth and reduced business growth which may ultimately undermine its financial performance and reduce the likelihood of its future continuity. The transition process also has implications on the sectoral level (i.e. by altering the structure, dynamics and/or performance of that sector). This study focuses solely on farm-level implications. A different modelling approach is required to estimate the effect of these transfers at other levels and is left for another time and/or for other researchers.

The majority of farms in the U.S. are family-owned operations[1] making the farm transition process critical to the future of these businesses. Retiring farmers like all business owners have choices regarding their exit strategy. Several strategies often considered include: (1) sell the farm to an outside (non-family) entity, (2) retire from active production and rent the businesses assets until their demise and then bequeath it to the younger generation (possible absentee landlords in the future), or (3) transfer the farm to the younger generation and maintain the farm/business in their family. This work relates to the third choice, the farm businesses transition to next the generation and continued farming operations.

A closer look into farmer and farm demographics sheds light on why we narrowed the focus of this work: about 23 percent of farm operators who fall in the age group 55 or older operate businesses with production value of $250,000 or more and real estate value greater than $5 million. The remaining farming population in this age group are classified as small, "retirement" or "recreational" farmers.

The recreational and retirement farmers are most likely to select the first or second exit strategy since the typical size of these operations cannot by themselves support multiple generations.

Owners of large or very large farm businesses of this age group generally claim agriculture production as their full-time occupation, with many of them having a strong wealth position with a strong attachment to "their" land and the way of life. Farmers with this disposition are very likely to use the third exit strategy. Statistical evidence shows the

[1] According to the 2012 Census of Agriculture, 97 percent of all U.S. farms are family operations.

share of large-scale family operations remained relatively stable between 1989 and 2003[2] (between 5.9 and 7.1 percent of total U.S. farms). This fact indicates that large-scale family farms have had a tendency to transfer the farm business to the younger generation rather than using some other exit strategy (Structure and Finances of U.S. Farms 2005).

From the financial perspective, the transfer process is of a greater concern for these large or very large farm businesses. This is true since these farms generally have strong wealth positions and are therefore likely to have a higher tax burden and other related financial obligations (e.g., buying out siblings' portion of inheritance) upon transfer. For this reason, this research focuses on understanding the financial impacts of the timing of the farm transfer initiation on the terminal wealth in the farm business.

This work is an exposition in economics and does not address any of the so-called "soft" issues associated with the complex nature of human relationships relating to the operation and/or transfer of the farm business. For our purposes it is assumed that both generations agree on the continuity of the family farm business as their mutual goal, where the successor is known. The timing of the farm transfer initiation is the focus of this work and is viewed as the crucial determinant of the financial performance of the business and its future continuity. The decision to initiate the business transfer affects the flow of earnings and power to make financial decisions related to income generation, consumption, and equity accumulation.

The timing of the farm transfer initiation is affected by:

[2] The change in the farm typology that took place in 2013 makes the comparison of this statistic difficult across years (prior and after the change in typology). Many farms that used to be classified as large-scale prior to the change in typology moved down to the midsize farm category in the updated farm typology classification (Hoppe and MacDonald 2013).

- Trade-offs between firm's growth and potential tax implications at the time of transfer.
- Life-cycle patterns in family consumption and farmer productivity and their impact on the firm's growth.

Under current tax laws, the federal estate tax, up to 40 percent, is applied to the estate transfers that exceed the exemption amount of $5.45 million for an individual (Internal Revenue Code, 2016). While this number may at first glance seem high, recent escalation in farmland values, ever increasing farm size and technology investments needed to remain competitive in agriculture production systems make it likely that an ever increasing number of farms will meet or exceed the current tax exemption limits. Farm businesses, by nature of the production process, have large asset bases comprising of real estate (80 percent) and machinery (8 percent) both of which are relatively indivisible and lack liquidity (Kirkpatrick 2013, USDA Farm Income Team 2016). Recently, the period between 2007 and 2014 has been referred to as a "second golden age in agriculture" during which the economic environment created conditions for the further strengthening of wealth positions in farm businesses (Young, 2015). Record high farm income and low interest rates during this period have triggered a rise in farmland prices and supported large capital investments in farm technology, machinery and equipment. Finally, the size of large and very large operations have been increasing over time since well-established seasoned farmers generally have a strong borrowing capacity to grow their asset bases, in particular increasing farmland in their investment portfolio.

The combination of the above factors has led to strong wealth positions for many of these farms. Thus, if the farm transfer decision is delayed, the growing size of the

estate to be transferred to the younger generation may come with a large tax obligation. In such cases, it is not uncommon for the successor to sell a portion of farm assets (such as a parcel of farmland) to meet the tax obligations and/or to compensate other off-farm successor/s. Such disposition of assets reduces the size of the operation and may negatively affect the firm's production efficiency, future growth and continuity.

Existing literature and statistical evidence show that farm family businesses experience life-cycle changes in farmer productivity and family consumption. This research focuses on these factors since they impact the firm's growth and ability to accumulate wealth. Tauer (1995) studied the age-productivity relationship[3] of U.S. farmers and concluded that farmer productivity increased about 7.5 percent as farmers moved into successive age groups until they reached the 35-44 age group and then declined at a similar rate.

Family living expenses is another expense category placed on the family farm businesses, unless the earned income from off-farm sources[4] is available to cover some or all of the family living expenses. The added withdrawals place additional requirements on the annual cash flow of the farm business, reduce the retained earnings, and affect the firm's future growth and wealth accumulation. Thus, it is critical to recognize that there are two families on the farm (the younger and older generations) overlap at different stages of their life-cycles and change the composition of the household dependent on the farm business to different degrees depending on their ownership positions.

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[3] Tauer (1995) specified six age groups (25 or younger, 25 to 34 years, 35 to 44 years, 45 to 54 years, 55 to 64 years, and over 65 years).

[4] Off-farm income is specified as any income stream available for the farm household except the farm equity. Wages earned on the farm may be included in the off-farm income.

These two factors (family consumption needs and the age-productivity profile of the owner-operators) affect the firm's profits, growth potential, and the size of the business at the time of transfer. The latter one determines the terminal wealth of two families and tax obligation associated with the transfer of wealth to the younger generation. Generally, more growth is desirable and needed to ensure a continuity in life-style for both families and to secure the wealth position of the farm business. However, as the size of the farm increases greater amounts of wealth must be transferred to the younger generation, exacerbating the tax burden and potentially reducing the wealth position and future growth of the business. The trade-off between the firm's growth and the potential tax implications at the time of transfer directly affects terminal wealth and the farm's continuity.

The life-cycle patterns in farmer productivity and family consumption, and changes in composition of household impact the growth potential of the business which, in its turn, along with wealth transfer strategy determine the tax obligation at the end of the planning horizon. The above factors ultimately impact the wealth accumulation process and help determine (directly or indirectly) the terminal wealth position of the business. If these factors are not considered properly the farm transfer is not likely to result in the achievement of the maximum wealth position or in the greatest possible chance of its continuity.

Oftentimes, producers focus on transfer tax minimization and/or specific transfer tool when determining the most desirable time to initiate farm transfer (apart from other non-financial considerations such as family dynamics, availability of successor, etc.). In the presence of life-cycle patterns, their impact on the firm's growth, and trade-offs

between the firm's growth potential and tax obligations are not integrated into the decision-making process, the selected timing for the transfer initiation will likely result in lower than maximum level of terminal wealth for the farm.

The problem is that delayed or early farm transfer initiation will not result in the accumulation of the maximum possible level of terminal wealth in the business and thus reduce the probability of the firm's continuity and future financial viability into the next generation.

1.1 Motivation

Continuity and financial viability of large and very large farms is crucial to agricultural stability since these farms are estimated to produce 60 percent[5] of agricultural production in the U. S. farm sector (USDA ERS2014). A transition crisis or large number of failures would not only impact the economic and social well-being of the individuals and their families but also the rural communities where they live.

Intergenerational farm transfer is a difficult endeavor. Faced with the complexity of the issue, current owner-operators may not fully observe or realize how the timing of farm transfer impacts their firm's continuity, viability and terminal wealth position. A better understanding of the relationships among the timing of transfer initiation and other drivers of the firm's growth such as life cycles in farmer productivity and consumption will allow for a quantitative analysis of the implication of the delayed or early transfer of the farm on the terminal wealth of the business.

[5] This statistic refers to the farms of midsize and large-scale U.S. family farms.

1.2 Contribution and Application

Available literature focuses primarily on such elements of intergenerational farm transfer issues as succession planning (Mishra et al. 2010, Glauben et al. 2004, Harris et al. 2012), the sector-level implications of the potential impact of a massive shift of wealth, and the legal mechanisms/methods of intergenerational farm transfer measured in financial terms (Boehlje and Eisgruber 1972, Peterson 2013). These studies provide important insights on various aspects of this phenomenon; however, none of them recognize or incorporate life-cycle patterns in family consumption, farmer productivity, and changes in household composition as factors which impact the growth potential, tax obligations, which ultimately determine the terminal wealth position of the business.

This study narrows down and incorporates the above mentioned factors building a representation of the wealth creation process inherent in the family farm business. It is hoped that the resulting deterministic simulation model will ultimately be modified into a user-friendly decision tool to inform agricultural producers about the financial impact of the timing of farm transfer initiation on their business. It is further hoped that this model will continue to be developed and be used by others, including lending institutions and wealth management firms to help their clients make sound choices in the timing of their farms transition.

1.3 Objectives

The primary *goal* of this research is to develop and apply a deterministic electronic simulation model that determines the potential financial consequences of early or delayed farm transfer initiation on the wealth position of large and very large farm businesses in the Midwest. This goal is achieved by fulfilling the following objectives:

- Build a representative electronic simulation model that reflects the wealth creation process in large and very large family farm businesses in the Midwest (Nebraska, South Dakota, and Iowa).
- Impose life-cycle patterns in farmer productivity and family consumption to reflect their impact on the growth potential of the business.
- Based on the simulation results, identify the time of farm transfer initiation under a certain transfer method (amount of annual gifts and final transfer tool) that yields the highest level of terminal wealth accumulated by both generations through the farming operation at the time of the parents' passing (end of the planning horizon) and increases the likelihood of business continuity.
- Finally, conduct a series of sensitivity tests to determine the responsiveness of the terminal wealth to the selected assumptions made in the construction of the model.

1.4 Organization

Chapter 1 addresses the need (motivation) for this research, illustrates how this work can potentially benefit various stakeholders (value or contribution) and outlines the structure of this document to enhance readers understanding. Chapter 2, is an overview of the existing literature providing background and relevance which helps the reader understand various aspects of the intergenerational farm transfer and relevant concepts from agricultural finance theory used in developing the analytical model.

Chapter 3 provides the description of the conceptual framework and empirical model, lists and explains underlying assumptions, and defines scenarios used in the sensitivity analysis. Data sources and the construction of the representative farm are

explained in detail in Chapter 4. The discussion then moves to Chapter 5 in which the simulated results for the baseline and other scenarios are presented and explained. Finally, Chapter 6 highlights major conclusions, implications and discussion.

CHAPTER 2: BACKGROUND

2.1 Farmer Productivity: Life-Cycle Pattern

The relationship between individual productivity and age has traditionally been an important research area in such fields as psychology and gerontology. In the last several decades, the fields of labor economics and demographics have started investigating this phenomenon recognizing that the U.S. labor force age profile has been shifting, i.e. baby boomers (those born in the U.S. between 1946 and 1964) are approaching retirement age. Initial work in the area of the age-performance did not find a strong direct impact of age on work performance (Rhodes 1983, Davies and Sparrow 1985). Later work such as Salthouse and Mauer (1996) studied the productivity variation over the life cycle using a different perspective from previous works. Instead of evaluating the direct impact of age on the productivity, they developed a framework in which the effect of age on the work performance was mediated through other variables (e.g., abilities, skills, and worker characteristics). They concluded that as the individual aged, his/her cognitive abilities declined. In particular, around the age of 50 and after, individuals' reasoning ability and episodic memory declined. Other studies (Baltes and Linderberger 1997, Hoyer and Lincourt 1998) found that individuals' speed at which they learned and processed information deteriorated with advancing age.

A more recent work in this area (Skirbekk 2004) shows that the individual productivity can be described as an inverted U-shaped curve with a significant decline in productivity around the age of 50. This study concluded that while people generally experienced productivity variation over their life time, those changes depended on the work tasks being performed. In situations that demand rapid problem-solving and learning, individuals' productivity declines rapidly with age. However, aging has a

significantly lower impact on the individual's productivity if the job requires extensive experience and verbal communication (these abilities are much less affected than the speed of learning and processing).

Tauer (1984, 1995) and Tauer and Lordkipanidze (2000) conducted a series of research that estimated farmer productivity by age using several approaches. In the first study (1984), separate farm-level gross revenue production functions were estimated for each age group of farmers. Their results suggest that farmers of different ages use slightly different technologies and use inputs with varying efficiencies. According to these results farmer productivity peaks around the age 35-45 and is nearly 30 percent higher when compared to the 25-year-old group.

The second study (Tauer 1995) estimated productivity by age for ten U.S. production regions using state-level data. The underlying production technology was assumed to be constant within the region and age groups, but farmers of varying ages were assumed to utilize the same technology at different efficiency levels. Following Diewert (1976), the Tornquist input index was applied in translog form of relative efficiency of two different age groups, and two regression models were estimated (with symmetric and nonsymmetric specifications). His results support the general direction of changes in farmer productivity as age progresses: it generally increases and then decreases with age. Results by production region generally indicate that productivity changes 5 to 10 percent on average every 10 years and are symmetric in nature. Productivity increases on average 5-10 percent every ten years until the middle age (35 - 45 years) and then declines at the same rate. This study finds that middle-aged farmers

are 10 to 20 percent more productive (different from 30 percent estimated by Tauer 1984) compared to younger and older age groups.

More recently non-parametric linear programming was used to obtain Malmquist productivity indices for each farmer age group (Tauer and Lordkipanidze 2010). This methodology allows for separation of the productivity index into two components (efficiency and technology) which provides more complete insight into productivity difference among farmers of varying age groups. The 1992 Census data was used to estimate state-level productivity indices by four specified age groups. Generally, their results suggest that productivity slightly increases with age and then declines. However, a lot of variability is observed across states and regions.

The decomposition of the productivity index shows that the majority of the variation comes from changes in technology use rather than changes in efficiency. Among Midwestern states, productivity peaks earlier (around 25-34 years) compared to other regions which is primarily driven by changes in technology use rather than efficiency. Midwestern states exhibit very rapid increase in technology use at early stages of life-cycle which levels off with time, while the efficiency remains almost unchanged over age.

2.2 Household Consumption: Life-Cycle Pattern

Farm household consumption is one of many drivers of firm's growth since it impacts capital available for investment (e.g., ability to purchase productive assets) and the firm's growth potential (Pederson and Brake 1982, Phimister 1985).

Traditionally money income/wealth of the household is used as an indicator of the economic well-being or standard of living for the household. But there are those that have

argued that household consumption is a better measure of the household's standard of living (Johnson et al. 2005, Cutler et al. 1991, Meyer and Sullivan, 2003).

Jones et al. (2010) found that since 1998 farm households have had higher income (3 to 20 percent) and wealth (4 times) compared to urban households; however, farm households experienced more volatility in income compared to their urban counterparts. The authors hypothesized that using the money income or wealth approach may result in an inaccurate comparison. Thus, they adopted the consumption approach as a more stable measure of long-term economic well-being of the household. When incomes are low, farm households consume a relatively larger portion of their current income compared to their urban counterparts. Conversely, when incomes are high, they do not expand discretionary purchases to the extent that urban households do. Farm households have a lower marginal propensity to consume (MPC) from current income and tend to smooth out consumption over time.

Mishra et al. (2002) addressed the fact that farm households traditionally had multiple sources of income and concluded that farm households were relatively better off compared to the average U.S. household when other off farm sources were included.

Carriker et al. (1993) studied farm families' consumption when current income was drawn from multiple sources (from farm operation, off-farm work, and government payments). Assuming that all three income sources are perfect substitutes, the propensity to consume off-farm income and government payments was found to be higher than propensity to consume income from farming operations. When a farm household draws funds for its consumption from farm income only, its responses historically are dampened or smoothed overtime.

This low marginal propensity to consume is an indication of some habit persistence or impact of past events on the current consumption pattern (Langemeier and Patrick1990, Hall 1979). Four major theories have been used to explain habit persistence of consumption: (1) partial adjustment hypothesis (Johnston 1984), (2) relative income hypothesis (Duessenberry 1952, Mullen et al. 1980), (3) permanent income hypothesis (Friedman 1957), and (4) life cycle hypothesis (Ando and Modigliani 1963). Langemeier and Patrick (1990) used all four consumption theories to estimate MPC for a sample of Illinois grain farms between 1979 and 1986 and conducted non-nested hypothesis tests to explain farm consumption most accurately. Their results are consistent with those mentioned above and suggest that farm households have low short-run MPCs ranging between 0.007 and 0.020. During times of high income, farm household consumption tends to increase slower than its income, indicating more income is available to be reinvested back into the business. In contrast, when farm incomes are low, consumption is adjusted (but not significantly) which requires withdrawal of additional funds from stored up equity i.e. farm assets, deferred debt payments, delayed capital investments, etc.) (Langemeier and Patrick 1990). This original finding is supported by more recent works (Langemeier and Snider 2009, Browning and Crossley 2001). These findings indicate that the assumption of constant consumption over time is not as unreasonable as sometimes perceived by researchers. Thus, in this study (with 10 years planning horizon), little or no change in short run consumption of farm households is anticipated.

However, the level of consumption is expected to vary with changes in the composition of family and size of the operation. The USDA report on Income, Wealth and the Economic Well-being of Farm Households indicates that a positive relationship is

observed between the size of the farm business and the family living expenses of the household (Mishra et al. 2002). Using the 1996 and 1998 Agricultural Resource Management Study (ARMS) data it has been found, unlike with the income generating ability, consumption tends to peak at the early stages of the family's life cycle and gradually levels off. The data's highest average family living expenses, $35,635 per year per household were observed for operators 35 years old or younger while the lowest average annual living expenses were $10,079 per household for operators 65 years or older.

Information from the University of Minnesota's Farm Financial Management Database shows that family living expenses generally vary by the size of operation and peak when the head of the household is 41 to 50 years old.

In summary, the literature supports the idea that farm household consumption is relatively constant in the short run but changes as these households move into the succeeding age group and as the size of the farm operation changes.

2.3 Transfer Environment

Transfer Tax Policy

When transferring wealth to the younger generation during the older generation's lifetime (inter vivo transfers or bequests), tax implications associated with the transfer process must be carefully considered by both generations to reduce the financial burden of these obligations on the business. Tax implications depend on how the assets are transferred to the younger generation (e.g., sale, installment sales, lifetime gifts, passed through an estate). If assets are sold, the seller incurs the income tax placed on the difference between the selling price and the adjusted basis of the asset (Hachfeld, Bau,

Holcomb 2014). Installment sales allow the seller to spread the proceeds from the sale of his/her assets and the resulting income tax obligations associated with the sale over time. This study, however, focuses on lifetime gifting and the transfer of estate at death (via will). The resulting tax implications as explained in detail below.

The Internal Revenue Service (IRS) Code defines the federal estate tax (sometimes referred to as "transfer tax") as a tax placed on the individual's right to transfer his/her property to another individual(s) at the time of his/her death. A 40 percent tax rate is applied to taxable estates that exceed $5.45 million as of 2016. The *gross estate* is the dollar amount of the decedent's property to be transferred to the successor calculated at the fair market value. Taking out appropriate deductions (e.g., marital deductions, debt, administrative and funeral expenses, and charitable deductions) and adding back taxable lifetime gifts produces the *taxable estate.* The taxable estate is reduced by the amount of available estate and lifetime gift exemption, $5.45 million, and the residual value is taxed at a 40 percent tax rate (IRS 2016). The state estate tax has been repealed and cancelled in most states over the last two decades. Currently, only 12 states[6] and the District of Columbia still impose a state estate tax on the transfer of estates with a 16 percent tax as the highest rate (Michael 2015).

Gift tax is defined as a tax on the property being transferred (directly or indirectly) and without asking anything in return. Typically, a donor is responsible for the gift tax; however, other arrangements can be made if both parties agree (IRS 2016). The federal government identified certain types of gifts as non-taxable: (1) gifts that do not exceed the annual gift tax exclusion amount ($14,000 as of 2016), (2) gifts to a spouse,

[6] Connecticut, Delaware, Hawaii, the District of Columbia, Illinois, Maine, Maryland, Massachusetts, Minnesota, New Jersey, New York, Oregon, Rhode Island, Vermont, Washington.

(3) covering another donee's tuition or medical expenses, and (4) charitable gifts. The donor can transfer a non-taxable gift to as many donees as he/she wishes without incurring a gift tax (as long as the annual gift per individual per calendar year does not exceed the annual gift exclusion amount, $14,000). If the gift exceeds the federal annual tax-free gift amount, the dollar value of the excess is added back to the taxable estate at the time of the final transfer to compute the federal estate tax. On the state level, the gift tax is applied only in Connecticut (Michael 2015).

Currently, five states[7] impose inheritance tax on property that is being transferred as inheritance to the donee, with New Jersey and Maryland imposing both state estate and inheritance taxes. The inheritance tax depends on the relationship of the heir (lineal or collateral): in Iowa, inheritance tax is not applied to the lineal heirs (grandmother, grandfather, parents and their children), while in Nebraska, the exemption amount for lineal heirs is $40,000 and a 1 percent inheritance tax rate is applied on the excess if the estate exceeds this exemption amount.

Succession Planning

About 70 percent of U.S. family businesses fail the transfer to the second generation, and about 90 percent are not able to remain a successful financial viable enterprise when transferred from the second to the third generation (Williams and Preisser 2003). Some studies show that 60 percent of these failures are associated with the communication breakdown in the family, 25 percent due to failure to prepare heirs, 12 percent are associated with other errors, and only 3 percent result from professional errors in accounting, legal, or financial advising (Babikian 2006, Williams and Preisser 2003).

[7] Iowa, Nebraska, Kentucky, Pennsylvania, Tennessee.

Kaplan et al. (2009) conducted interviews with farm families to better understand the causes of communication breakdown during the farm transfer process. They concluded that passive communication, the presence of unresolved issues between family members, and the lack of inclusion of the younger generation into future planning were major causes of unsuccessful dialogue in farm families, particularly when the intergenerational farm transfer was discussed. These results suggest that succession planning is a crucial aspect of the intergenerational farm transfer.

Harris et al. (2012) found that the presence of succession plan had a significant positive effect on the farm's on-going financial performance (profitability and return on equity). In addition, farms with an identified successor showed stronger financial performance compared to those without the successor.

Applying a binomial logit regression model to a farm-level dataset and treating wealth as an endogenous variable, Mishra et al. (2010) studied the drivers/determinants of succession planning in U.S. family farm businesses. Results show that the age of the operator and the net worth of the farm business have a statistically significant positive effect on the likelihood of having a succession plan.

Glauben et al. (2004) used survey data for 272 farm households in Germany to study the impact of farm and family characteristics on the likelihood of farm succession within a given observation period utilizing probit and competing risk models. Based on the results, higher profitability, larger amounts of farmland owned in the operation and larger size of households increase the probability of succession of the business to the younger generation.

Estate Tools and Structure of Business Ownership

Farm transition is a complex process and consists of three major components: (1) the transfer of ownership of assets (or business entity itself), (2) the transfer of control over assets, and (3) the decision on whether to allow other parties (non-successors who do not have ownership and/or control) to participate in future revenue streams of the firm (Ferrell and Jones 2013).

The most commonly used estate tools are wills, trusts, and life insurance. A simple will is a very common estate tool used by farm businesses. A will is a legal document that provides directions for redistribution of estate to heirs after the death of the owner/s of the estate. (Ferrell and Jones 2013). Advantages of a will include the ability to adjust a will prior to death and appoint the individual to administer probatewhich is required for the will to have any binding legal effect. This probate procedure may be costly, may take significant time, and is a public event, making information presented their (the firm's current financial position, future plans, inventories, etc.) open for scrutiny or perusal by anyone.

Unlike a simple will, a trust is a separate legal entity that does not require assets to go through probate to be allocated to their recipients. These features of this transfer method ensure confidentiality of the farm business's matters during the process and is much more difficult to contest. Some of its disadvantages include the upfront costs of establishing and managing a trust and its complete irrevocability after the owner's death.

Life insurance is a rather flexible and useful estate tool that is not as widely used by many farm families. Its main advantages are that; (1) It increases the size of estate to support the economic well-being of heirs and/or remaining spouse without affecting the taxable estate, (2) It covers funeral expenses and administrative costs, (3) It can be used

to balance the allocation of transfers among on- and off-farm heirs (on-farm successor would get all productive assets needed to maintain the farm business as a viable enterprise, while life insurance proceeds would be given to the off-farm heirs, much like a payoff), and (4) It may give an opportunity to a successor who wishes to buy out the interest of the off-farm heirs by purchasing life insurance on their parents. The main disadvantage/challenge is the upfront cost of the premiums.

While estate tools aid in transferring wealth *after the death* of the owner, there are other components of the farm transition process (such as the choice of the structure of business ownership and transactional tools) that take place *during the life of the owner*. If carried out correctly, these factors can potentially make the transfer process of ownership, control and participation smoother.

According to the 2012 Census of Agriculture, about 87 percent of farm operators who are 60 or older listed sole proprietorship as a legal status of their operations, whereas only 7 percent formed their business as a partnership registered under the state law and 5 percent as a corporation (USDA NASS2012). If carefully selected, the right choice of business entity can help reduce tax obligations (particularly self-employment taxes), facilitate a smoother transfer of assets between generation (transferring interest in business or stock rather than a percent of a physical asset annually), and provide legal protection (a limited liability used to protect assets as the business grows.

A sole-proprietorship is a business entity that is easy to form and manage, has the lowest record-keeping requirements of any other entity in the U.S. and allows for only one owner. Its main disadvantage, however, is the self-employment tax (15.3 percent as of 2016) which places a significant financial burden on the business.

Partnership businesses allow for multiple owners (partners) and a convenient splitting of income and expenses among these individuals. Arranging the business in this form may help limit liability protection for non-active partners but exposes general partners to liabilities incurred by the others. Similar to the sole proprietorship, partnerships are required to pay self-employment taxes.

A limited Liability Company (LLC) is a relatively new but popular type of business entity that offers the same liability protection as corporations do for all members (Ferrell and Jones 2013). Members are liable only up to the amount of their investment in the business.

Corporations (S-Corp and C-Corp) provide benefits but have a more complex structure and have specific criteria to start and maintain. Organizing the business as a corporation provides self-employment tax savings and significant liability protection for the owners, offers some potential income tax savings (C-corporation), and allows for smooth transfer of ownership of the farm business (e.g., transferring shares of the business). Corporation do have some drawbacks as well such as; 1) C type corporations have double taxation on the retained earnings, 2) Type S corporations incur tax liabilities at the time of dissolution.

CHAPTER 3: MODEL

3.1 Conceptual Framework

The family farm businesses are most likely to be viable post transfer when wealth is maximized, ceteris paribus. Thus, for purposes of the study a wealth accumulation model was created to focus on only those firms that wanted the continuity of the family farm business as a joint goal of both generations engaged in the business. The model will allow for studying the impact of the timing of farm transfer initiation on the terminal wealth in the business.

Planning Horizon

The model uses a time horizon of 10 years (N) which starts at n=1 and ends upon the execution of the will in the last period where N=10 with each year's ending wealth discounted to the present value. For this analysis, the will is executed upon the demise of both parents[8] which is set to be the end of period 10.

Boehlje and Eisgruber (1971) considered time and uncertainty explicitly when they modeled farm estate management plans. They used a survival function to calculate mortality probabilities and applied them in the simulation of this multi-stage decision problem. Their goal was to identify the set of estate creation and transfer strategies as new information about the survivability of the older generation became available.

While the uncertain nature of the older generation's life expectancy is important in the overall picture in the transition process, they are beyond the scope of this work and are left to others.

[8] The death of the first parent can also trigger the final transfer of his/her portion of wealth to the younger generation if the selected final transfer instrument allows for such transfer. However, in this model, we assume that the wealth is transferred to the surviving spouse upon to the death of the first parent and then the final transfer occurs when the second parent passes away (life estate).

A 10 year planning horizon was used due to the model's need for the specification of economic conditions. Most advance firm-level baseline projection models developed and maintained by USDA Economic Research Service (ERS), Food and Agricultural Policy Research Institute (FAPRI), and Texas A&M University (the Firm Level Income Policy Simulation Model (FLIPSIM)) make forecasts only for 10 years into the future. Thus, extending the planning horizon beyond 10 years would create concerns related to reliability and scenario development. Since the value of farmland is the largest single driver in wealth accumulation forecasting its value even for 10 years might be considered tenuis.

During the period of the simulation, 10 years, it is assumed that the older generation has made a life estate contract with the younger generation. As the 10 year period reaches its end, the surviving spouses passes away and the final transfer to the younger generation is completed[9]. In year one, the model is populated with key input variables (KIVs) calculated based on the firm's financial performance at the beginning of the planning horizon. Then, using financial relationships, equations, and the populated data, the model generates the firm's growth for the next nine years.

Transition Strategies: Proactive versus Regular

The intergenerational farm transfer process includes both estate planning and transition planning. The estate plan allows for the successful transfer of the physical assets and the transition plan helps ensure the continued operation of the farm business. The transition planning encompasses three major areas: succession planning, retirement planning, and the firm's financial viability assessment and projections. All three contribute to the future continuity of the business. In succession planning, both generations decide

[9] The assumption on the death of the last parent (end of year 10) has not been tested in this study. Thus, the model was run only for 10 years. The testing of this assumption is left for future research.

and agree on how managerial responsibilities will be transferred to the next generation. The retirement component of the transition plan helps procure sources of retirement income for the older generation to ensure their consumption needs are met. The financial viability assessment of the farm allows for an objective evaluation of the financial condition and performance of the business. This information is used to judge the firm's ability to support consumption of both generations.

The intergenerational transfer of the farm business is generally not a discrete event, but a continuous process and defines the *transfer initiation time.* The intergenerational transfer process is the period of time when both generations develop and are executing *both* transition and estate strategies. This work is limited to two types of transition strategies, proactive and regular. The *Proactive transition strategy* refers to the situation in which both generations have developed and started implementing components of the transition planning *prior to the transfer initiation*. The proactive transition strategy is the situation where the younger generation has been given managerial responsibilities[10] and is able to withdraw their share of the income generated by the business[11] prior to the initiation of the transfer. This would be the case where the operation has a seasoned primary operator and a well-established and groomed successor who has been actively involved in the farming operation. The *regular transition strategy* has no components of transition planning implemented until the transfer is initiated. This is where the younger generation does not hold any managerial responsibilities in the business and does not have access to farm

[10] proportional to its ownership share in the farm business
[11] to cover consumption withdrawals

income[12] , other than their wage. If equity is being built up, it is automatically re-invested into the business.

Terminal Wealth

Terminal wealth is defined as the wealth position[13] of the business after the farm transfer process is completed. The transfer process is assumed to be completed when the transfer tool selected by the older generation is enacted (e.g., the will is executed), the remaining part of the wealth (total older generation's wealth minus gifts already transferred) is transferred to the younger generation according to the parameters of the final transfer tool specifications, and the tax obligations associated with the transfer are taken out.

Conceptually, this study adopts a traditional definition of wealth (the composition and sources are contained in equation 1). This equation is used to recreate the process of wealth generation and accumulation in a farm business. Terminal wealth consists of the sum of the following arguments: total amount of initial wealth in the business, discounted retained earnings accumulated by both generations during the planning horizon, discounted capital gains/losses on assets owned, i.e. farmland, and discounted tax obligations associated with the transfer of wealth.

$$W_{terminal} = W_0 + \sum_{n=1}^{n=N} \frac{RE_n}{(1+d)^n} + \frac{G_N}{(1+d)^N} - \frac{T_N}{(1+d)^N} \quad (1)$$

where, $W_{terminal}$ is the terminal wealth in present terms of the business in the 10th period; $n = \{1, N\}$, planning horizon; W_0, the initial wealth; RE_n, retained earnings generated in

[12] The term "farm income" is interchangeable used with the term "firm's profit".
[13] Wealth position in this study refers to the dollar value of the owner equity in the business.

period n; d, the discount rate; G_N, capital gains/losses realized in the terminal period and T_N, federal estate tax.

Another modelling approach would be to include the off farm income. This means decisions and choices are made based on the wealth position of the farm household rather than just the farm business. (Mishra et al.2002). For instance, during the 1980's crisis, off-farm income often served as a major income stream which improved farm businesses' resilience to risks.

Blank and Erickson (2009) found that farmland outperformed the non-farm investments in the last decade and hypothesized that farm households may turn to off-farm income to keep their farmland and build wealth. These facts suggest that farm production, investment, and financing decisions might include both off and on farm wealth rather than just those associated with the farm. In this case, terminal wealth would be defined as:

$$W_{terminal} = W_0 + \sum_{n=0}^{N} \frac{RE_n}{(1+d)^n} + \sum_{n=0}^{N} \frac{I_n}{(1+d)^n} + \frac{G_N}{(1+d)^N} - \frac{T_N}{(1+d)^N} \quad (2)$$

where, I_n, off-farm income streams generated by both generations earned in year n are added into the equation. This value captures any off-farm wages/salaries earned by the older and younger generations, as well as income collected due to off-farm investments during the planning horizon. This approach allows for the incorporation of off-farm wages/salaries and is used in this work.

USDA estimates that off-farm employment and investments depend on the size of the farm business. For large and very large family farms, the primary operators claim farming as their occupation and rely solely on the income from the farm business.

Smaller farms tend to have the off-farm employment as their main income stream and are more likely to invest in off-farm sources. For large and very large farms addressed in this study, the off-farm income is expected to be an additional source of income[14] used to cover consumption withdrawals only and not subsidize the firm's growth. Therefore, the model as specified in Equation 1 is used to study the impact of the transfer time under assumptions on the gifting strategy and final transfer tool for family farm businesses that aim the business continuity by maximizing the terminal wealth.

Retained Earnings

The retained earnings of the business are defined as the after-tax profit less household living expenses, plus off-farm income (a substitute for covering family living expenses) is shown in Equation 3.

$$\mathrm{RE_n} = (1-\tau)\pi_\mathrm{n} - (\mathrm{C_n} - \mathrm{OffInc_n}) \tag{3}$$

where,

$$\pi_n = \gamma_t^{joint} p_n y_n - \sum_{i=1}^{K} x_i w_i \tag{4}$$

$(1-\tau)\pi_n$ is after-tax income (further referred as net income) in period n; τ is income tax rate; C_n is household consumption withdrawals in period n; $OffInc_n$ is off-farm income streams generated by both generations earned in year n that can serve as a supplement for covering family living withdrawals; $p_n y_n$ is gross revenue in period n; $\sum_{i=1}^{K} x_i w_i$ is total production cost (operating, interest, and depreciation expenses) used in period n, with inputs denoted i through K, where K is the total number of inputs used.

Age-Productivity Profile

[14] Any sources of income but farm equity withdrawals.

Since farmer productivity is expected to change with age, gross revenue generated in the business is adjusted by the factor γ_n^{joint} to capture the impact of the age-productivity profile of both generations of operators. In this model, the transfer of the ownership of the farm is concurrent and proportional with the transfer of the managerial responsibilities. Thus, the joint farmer productivity index, as specified in Equation 5, is the sum of the respective age-dependent productivity indices for the older and younger operators weighted by their respective shares of ownership in the business that reflect the degree of managerial involvement in the business in a given period.

$$\gamma_t^{\text{joint}} = \alpha_t^1 \gamma_t^1 + \alpha_t^2 \gamma_t^2 \quad (5)$$

where, α_t^1, ownerships share of the older generation in the business in period t; α_t^2, ownerships share of the younger generation in the business in period t; γ_t^1, the base productivity of the older generation in period t; γ_t^2, the base productivity of the younger generation in period t. The base indices are drawn from Tauer and Lordkipanidze (2000) and are age- and state-specific.

Annual Consumption and Consumption Withdrawals under the Baseline Scenario

This section explains the methodology and construction for approximating the level of annual consumption for each generation and total annual withdrawals from the farm business *in the baseline scenario*. Under other scenarios used in this study, the logic and assumptions about consumption withdrawals remain unchanged but the level of the younger generation's consumption covered by farm operations varies (see Chapter 4).

Consumption for each generation is approximated by the average farm family living expenses using state-level data (see Chapter 4 for details). Two criteria are used to generate the level of annual consumption for each generation: 1) the age of the head of a family unit,

which is a proxy for the size and composition of the family, and 2) the size of the farm business[15]. For example, the younger generation's level of annual consumption in year 1 of the planning horizon is populated from the Lookup table 2 provided in Appendix D based on the successor's age [16] and his/her portion of the farm business controlled for that year. In the second year, this value is updated due to an increase in the successor's age and any changes in farm business control. This methodology is intended to approximate typical farm family consumption at varying stages of its life-cycle and changing ownership structure of the farming operation. Consumption is estimated in like manner for all consecutive years.

The total consumption withdrawals depend on the transition strategy that the business follows. In the instance of *the proactive transition strategy* total consumption withdrawals are constructed as follows:

1. *Prior to the farm transfer initiation*, the farm fully covers the older generation's annual consumption, and the younger generation is allowed to take out equity from the business to cover their annual consumption, but only up to their share of generated income in the business in a given year. *Total consumption withdrawals* are the sum of the older generation's annual consumption (full amount) and the smaller of the two – the younger generation's annual consumption or their share of income generated during the year by the firm.

[15] Total crop acres owned by the respective generation are used as a proxy for the size of the farm business to approximate family living expenses and compute household consumption.
[16] Successor is assumed to be the head of the younger generation's family unit.

2. *Once the transfer is initiated,* the farm business fully covers consumption of both households, making *total consumption withdrawals* the sum of annual consumption of *both* generations.

In the case of *a regular transition strategy*, total consumption withdrawals are constructed as follows:

1. *Prior to the farm transfer initiation*, *only* the older generation's consumption is covered by the farm business. *Total consumption withdrawals* consist only of the older generation's annual consumption. The younger generation is not allowed to withdraw farm equity to cover family consumption.
2. *After the transfer is initiated,* the farm business fully covers consumption of both generations.

Off-Farm Income

Farm households make consumption decisions based on their total farm household income[17] rather than solely on income generated by the farm business. The USDA ERS indicate that about 65.1 percent of farm household income comes from off-farm sources[18]. When farm household income consists of only income from the farm business, it places the complete financial burden on the farm business. However, when off-farm income is present, it has the opposite effect and reduces the financial burdens on the farm business.

In the baseline scenario, no off-farm income is available. However, this assumption is relaxed in Scenario 1 and the earned off-farm income is incorporated as a factor that reduces consumption withdrawals. When off-farm income is lower than the consumption,

[17] Farm household income includes: (1) income from the farm business, (2) income from other farming activities, and (3) earned and unearned income from off-farm sources. (USDA National Agricultural Library. 2015. Glossary).
[18] USDA ERS. 2016. Income and Wealth in Context, by Daniel Prager.

the difference between the two is the amount that will be taken out from the farm income. If the earned off-farm income fully covers the family consumption, the last term in the equation is assumed to be zero.

From Equation 3, the term $(C_n - \text{OffInc}_n) > 0$ implies that consumption exceeds the earned income from off-farm sources in the current period. In this case, the remaining part of the household consumption expenses are covered from the farm income and thus are subtracted from the after-tax farm income. If the total wages and salaries in the current period are large enough to fully cover the consumption expenses, then $(C_n - \text{OffInc}_n) < 0$. Since the model of the accumulated wealth in this study does not attempt to incorporate the effect of the contributed capital from other non-farm sources to grow the primary farming business, the last term on the right-hand side of Equation 3 is set to zero. In this case, the earned off-farm income fully covers the household consumption expenditures and no funds are withdrawn or added to the farm income.

Capital Gains/Losses in Terminal Period N

Capital gains/losses are traditionally realized at the time of transfer or a sale of property. An alternative framework suggested by Plaxico and Kletke (1979) and Boehlje and Lowenberg-DeBore (1986) is to model capital gains and losses in which a fraction(φ) of unrealized gain/loss in each period were recognized as an income stream by the lending institution, and the remaining fraction,$(1 - \varphi)$ occurs at the time of final transfer of wealth (period N). Allowing the fraction of capital gains to be realized before the final transfer and be recognized as an income stream by the lending community provides a basis for the firm to borrow against the appreciated farmland values.

This model incorporates year-to-year changes in farmland prices to reflect their impact on the firm's Balance Sheet (value of farmland and owner equity position) annually within the planning horizon and thus, financial performance in future periods. However, this adjustment does not allow for borrowing against appreciated/depreciated values of farmland. Adjustments in farmland prices enter into the simulation through the variable G_n and calculated for each period as Equation 6.

$$G_n = \frac{(p_n - p_{n-1})}{p_n} L_n \tag{6}$$

where $\frac{(p_n - p_{n-1})}{p_n}$ is the annual percent change in farmland prices; L_n, dollar value of land owned by the farm business in period n.

Wealth Transfer Methods

Wealth was shifted using two mechanisms: (1) lifetime gifting and (2) and a simple will. The older generation uses lifetime gifting to shift wealth upon transfer initiation (starting in period n^*) and continues gifting away a constant amount of wealth every year until their demise. The residual wealth owned by the older generation is transferred to the younger generation through a will upon the older generation's passing in the terminal period N.

Gifting strategy

The gifting strategy comes into effect in period n^* where * is the year number of the planning horizon when the farm transfer initiation is begun. The baseline scenario denotes annual gifting as S_n and assumes the legal annual maximum amount of gifting without a tax penalty. This gifting strategy shifts wealth from one generation to another but does not change the total wealth created and accumulated by the farm business (see Equation 7).

$$+\sum_{n=n^*}^{n=N}\frac{S_n}{(1+d)^n}-\sum_{n=n^*}^{n=N}\frac{S_n}{(1+d)^n} \quad (7)$$

Gifting results in three primary outcomes: 1) it has no direct impact on the total wealth in the business, 2) it alters the size of the estate to be transferred and 3) it changes the portion of ownership and control by both generations. It is the last effect of gifting that will have an impact on the productivity index through the assumption that the transfer of managerial responsibilities is proportional to changes in the ownership structure.

Federal Transfer Tax

Final wealth transfer occurs at the time of the execution of the final transfer tool in period n= 10 (in this study, a will). The tax base is based on the total wealth to be transferred (value of all real and financial assets owned by the older generation) less deductions (debt, funeral expenses, administrative costs associated with transfer) less total amount of gifts already transferred.

$$\frac{T_N}{(1+d)^N}=t(BASE) \quad (8)$$

where,

$$BASE=\left[\sum_{n=0}^{N}\frac{RE_n}{(1+d)^n}+\frac{G_N}{(1+d)^N}-D-\sum_{n^*}^{N}\frac{S_n}{(1+d)^n}\right] \quad (9)$$

T_N federal transfer tax obligations due in the final period, N; t is a federal estate (transfer) tax rate.

Discount Factor

The discount factor reflects the owner's expectations of risk involved in operating the farm business now and in future periods, interest rates, and time preferences. Time

preferences and risk attitudes depend on the owner's expectations about future events which result from the owner's preferences (utility function). If profits exhibit constant growth over time, the capitalization rate can be used to compute the terminal value. One way to specify the capitalization rate is to define it as a linear function of the variance of profit expectations ($Var(u)$), yield on riskless securities (a), and operator's substitutability between risk and profit, based on the shape of his utility function(w) (Vickers, 1968). Thus, capitalization rate can be expressed as:

$$\rho = a + wVar(u) \tag{10}$$

However, in the cases when projected income streams do not grow at a constant rate, future streams of wealth are discounted using the time discount factor rather than the capitalization rate. The weighted average cost of capital (WACC) is used as a discount rate since it incorporates (1) time preferences, (2) inflation, and (3) risk.

3.2 Empirical Model

Model Description

Given the stated research question, an electronic simulation model was created to predict the implications of the timing of the farm transfer initiation and gifting strategies under varying exogenous shocks such as changes in farmland values and interest rates. In thus study, the term *simulation* is not used in a statistical sense of generating data, but refers to the methodology that uses a set of input variables and a system of equations to replicate the process of wealth creation and accumulation in the farm business.

At the core of this simulation is a set of dynamic financial statements of a representative farm linked through time for 10 years. The linking replicates the process of wealth creation and accumulation across the planning horizon. Each financial statement is

constructed using a number of relevant financial equations and linked over time as detailed in this section. This methodology provides answers about how the time of the farm transfer initiation affects the terminal wealth of the simulated business by:

(1) capturing the financial linkages among major determinants of the wealth creation and the accumulation process of the business,

(2) accounting for certain phenomena that affect revenue generating and saving ability of the business i.e. the age-productivity profile and the composition and level of household consumption withdrawals through time,

(3) reflecting the impact of the decision variable(s) on the terminal wealth.

The ability of the model to account for these phenomena helps reflect the revenue generation and growth potential of the business more accurately as the business undergoes an intergenerational farm transfer. The model is constructed in a way that explicitly links the decision variables of interest and the wealth creation process. For instance, one of the decision variables is gifting strategy, in particular the level of wealth gifted annually. The model reflects the impact of this strategy on (1) wealth transfer tax at the end of the planning horizon and (2) change in ownership structure in the business between the older and younger generations which in its turn determines how the managerial responsibilities are transferred to the younger generations and how that transfer than affects the efficiency and (productivity) revenue generation in the business.

The Operational Procedures for Using the Model

In the initial period, KIVs (key input variables) from representative farm are used to populate the financial documents in the model's year 1, and then given the base assumptions/parameters the model simulates future periods' financial statements

documents in a recursive manner. The KIVs and parameters are listed in the section below, and their specific numerical values are provided and discussed in Chapter 5. To determine the maximum terminal wealth, the model is re-run ten times reflecting each of the possible years in which the farm transfer could be initiated[19]. For example, the first of the ten runs is done assuming the transfer is initiated in year 1of the planning horizon, and the key output variable (KOV), terminal wealth in the business, is generated and recorded. This same procedure for each of the eight remaining possible transfer initiation years (including year 9) is repeated, and respective terminal wealth positions are saved. The last time the model is re-run assuming that the transfer has not yet been initiated, and thus the total wealth is transferred upon the death of the older generation. The recorded results allow for constructing a distribution of terminal wealth positions depending on the transfer initiation year (1 through 9 and no transfer initiation) which visually captures the effect of the transfer initiation on the terminal wealth position in the business.

Decision Variables

The planning of farm transfer from the older to the younger generation involves many decisions in regard to asset ownership, managerial responsibilities, and communication within and between the business and family members then this simplified version. This study incorporates three decision variables: timing of farm transfer initiation, level of annual gifts, and the instrument to transfer the remaining wealth. These variables were chosen because they affect the terminal wealth and their impact can be identified and quantified.

[19] Please see Figures 1A and 1B in Chapter 5.

The timing of farm transfer initiation is indeed a "trigger decision variable" since it activates the decision on the final transfer method and the annual gifting strategy which in turn calls for adjustments in the age-productivity profile and household consumption withdrawals which then determine retained earnings and growth potential of the operation in future periods.

Annual gifting is a tool designed to reduce the amount of wealth to be transferred at the time of final transfer and to shift managerial responsibilities to the younger generation. In this model annual gifting affects the distribution of wealth between the older and younger generations in the business in each period affecting total farm productivity in the business after this strategy is triggered, but does not directly change the total wealth. Two types of gifting strategies are modelled: (1) normal, tax free annual gifting amount ($14,000 per year per individual) and (2) aggressive ($25,000 per year per individual).

The third decision variable, the will, is used to transfer the remaining wealth at the time of the farm transfer initiation, but its impact is captured at the end of the planning horizon. In this case a regular will is used as the final transfer tool. Each of the decisions variables have implications on the potential tax obligation and affect the terminal wealth position of the business.

Description of Financial Flows in the Wealth Creation Model

A visual representation of financial flows (as shown in Appendix A, Figures 1 and 2) provide theoretical background/rational for the specification of each financial document and construction of linkages between these documents within a production year and over the planning horizon.

As shown in Figure 1 of Appendix A, each period starts with the beginning year Balance Sheet. The black arrows show the flow of wealth creation, while the yellow ones

reflect the impact of farmer age on that process. The ending year Balance Sheet becomes the beginning Balance Sheet of the next period. The asset base is used to generate gross revenue recorded on the Income Statement. This is the first step in the wealth creation process and the origin of the flow.

The liability category on the Balance Sheet, respective financial ratios, and the level of output determine the operating and financing expenses with KIVs drawn from a representative farm. Then, the revenues, all expenses and taxes are added, and net income is obtained. Therefore, the assets owned by the business affect the firm's production capacity (output), and its liabilities partially determine the operating and financing expenses. These linkages show both assets and liabilities at the beginning of the period affect the after-tax net income in the business and reflect the flow from the Balance Sheet to the Income Statement.

With no contributed capital added into the business during the planning horizon, the statement of owner equity separates total equity into two major categories: (1) change in valuation equity, and (2) change in retained earnings. By definition, retained earnings are a portion of generated income left after all expenses are paid and necessary withdrawals are taken from the business. Retained earnings are fully re-invested into the business in each period after all financial obligations are met.

Retained earnings for each period are equal to net (after-tax) income minus total consumption withdrawals for the period. If either of these two variables fluctuate, retained earnings changes accordingly, altering the amount of reinvestment. Following the above assumption, the retained earnings are reinvested back into the business increasing the assets and the owner equity at the end of the current period. The firm's

current capital structure and cash flow control the degree to which the firm may undertake additional debt if needed, which may alter total amount of assets and liabilities. The ownership structure is tracked as ending equity on the statement of owner equity. The ending equity is then recorded as the beginning equity in the balance sheet in the succeeding year. This balance sheet then becomes the beginning of next period's balance sheet, and the flow continues through all periods.

The age of a farmer affects his/her productivity and thus the firm's ability to generate revenue and income. As represented with yellow lines, the farmer age also determines the household consumption withdrawals affecting the retained equity and firm's growth potential in the future.

In Appendix A, Figure 2, decision variables and phenomena through which they affect the wealth creation process are added on to the model presented in Figure 1 in the same appendix. The model shown in Figure 2 has identical financial flows as in Figure 1, but the flow is not visually presented on the graph to avoid additional complexity.

The yellow triangle symbolizes a set of decisions with arrows pointing to the phenomena through which these decisions impact the financial flow in the model. The level of annual gifting changes the ownership structure, determining the distribution of ownership between two generations and thus impacting transfer tax obligations at the time of final transfer. Their age determines family living expenses for each generation's family unit affecting the equity withdrawals from the business and thus its future growth.

In addition, the timing and speed of the changes in ownership structure and the farmer's age at the time when the transfer was initiated, determines the farmer age-productivity profile affecting his/her ability to generate revenue. The last decision variable

– the final transfer instrument – affects the model only in the terminal period. The type of instrument selected may result in different tax implications for the business. Therefore, decision variables impact the wealth creation flow in the model by adjusting (1) the age-productivity parameter on the gross revenue function, (2) composition and level of household consumption, and (3) the ownership structure in the business.

Specification of Financial Documents

The framework and guidelines of the Farm Financial Standards Counsel are adopted in developing the financial documents that make up the model. However, the level of detail included in these documents is minimal and is adjusted to the needs of this work. The objective of this study requires computation to be done on a fairly aggregated level relying on the accounting/financial relationships rather than production practices. A set of financial efficiency ratios is adopted to reflect the efficiencies of the farm of a specific size. This generalization enables focusing on the business and estate creation and transfer process and avoiding unjustifiable complexity without undermining the correct logic and financial relationships in the model.

The beginning year *Balance Sheet* provides a snapshot of the firm's assets, liabilities, owner equity and their respective composition at that date. As a stock document, the Balance Sheet is created twice in a period: at the beginning and end of the year to reflect the changes in the position over time. The ending year Balance Sheet becomes the beginning year Balance Sheet in the following period. The production, financing, growth, and management decisions made during the year as well as changes in farmland prices affect the level and/or composition of assets, debt and equity in the business over that period.

As shown in Table 3.1, the Balance Sheet lists three major categories: assets, liabilities, and equity. Asset and liabilities entries are classified into two subcategories to reflect their structure: (1) current and (2) non-current. The non-current assets include (1) farmland and (2) other non-current assets. The equity entry lists total owner equity in the business and the ownership shares of the younger and older generations. This provides a way to track the wealth owned by the older generation at the end of the planning horizon yet to be transferred to the younger generation.

Table 3.1 Balance Sheet as Modelled in this Study for the Representative Farm

Representative Farm Balance Sheet January 1, Year 1	
Current assets	Current liabilities
Fixed assets	Non-current liabilities
• Farmland	
TOTAL ASSETS	**TOTAL LIABILITIES**
	Equity
	• Retained earnings
	• Valuation equity
	TOTAL OWNER EQUITY
	• Owned by older generation
	• Owned by younger generation

The entries on the Balance Sheet were constructed using the following set of equations:

$CA_{1,b} = TA_{1,b} * \delta$

$TA_{1,b}$, total assets in business at the beginning of year 1, populated from the representative farm data.

$CA_{1,b}$, current assets at the beginning of year 1.

δ, current assets as percent of total assets. This parameter is constant over the whole planning horizon.

$FA_{1,b} = TA_{1,b} - CA_{1,b}$

$FA_{1,b}$, fixed assets in business at the beginning of year 1.

$L_{1,b} = FA_{1,b} * \beta$

$L_{1,b}$, total dollar value of farmland in the business at the beginning of year 1.

β, land as percent of fixed assets. This parameter remains constant throughout the planning horizon.

$TL_{1,b} = \frac{D}{A} * TA_{1.b}$

$TL_{1,b}$, total liabilities of the business at the beginning of year.

$\frac{D}{A}$, debt-to-asset ratio of the firm. Capital structure is allowed to vary from year to year, but the share of debt is capped at 25 percent.

$CL_{1,b} = TL_{1,b} * \theta$

$CL_{1,b}$, current liabilities at the beginning of year 1.

θ, current liabilities as percent of total liabilities.

$NCL_{1,b} = TL_{1,b} - CL_{1,b}$

$NCL_{1,b}$, non-current liabilities at the beginning on year 1.

$E_{1,b} = TA_{1,b} - TL_{1,b}$

$E_{1,b}$, total owner equity at the beginning of year 1.

$E_{1,b}^{older} = \alpha_{1,b}^{older} * E_{1,b}$

$E_{1,b}^{older}$, equity owned by the older generation at the beginning of year 1.

$\alpha_{1,b}^{older}$, ownership share of the older generation at the beginning of year 1.

$E_{1,b}^{younger} = \alpha_{1,b}^{younger} * E_{1,b}$

$E_{1,b}^{younger}$, equity owned by the younger generation at the beginning of year 1.

$\alpha_{1,b}^{younger}$, ownership share of the younger generation at the beginning of year 1.

The *Income Statement* is a flow document that reflects the income generating ability of the business by accounting for the gross revenue, total operating and financing expenses, as well as income tax obligations of the business. This document provides important information further used to compute the retained earnings and changes in the size of the asset base in future periods utilizing the Statement of Owner Equity and the Balance Sheet.

Table 3.2 shows the Income Statement as used constructed in the model. The structure of the document follows a traditional form with the exception of three adjustments.

Table 3.2 Income Statement as Modelled in this Study for the Representative Farm

Income Statement **Representative Farm** **January 1 – December 31, Year 1**
Gross revenue
Operating expense
Financing expense
Depreciation expense
Income before tax, total
• Income before tax, older generation
• Income before tax, older generation
Total taxes (income and self-employment)
• Older generation
- federal income tax
- state income tax
- self-employment tax
• Younger generation
- federal income tax
- state income tax
- self-employment tax
Net after-tax income, total

First, before-tax income in the firm is separated into two categories (the older and the younger generation's shares of income). Second, income and self-employment taxes are calculated for each generation's share of business separately. These two adjustments

capture the impact of income sharing between two generations on total tax obligations. Finally, the gross revenue is adjusted for the joint farmer productivity index to reflect the life-cycle pattern.

Entries of the Income Statement are calculated with the set of equations described below that utilize certain entries from the Balance Sheet (total assets), respective calculated ratios (ATR, OER, IER, DER) and parameters on taxes and farmer productivity.

The Income Statement is constructed using the following equations:

$$GR_1 = TA_{1,b} * ATR * \gamma_1^{joint}$$

$$ATR = \frac{Gross\ Revenue}{Total\ Assets}$$

GR_1, gross revenue generated in business in year 1.

ATR, asset turnover ratio.

$$\gamma_1^{joint} = \begin{Bmatrix} \gamma_1^{older}, if\ regular\ transition\ strategy is\ used\ AND\ g_0 = 0 \\ \alpha_{1,b}^{older} * \gamma_1^{older} + \alpha_{1,b}^{younger} * \gamma_1^{younger}, otherwise \end{Bmatrix}$$

γ_1^{joint}, joint farmer productivity in the business in year 1.

γ_1^{older}, base productivity index of the older farmer in year 1.

$\gamma_1^{younger}$, base productivity index of the younger farmer in year 1.

$\alpha_{1,b}^{older}$, ownership share of the older generation at the beginning of year 1.

$\alpha_{1,b}^{younger}$, ownership share of the younger generation at the beginning of year 1.

$$OE_1 = OER * GR_1$$

$$FE_1 = IER * GR_1$$

$$DE_1 = DER * GR_1$$

OE_1, operating expenses of the firm in year 1.

FE_1, financing expenses of the firm in year 1.

DE_1, depreciation expense of the firm in year 1.

OER, operating expense ratio, constant during the planning horizon.

IER, interest expense ratio, constant during the planning horizon.

DER, depreciation expense ratio, constant during the planning horizon.

$$I_1^{total} = GR_1 - OE_1 - FE_1 - DE_1$$

I_1^{total}, total before-tax income generated in business by both generations in year 1.

$$I_1^{older} = \alpha_{1,b}^{older} * I_1^{total}$$

I_1^{older}, share of income generated by the older generation in year 1.

$$I_1^{younger} = \alpha_{1,b}^{younger} * I_1^{total}$$

$I_1^{younger}$, share of income generated by the younger generation in year 1.

$$ft_1^{older} = \tau_{f,1}^{older} * I_1^{older}$$

ft_1^{older}, federal income tax obligations of the older generation in year 1.

$\tau_{f,1}^{older}$, federal income tax rate for the older generation in year 1.

$$ft_1^{younger} = \tau_{f,1}^{younger} * I_1^{younger}$$

$ft_1^{younger}$, federal income tax obligations of the younger generation in year 1.

$\tau_{f,1}^{younger}$, federal income tax rate for the younger generation in year 1.

$$st_1^{older} = \tau_{s,1}^{older} * I_1^{older}$$

st_1^{older}, state income tax obligations of the older generation in year 1.

$\tau_{s,1}^{older}$, state income tax rate for the older generation in year 1.

$$st_1^{younger} = \tau_{s,1}^{younger} * I_1^{younger}$$

$st_1^{younger}$, state income tax obligations of the younger generation in year 1.

$\tau_{s,1}^{younger}$, state income tax rate for the younger generation in year 1.

$$SE_1^{older} = \begin{Bmatrix} (0.124 + 0.029) * I_1^{older}, if\ I_1^{older} < \$118{,}500 \\ 0.124 * 118{,}500 + 0.029 * I_1^{older}, otherwise \end{Bmatrix}$$

SE_1^{older}, Self-Employment tax obligations of the older generation in year 1.

0.124, Social Security tax of 12.4%

0.029, Medicare tax of 2.9%

$118,500, benchmark level of net income for self-employment tax calculations (IRS Employer's Tax Guide 2016).

$$NI_1^{total} = I_1^{total} + DE_1 - tt_1^{older} - tt_1^{younger}$$

$$tt_1^{older} = ft_1^{older} + st_1^{older} + SE_1^{older}$$

$$tt_1^{younger} = ft_1^{younger} + st_1^{younger} + SE_1^{younger}$$

NI_1^{total}, net (after-tax) income in the firm, total in year 1.

tt_1^{older}, total tax obligations (federal and state income, as well as social security taxes) of the older generation for year 1.

$tt_1^{younger}$, total tax obligations (federal and state income, as well as social security taxes) of the younger generation for year 1.

Statement of Owner's Equity tracks the changes in the owner equity from the beginning to the end of the period. Certain entries from the Income Statement (net farm income) and the Balance Sheet (farmland owned in the business) along with the information on the changes of farmland prices allow for decomposition of the total owner equity into its major sources (retained earnings and valuation equity) providing a more accurate description of sources of equity growth. Total consumption withdrawals are calculated as a sum of consumption withdrawals for both generations in a given year

following the conceptual framework addressed in the beginning of this chapter and specified baseline assumptions.

Table 3.3 Income Statement as Modelled in this Study for the Representative Farm

Statement of Owner's Equity **Representative Farm** **January 1 – December 31, Year 1**
Beginning equity
Retained earnings
• Net farm income from operations
• Total consumption withdrawals
Valuation equity
Ending equity
• Owned by the older generation
• Owned by the younger generation

As shown in Table 3.3, in this analysis, a traditional format of this financial document is constructed, except the ending equity entry. Given the goal of the study, this variable is reported in the Statement of Owner's Equity in two ways: (1) as total equity in the business and (2) equity owned by each generation (after gifts are re-distributed, if any).

The entries on the above provided Income Statement were constructed/populated using the following set of equations:

$$A = \frac{PP^{av}}{NCL_{1,b}}$$

A, average amortization for non-current debt, assumed to remain constant during the planning horizon.

PP^{av}, average principal payment for the representative farm.

$NCL_{1,b}$, non-current liabilities in the firm at the beginning of year 1.

$$PP_1 = NCL_{1,b} * A$$

PP_1, principal payment on non-current debt in year 1.

$$RE_1^{total} = NI_1^{total} - PP_1 - TCW_1$$

RE_1^{total}, total retained earnings generated in the business by both generations in year 1.

TCW_1, total consumption withdrawals from the farm business in year 1.

$$TCW_1 = CW_1^{older} + CW_1^{younger}$$

CW_1^{older}, consumption withdrawals from the business to cover the older generation's family living expenses in year 1.

$CW_1^{younger}$, consumption withdrawals from the business to cover the younger generation's family living expenses in year 1.

$$CW_1^{older} = FLE_1^{older}$$

$FLE_1^{older} = f(Age_1^{older}, G_1^{older})$, Lookup table is used to select the value based on two main factors that determine family living expenses in FINBIN database (age of operator and size of his/her share of operation).

$$G_1^{older} = \frac{L_{1,b} * \alpha_{1,b}^{older}}{p_1}$$

FLE_1^{older}, family living expenses of the older generation in year 1.

Age_1^{older}, age of the head of the older generation's household in year 1.

G_1^{older}, the size of operation owned by the older generation in year 1 (in acres).

$$CW_1^{younger} = \begin{Bmatrix} 0, if\ regular\ transition\ strategy\ AND\ g_0 = 0 \\ FLE_1^{younger}, if\ regular\ strategy\ AND\ g_0 > 0 \\ (RE_1^{total} * \alpha_{1,b}^{younger})\ or^{20}\ FLE_1^{younger}, if\ proactive\ strategy\ AND\ g_0 > 0 \\ FLE_1^{younger}, if\ proactive\ strategy\ AND\ g_0 > 0 \end{Bmatrix}$$

$FLE_1^{younger}$, family living expenses of the younger generation in year 1.

[20] Whichever is lower.

$FLE_1^{younger} = f(Age_1^{younger}, G_1^{younger})$, LOOKUP table is used to select the value based on two main factors that determine family living expenses in FINBIN database (age of operator and size of his/her share of operation).

$$G_1^{younger} = \frac{L_{1,b} * \alpha_{1,b}^{younger}}{p_1}$$

$Age_1^{younger}$, age of the head of the younger generation's household in year 1.

$G_1^{younger}$, acres owned by the younger generation in year 1.

$$VE_1 = L_{1,b} * (\frac{p_1 - p_0}{p_0})$$

$$VE_1 = \begin{Bmatrix} 0, if\ (p_2 - p_1) = 0 \\ > 0, if\ (p_2 - p_1) > 0 \\ < 0, if\ (p_2 - p_1) < 0 \end{Bmatrix}$$

VE_1, valuation equity in the firm in year 1.

$(\frac{p_1 - p_0}{p_0})$, percent change in farmland prices between year 1 and 0.

$$TA_{1,e} = TA_{1,b} + RE_1^{total} + VE_1$$

$$TL_{1,e} = TL_{1,b} - PP_1$$

$$E_{1,e} = TA_{1,e} - TL_{1,e}$$

To verify the above equation,

$$E_{1,e} = E_{1,b} + RE_1^{total} + VE_1$$

$TL_{1,e}$, total liabilities at the end of year 1 (before additional borrowing).

$TA_{1,e}$, total assets at the end of year 1 (before additional borrowing).

$E_{1,e}$, total equity in business at the end of year 1.

g_1, total amount of the firm's equity gifted in year 1 by the older generation to the younger one.

$E_{1,e}^{older} = E_{1,e} * \alpha_{1,e}^{older}$, where

$$\alpha_{1,e}^{older} = \begin{Bmatrix} \alpha_{1,b}^{older}, if\ g_1 = 0 \\ \frac{(\alpha_{1,b}^{older} * E_{1,e} - g_1)}{E_{1,e}}, otherwise \end{Bmatrix}$$

$E_{1,e}^{younger} = E_{1,e} * \alpha_{1,e}^{younger}$, where

$$\alpha_{1,e}^{younger} = \begin{Bmatrix} \alpha_{1,b}^{younger}, if\ g_1 = 0 \\ \frac{(\alpha_{1,b}^{younger} * E_{1,e} + g_1)}{E_{1,e}}, otherwise \end{Bmatrix}$$

$\alpha_{1,e}^{older}$, share of equity in business owned by the older generation at the end of year 1, after annual gifts are distributed (if any).

$\alpha_{1,e}^{younger}$, share of equity in business owned by the younger generation at the end of year 1, after annual gifts are distributed (if any).

$$D_{2,b}^{max} = RE_1^{total} * (\frac{1}{(i+p) - R})$$

$$D_{2,b}^{allowed} = \frac{(\frac{D}{A}) * TA_{1,e} - TL_{1,e}}{(1 - \frac{D}{A})}$$

$D_{2,b}^{max}$, maximum amount of additional debt that the firm can undertake given its performance in year 1 (retained earnings and cash flows).

$D_{2,b}^{allowed}$, allowed amount of borrowing, given $D_{2,b}^{max}$ and constraints on the firm's capital structure ($\frac{D}{A} \leq 0.25$).

i, average interest rate.

p, average principal repayment rate.

R, average rate of return

$TA_{2,b} = TA_{1,e} + D_{2,b}^{allowed}$

$$TL_{2,b} = TL_{1,e} + D_{2,b}^{allowed}$$

$$\alpha_{1,e}^{older} = \alpha_{2,b}^{older}$$

$$\alpha_{1,e}^{younger} = \alpha_{2,b}^{younger}$$

$TA_{2,b}$, total assets in the firm at the beginning of year 2 (after additional borrowing).

$TL_{2,b}$, total liabilities in the firm at the beginning of year 2 (after additional borrowing).

3.3 Model Assumptions

A set of initial and ongoing assumptions are made that simplify the model and preserve the logic behind financial linkages in the simulation among the financial documents. It is through the process of changing these conditions[21] or base assumptions that meaningful sensitivity analysis is performed.

- Both generations agree on and assign a single child as the successor of the family farm business.
- The age differential between the older and younger generations is held constant at twenty years of age.
- Farms are assumed to be homogeneous with the differences in revenue coming solely from differences in farmer productivity.[22]
- Capital structure of the business may vary during the planning horizon, but the firm's debt-to-asset ratio is capped at 0.25. Borrowing against valuation equity is allowed provided that the firm's capital structure, income and cash flows statements permit.

[21] Model conditions and model assumptions are used interchangeably in this study.
[22] Farmer productivity here includes the effect of technology use as well as efficiency gains on gross revenue by a farmer as he/she ages.

- The business/accounting entity is the grain enterprise; thus, any assets or debt obligations that are not related to the normal course of business in this enterprise are not included in the financial documents. The only exception to this assumption is the portion of off-farm income that can serve as a supplement for household consumption withdrawals (Scenario 1 only).
- Transfer of managerial responsibilities is a function of ownership structure in the business and occurs at the same speed as the transfer of business ownership. This assumption helps construct the joint farmer productivity index which is then used as a scaling factor on the gross revenue entry in the Income Statement.
- The initial ownership structure in the business is 80/20, with the older generation controlling 80 percent and the younger – 20 percent of ownership interest. All profits earned are split between these two generations according to their respective shares of ownership.
- Structure of assets (current to non-current) and farmland as a portion of fixed assets remain constant through the planning horizon.
- In the baseline scenario, the farm household (both older and younger generations) is assumed to have no off-farm income available to cover family living expenses. This assumption is relaxed in Scenarios 1.
- Financial efficiency and profitability ratios remain unchanged throughout the planning period.
- The older generation is currently 71 years old (without a spouse) and two children. According to the U.S. Bureau of the Census, the average size of family between 1960 and 1970 ranged between 3.57 and 3.70. Given the age of the primary operator who is

also the head of the older generation's household in the representative farm (71 years old), his family unit would have been established between 1960 and 1970, and thus, the above statistics was used to define the assumption on the family size.

- When gifts are made, they occur at the end of the production year, altering the ownership structure and consumption withdrawals for the next year. The normal gift size has a value of $14,000 annually to each of the two children and their spouses making a total of 4 gift recipients.
- The 2012 U.S. Census of Agriculture, indicates that about 72 percent of large farms (500 acres or more) are farmed as family farms, sole proprietorships. In this model the legal status for tax purposes is a sole proprietorship. This is applied to both the older and the younger generations.
- The income tax bracket for each generation is defined based only on their share of income generated in the business. The federal estate tax rates are based on 2016 tax rates for married individuals filing jointly and surviving spouses (IRS 2016). Initially the older generation's tax rate is 33 percent for federal and 8.9 percent for state income taxes. The younger generation's rates are 25 percent and 7.9 respectively.
- The baseline scenario conservatively assumes that the passing generation has only one estate tax exemption of $5.45 million. This would be an example of the situation in which the older generation is the surviving parent, and the deceased spouse's exemption was either previously used up or could not be transferred to the surviving spouse.
- In the baseline scenario, farmland values are held constant throughout the planning horizon. The baseline is altered in Scenarios 4 and 5 where two alternative land value

trends are applied. These trends are modelled based on the results of the Iowa Land Survey. In this survey 75 percent of the respondents expect a land value decrease of less than 5 percent in 2016. Their predictions for next five years where mixed with 32 percent expecting values to increase and 17 percent expecting values to remain constant. In Scenario 4, farmland values decline in the first four years, and then gradually recover for the remaining planning horizon. Scenario 5 suggests a more severe decline in farmland values and has a slower recovery. Chapter 4 has the detailed explanation of the various data sources and values used in the simulations.

- Under proactive transition strategy, *prior to the transfer initiation*, the total farmer productivity is adjusted for the younger generation's productivity index, and the younger generation can take out funds from the business to cover consumption, but only up to their share of generated income in the business. *After the transfer is initiated*, the total farmer productivity is adjusted for the younger generation's productivity index, and the younger generation's consumption is fully covered by the farm after the transfer is initiated.
- Under regular transition strategy, *prior to the transfer initiation*, even though the younger generation has some limited ownership in the business (initial assumption 20%), total farmer productivity is not adjusted for the younger generation's productivity index since they do not have managerial involvement in the farm, and the business does not cover any of the younger generation's family consumption. *After the transfer is initiated,* the total farmer productivity is adjusted for the younger generation's productivity index, and the weights on both generations' productivity indices are modified. The younger generation's consumption is fully covered by the

farm after the transfer is initiated, whereas the older generation's one is covered in full under all scenarios.

3.4 Scenarios

The model generates results for the baseline scenario followed by a series of six scenarios as a sensitivity analysis. These six scenarios are listed in Table 3.4.

Table 3.4 Description of Scenarios.

Scenario	Description
Baseline scenario	Explained below.
Scenario 1	Available off-farm income is set at $47,353.
Scenario 2	Farm covers only 50% of younger generation's consumption.
Scenario 3	Farm covers only 80% of younger generation's consumption.
Scenario 4	Constant farmland value assumption is relaxed. Farmland values experience a severe decline followed by a gradual conservative recovery.
Scenario 5	Farmland values decline slower than in Scenario 4, and the land market starts recovering sooner.
Scenario 6	Annual gifting becomes aggressive and increases to $25,000 per person per year.

This study conducts analysis for two types of transition strategies (proactive and regular). Thus, every scenario is re-run and analyzed separately for each type of transition strategy. Below are explained major assumptions of the *baseline scenario* under both types of transition strategy.

Proactive Transition Strategy

1. The total farmer productivity index accounts for the productivity of both generations even prior to the transfer initiation due to the fact that the younger generation has some managerial involvement in the business even prior to the farm transfer initiation. The adjustment of the total farmer productivity index under this type of transition strategy is explained in Equation 5. Until the transfer is initiated, the respective weights on the younger and the older

generations' productivity indices remain constant since no wealth is shifted between the generations during that time. Prior to the transfer initiation, the younger generation can take out funds from the business to cover its consumption, but only up to their share of annual farm net income generated in the business. After the transfer is initiated, the total farmer productivity is adjusted annually for changes in both farmers' productivity indices as they age and changes in their respective weights that reflect the shift of wealth between the two generations. The younger generation's consumption is fully covered by the farm after the transfer is initiated, whereas the older generation's one is covered in full prior and after the transfer initiation and under all scenarios.

2. Constant farmland values ($8,716, Zhang 2015).
3. Normal gifting strategy ($14,000/year/person, Internal Revenue Service n.d.).
4. No off-farm income is available.
5. Weighted average cost of capital for the representative farm is (4.45%), used as the discount rate.

Regular Transition Strategy

1. Prior to the transfer initiation total farmer productivity is not adjusted for the younger generation's productivity index. Until the transfer is initiated, the younger generation is assumed to have 20% ownership in the farm business. This is the case where they live off-farm and do not hold managerial responsibilities. During this time, the farm business does not pay any of the younger generation's family consumption. After the transfer is initiated, the

total farmer productivity is continually adjusted to include the younger generation's productivity index, and the weights on both farmers' productivity indices are modified annually based on the changes in ownership structure between two generations.

2. Assumptions 2, 3, 4, and 5 are identical as those found in the proactive transition strategy.

CHAPTER 4: DATA AND REPRESENTATIVE FARM

Strong financial performance of the farm sector over the last decade resulted in highly-elevated farmland prices, increased capital investments, and strengthened the overall equity positions of Midwestern grain operations. The growing size of operations and a large percentage of near- or- after- retirement age farmers in the Midwestern states is likely to lead to a large percentage of these farms undergoing an intergenerational transfer over the next two decades. This research project is intended to provide social benefit for this particular group of farms. Thus, the representative farm in this study is defined as a large grain farm (with $4 million in equity or more) located in the Corn Belt and Northern Plains.

Data

The farm-level data was obtained by a large lending institution[23] and contains variables from the Income Statement and the Balance Sheet for grain farms in three Midwestern states (Iowa, Nebraska, and South Dakota) that generate over $250,000 in annual gross revenue. There were two different datasets: (1) a cross-section set with 1,427 observations for production years 2006 – 2015, and (2) a panel set with 294 observations from all three states including large and very large farms with at least 4 consecutive production years of observations. The cross-sectional data for production years 2012 and 2013 was combined and studied together to understand the distribution of farms in each state and determine the size of the representative farm and other KIVs. Earlier production years (2006 – 2011) were not used because the issue studied in this research project requires consideration of a current wealth position of the business and

[23] The name of the institution cannot be disclosed due to the confidentiality agreement.

not average or historic. Therefore, using the 2012 and 2013 years allows for capturing the effect of the spike in farmland prices and increased capital investments in agriculture on the wealth positions of grain farms. If production years 2013 through 2015 are selected, the number of observations is reduced significantly. Once the representative farm size was chosen, the 2006 through 2010 panel data for large farms was used to benchmark historic financial performance of large farms against the performance exhibited in 2012 and 2013 by the representative farm. The size of the model[24] farm and its key financial variables were derived by taking the average of the respective variable for all farms in the pre-defined subsample.

The Size and Location of the Representative Farm

While several alternative approaches for defining the boundaries of the subsamples of large and very large farms in each state were considered, it was decided that the equity approach with percentile distribution ranking was best suited to our purposes. Further analysis of data indicated that each of the three states' farms had significant differences and must be studied separately. The Iowa group of large farms was selected as the basis for this work.

Traditionally, the size of farms is measured in gross revenue generated by a firm over a year (Hoppe and MacDonald 2013). The USDA currently defines a large farm as the one that generates between $1 and $5 million in gross revenue, and very large farms – over $5 million. When the USDA's definition of a large farm is applied to the data, more than 25 percent of observations in Iowa and Nebraska and 10 percent in South Dakota have less than $4 million in farm equity (Table 4.1).

[24] Two terms - model farm and representative farm – have identical meaning and are used interchangeably in this study.

Table 4.1 Distribution of Large Farms (by Equity), USDA Definition

	Iowa	Nebraska	South Dakota
1%	1,657,512	1,753,275	1,936,857
5%	2,422,702	2,403,221	2,488,238
10	2,748,241	2,901,583	3,012,535
25	3,890,447	3,469,870	4,977,912
50	5,940,676	4,902,536	6,195,605
75	8,369,890	7,587,673	9,821,475
90	12,500,000	12,100,000	14,800,000
95	14,000,000	12,400,000	101,000,000
99	22,200,000	19,200,000	108,000,000
Total observations	90	41	30

One explanation for these lower equity positions could be that these farms rent a significant portion of their operated acres. In addition, as shown in Table 4.2 the top 25th percentile of farms that generate between $250,000 and $1 million in all three states is characterized by strong equity positions (over $4 million). As for the very large farms, in each state less than 3 observations were found that generate over $5 million in gross revenue. Thus, adopting the USDA definition would result in omitting the observations for which the transfer issue is a concern and including observations with low equity positions.

Table 4.2 Percentage of Farms listed by Equity that do not meet USDA's Definition of Large Farms (Gross Cash Farm Income between $250,000 and $1,000,000)

	Iowa	Nebraska	South Dakota
1%	557,107	663,148	712,453
5%	1,012,067	910,150	1,045,097
10	1,434,071	1,141,670	1,343,100
25	1,997,976	1,706,092	2,173,400
50	3,075,349	2,569,657	3,654,421
75	5,366,428	5,018,046	6,592,458
90	8,785,829	5,965,466	9,642,046
95	12,100,000	7,159,798	11,100,000
99	20,800,000	11,300,000	34,900,000
Total observations	132	89	59

Another potential approach to defining farm size is to use total farm assets. Given that the transfer tax is applied to the terminal wealth, not the asset base, it seems most logical to use the firm's equity position as a measure of size. The subsamples of large and very large farms in each state, were studied separately for shape, dispersion and skewness. Major outliers were excluded, and a lower boundary of $4 million[25] was set. The resulting sample (for each state separately) was split into two subsamples (large and very large farms), using the percentile methodology. The first 75 percent of farms were classed as large farms, and the remaining 25 percent as very large farms.

Table 4.3 Description of Subsamples of Large and Very Large Farms

	Iowa	**Nebraska**	**South Dakota**
Total number of observations in the sample	225	134	90
• observations with equity greater $4 million	119	61	52
Boundaries for large farms subsample, million $	4 – 9.7 (90 obs.)	4 – 7.9 (46 obs.)	4 – 9.9 (39 obs.)
Boundaries for very large farms subsample, million $	9.7 – 25.3 (29 obs.)	7.9 – 28.1 (15 obs.)	9.9 – 108.32 (13 obs.)

Table 4.3 shows the equity ranges (in millions of dollars) used as the bounds of each subsample by state and size and lists in parenthesis the number of observations of each subsample. For instance, Iowa has 119 out of 225 farm observations with equity greater than $4 million. Based on the percentile ranking, large farms in Iowa are defined

[25] This level was set as a lower bound because firms with low initial wealth positions (less than $4 million) are less likely to generate and accumulate equity that would exceed the federal estate tax exemption of $5.45 million at the end of the planning horizon. Thus, for those firms the transfer tax obligations are less likely to be a concern; therefore, they are excluded.

as those with equity between $4 and $9.7 million and very large farms – with equity between $9.7 and $25.3 million.

Table 4.4 Selected Descriptive Statistics for the Size of Subsamples of Large and Very Large Farms in Three States

	Total Equity		
	Mean	Standard Deviation	Median
Iowa			
• Large	6,172,080	1,518,765	5,940,676
• Very large	14,300,000	4,166,562	13,100,000
Nebraska			
• Large	5,516,804	994,011	5,311,207
• Very large	12,600,000	5,365,320	11,300,000
South Dakota			
• Large	6,295,235	1,375,128	6,267,966
• Very large	28,700,000	34,500,000	11,400,000

Using the above defined bounds (Table 4.1) for subsamples of large and very large farms in each state, the descriptive statistics are obtained for each subsample and provided in Table 4.3 for comparison purposes.

Very large farms are likely to use a different set of transfer strategies than large farms and hire professionals to navigate them through the transition process. Lending institutions and farm transition experts believe that the social benefit of this research lies in studying the implications for large farms in particular. Therefore, this research will focus solely on large farms.

As for the location of the representative farm, Iowa was selected and served as a base state to define the parameters and the KIVs for the representative farm. First of all, Iowa has by far the largest number of observations compared for 2012 and 2013 production years (90 observations in Iowa compared to 46 and 39 observations respectively for Nebraska and South Dakota, Table 4.3). For the purpose of this research, a subsample with larger number of observations is preferred since it allows one to better

capture true representative characteristics of large grain farms in that region. Second of all, observations from all three states should not be combined into one group and must be studied as a single sample because they use varying production technologies (the substantial presence of irrigation in row crop farms in Nebraska and South Dakota compared to Iowa) and exhibit different operation efficiency. These states also have different cropping patterns: South Dakota's grain farms produce mostly wheat and corn, compared to large corn and soybean production in Iowa and Nebraska. Statistical tests[26] for equality of sample means and variances were conducted for these three states (Iowa, Nebraska, and South Dakota), and the results suggest the sample of large farms in Nebraska is different (unequal means and variances) from Iowa and South Dakota, whereas the latter two are more similar.

The comparison provided above leads to a conclusion that a large grain farm in Iowa (with average equity of $6,172,080 as shown in Table 4.4) will serve as a base for the representative farm. Finally, the subsample of farms is Iowa with equity between $4 and $9.7 million (with an average of $6,172,080) is used to determine key financial variables that characterize the representative farm.

Other Characteristics of the Representative Farm

Table 4.5 lists the financial variables for the representative farm, calculated as the average value of the respective variable in the defined subsample of large farms in Iowa. The first three KIVs (total assets, current assets, and current liabilities) are used to populate the Balance Sheet portion of the model in year 1.

[26] Variance ratio test and two-sample t test with equal/unequal variances; these results are reported in Appendix B, Tables 1 and 2.

Table 4.5 Definitions and Descriptive Statistics for Key Financial Variables and Ratios that Define the Representative Farm

	Mean	Standard Deviation	Median
Total Assets	8,068,680	2,092,853	7,583,840
Current Assets	1,224,117	1,224,117	994,452
Current Liabilities	531,769	609,111	345,391
Operator Age	71	5	69
Real Estate Value	5,172,974	1,611,185	4,953,518
Gross Sales	1,296,075	1,039,590	1,042,921
Off-farm Income	47,353	44,598	38,513
Farm Living Expenses	34,968	13,205	30,000
Operating Expense Ratio (OER)	0.595	0.18	0.62
Interest Expense Ratio (IER)	0.0613	0.06	0.05
Depreciation Expense Ratio (DER)	0.10	0.05	0.09
Asset Turnover Ratio (ATR)	0.156	0.10	0.13
Debt-to-Asset Ratio (D/A)	0.22	0.13	0.20

When combined with appropriate financial ratios, i.e. interest expense, operating expense, depreciation expense, and asset turnover ratios, these KIVs generate the entries for the Income Statement portion of the model. A 20-year age differential is used to approximated the age of a younger generation. The age along with other variables are used to determine the annual consumption level for both generations and their respective productivity indices.

Given that the above ratios and financial variables for the representative farm were based on 2012 and 2013 production years, these estimated were compared to those from the 2006-2010 period to check for concerns about overestimation.

As shown in Table 4.6, the asset turnover ratio calculated using 2012-2013 data seems to be somewhat elevated compared to the historic average.

Table 4.6. Comparison of Financial Ratios for Large Farms in Iowa: 2012-2013 and 2006-2010

	Sample mean, 2006-2010	Sample mean, 2012-2013
ATR	0.1285	0.156
OER	0.6063	0.595
IER	0.0950	0.061
DER	0.0963	0.097

Thus, to use a more conservative scenario and preserve a representativeness of large farm's performance, the historic ATR for years 2006-2010 is used to populate the model. All other ratios used in the model are for the 2012-2013 period.

Base Productivity Indices

The productivity indices for the respective age of a farmer are drawn from the state-level empirical study by Tauer and Lordkipanidze (2000). The modelling approach in the empirical study that produced these indices is explained in detail in Chapter 2, and the table with indices is provided in Appendix B.

Consumption Withdrawals

The University of Minnesota's Farm Financial Management Database (FINBIN*)* is one of the most extensive databases for farm financial and production benchmark information in the United States. This database is used to generate family living expenses and populate the model in the Baseline and Scenarios 1 through 3. Several other sources[27] were used to benchmark the family living expenses found in FINBIN. As shown on Figure 1 in Appendix C, all sources have comparable values (Kansas Farm Management Association (FMA) and FINBIN however appear to be in a closer range than Kentucky Farm Business Management Program).

[27] Kansas Farm Management Association, Kentucky Farm Business Management Program, Illinois Farm Business Farm Management Association.

Family living expenses include food and meals expense, medical care and health/life insurance, household supplies/repairs, clothing, education, recreation, utilities, dwelling rent, etc. For the complete list of items, please visit www.finbin.umn.edu

The Lookup table used the FINBIN data for 2013 crop farm values for the Midwestern states of IL, MI, MN, NE, SD, MO, ND, OH, WI by the age of the operator and the size of farm. Table 1, Appendix D explains the definition of the sizes of operations adopted by FINBIN, and Table 2 in the same appendix provides family living expenses for various ages and size categories used in the model.

CHAPTER 5: RESULTS

A visual representation of how results are generated are shown in Figures 5.1A and 5.1B. The model generates results for two types of transition strategies (proactive and regular) under the baseline and six other specified scenarios each tested for ten possible periods of farm transfer initiation.

For each scenario, type of transition strategy and transfer initiation year, the model generates two major sets of results: (1) the discounted terminal wealth position of the business and (2) and key financial variables from major financial statements for each production year within a planning horizon. The discounted terminal wealth positions are ranked and used to determine the preferred timing for farm transfer initiation. The recorded output variables (retained earnings, net income, consumption withdrawals, principal payments, income and self-employment taxes, gross sales, total assets, joint farmer productivity index, total before-tax wealth at the end of the planning period, and transfer taxes) provide the background for a more in-depth analysis of the results. Figure 5.2 is an example of visual representation of these results where each bar represents discounted terminal wealth in the business for the associated transfer initiation year as a function of the transfer initiation year.

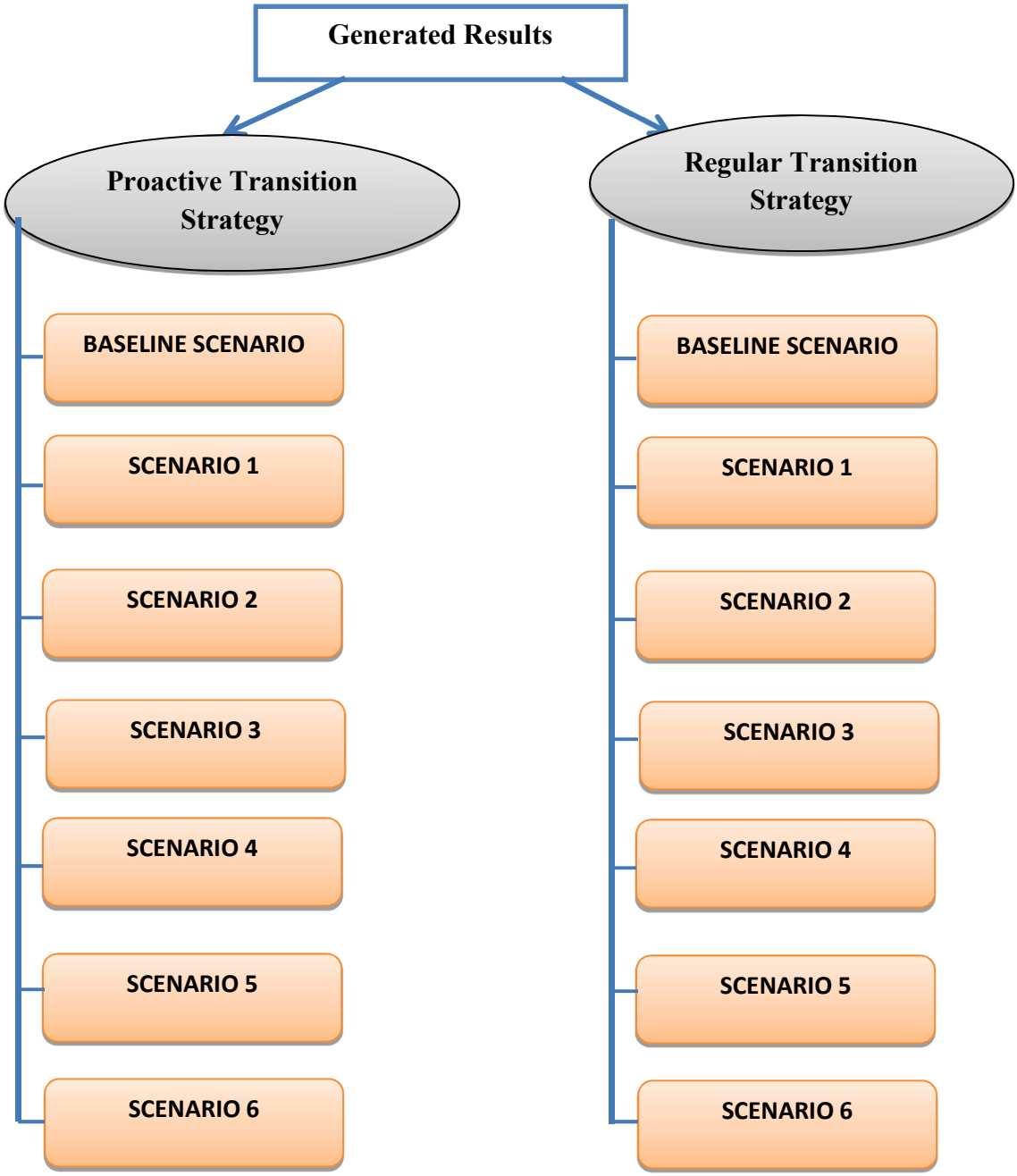

Figure 5.1A. Layout of Generated Results

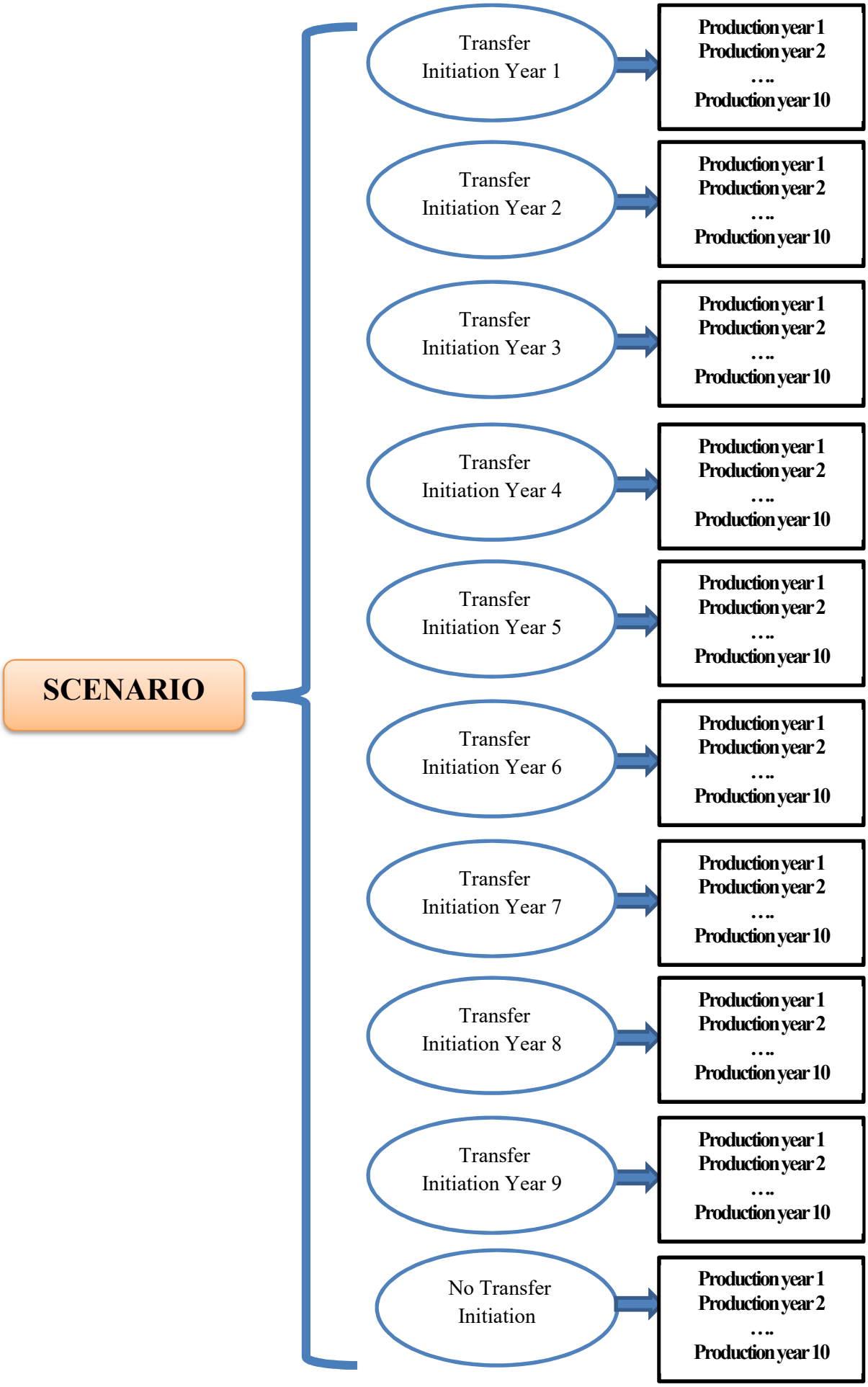

Figure 5.1B. Layout of Results under Each Scenario

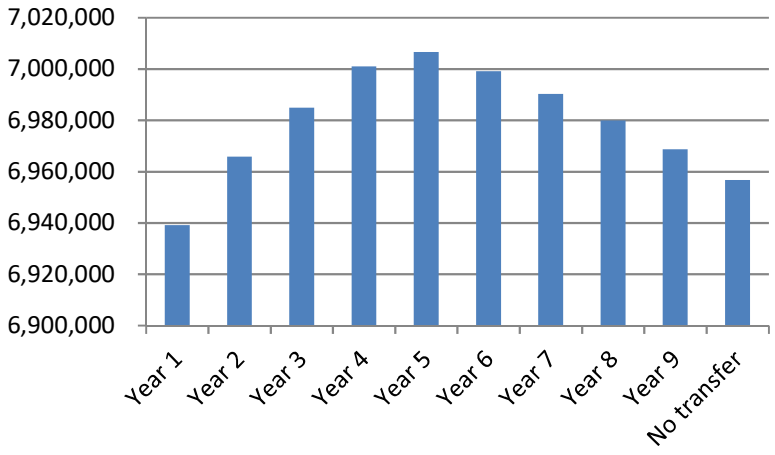

Figure 5.2. Terminal Wealth as a Function of Transfer Initiation Year

Additional output variables are recorded for every production year under each transfer initiation year and scenario as shown on Figure 5.1B and are recorded in a form similar to Table 5.1 (an empty templet)[28].These results help identify the underlying reason of year-to-year changes in firm's growth and accumulation of wealth under each scenario and transfer initiation year.

Table 5.1. Financial KOVs, Baseline Scenario, Proactive Transition Strategy

Variable	Transfer Initiation Year 1	Transfer Initiation Year 2	.. ..	Transfer Initiation Year 9	No Transfer Initiation
Retained earnings in year 1					
Retained earnings in year 2					
…..					
Retained earnings in year 10					
Net farm income in year 1					
Net farm income in year 2					
……					
Net farm income in year 10					
Consumption withdrawals in year 1					
Consumption withdrawals in year 2					
…….					
Consumption withdrawals in year 10					
Etc.					

[28] These results are not reported due to a lengthy format, but can be provided if requested.

5.1 Baseline Scenario

Proactive Transition Strategy

If the business follows a proactive transition strategy, the results shown in Figure 5.3 suggest that the firm accumulates the highest terminal wealth if the initiation occurs in year 6. Earlier or later transfer initiation leads to a lower discounted terminal wealth.

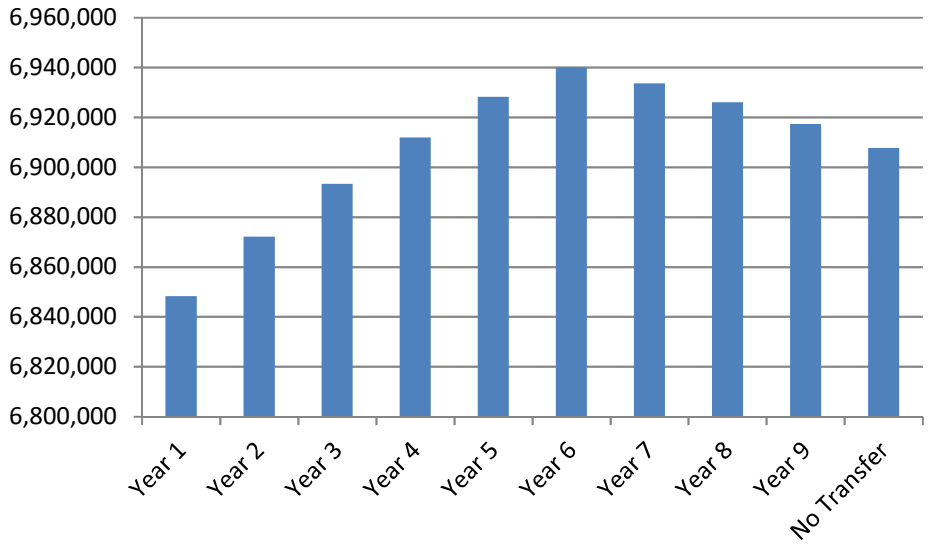

Figure 5.3. Discounted Terminal Wealth as a Function of Transfer Initiation Year

As shown in Table 5.2, year 1 initiation results in $109,796 lower total after-tax wealth relative to year 6. An early transfer reduces the firm's growth but offers tax savings when compared to later initiation (year 6). However, these tax savings ($3,782) are lower than the foregone total before-tax wealth ($113,578).

Therefore, for this growth rate and size of the operation, if the transfer is initiated in year 1, transfer tax savings do not justify the reduction in the firm's growth suggesting that transfer initiation year 6 is preferred to year 1.

Compared to a later transfer initiation, year 9 after-tax wealth is higher if the transfer is initiated in year 6 compared to year 9 suggesting that the earlier transfer is preferred. Higher total after-tax wealth under transfer initiation year 6 compared to year 9 is due to

large tax savings ($83,837) that almost double the foregone amount of total before-tax wealth ($44,611), resulting in a $39,226 higher total after-tax wealth. In this case, tax savings are large enough to offset the firm's reduced growth rate.

Table 5.2. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	Transfer initiation year 1 compared to year 6	Transfer initiation year 6 compared to year 9
Total after-tax wealth, $	-109,796	39,226
(as percent of the first year of two that are being compared)	(1.57%)	(0.55%)
• Total before-tax wealth, $	-113,578	-44,611
• Transfer tax savings, $	3,782	83,837

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

Results from both comparisons show that the earlier the transfer is initiated the lower is the firm's growth.

Table 5.3. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, %	
	Production Years 2 - 6	Production years 7 - 10
Retained earnings	-31.7	-3.6
Net income	-0.5	-1.5
Consumption withdrawals	19.0	0.0
Joint farmer productivity	0.00576	0.0

The numerical values in Table 5.3 were constructed in the following way: first, the model was re-run for the baseline scenario, proactive transition strategy, for two transfer initiation years (year 1 and 6). The key financial variables during the planning horizon were recorded on an annual basis for all ten production years for transfer initiation years 1 and 6. Then, the differences for each variable on the annual basis were computed comparing two given transfer initiation years. Most of the changes in the firm's financial

performance appear to occur between production years 2 and 6, thus the production years were grouped as shown in Table 5.3.

The firm experiences a slower growth under transfer initiation year 1 compared to a year 6 transfer, with the largest reduction occurring between production years 2 and 6 (on average retained earnings were 31.7 percent lower in every year between production years 2 and 6 under transfer initiation year 1 versus 6). Both factors - reduction in net income and increase in consumption withdrawals – lowered retained earnings, but the latter one was the major contributor of the slowdown in growth. In the first part of the planning period (production years 2 – 6), the early transfer (year 1 compare to year 6) significantly increased consumption withdrawals (on average, 19 percent annually), but resulted in a very small increase in joint farmer productivity (less than 1 percent). An earlier transfer initiation shifts wealth between the generations sooner and thus, increases the weight on the younger generation's base productivity index.

Table 5.4. Base Productivity Indices for Older and Younger Generations by Production Year

Year	Older generation's base productivity index	Younger generation's base productivity index
Production year 1	1.060	1.088
Production year 2	1.060	1.081
Production year 3	1.060	1.074
Production year 4	1.060	1.067
Production year 5	1.060	1.060
Production year 6	1.060	1.060
Production year 7	1.060	1.060
Production year 8	1.060	1.060
Production year 9	1.060	1.060
Production year 10	1.060	1.060

Given that during these years, the younger generation's base index is higher compared to the older operator (Table 5.4), a larger weight on the younger generation's

base productivity index increases the joint farmer productivity index. However, such a small increase in joint farmer productivity did not allow the firm to improve its income generating ability to the extent that would justify higher consumption withdrawals.

In the second part of the planning horizon (production years 7 through 10), the firm exhibits the same consumption withdrawal rates and joint farmer productivity indices under both transfer initiation years. [29] (based on the empirical estimated by Tauer 2000, and given the age of operators in this representative farm as shown in Table 5.3).

Table 5.5. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, %	
	Production Years 1 – 6	Production years 7 - 10
Retained earnings	0.00	-14.37
Net income	0.00	-0.23
Consumption withdrawals	0.00	11.00
Joint farmer productivity	0.00	0.00

As shown in Table 5.5, initiating the transfer in year 6 compared to year 9 results in the reduction of the firm's growth but only in the second part of the planning period. Until production year 7, there are no differences in firm's performance comparing these two transfer initiation years since no transfer has been initiated yet. The transfer initiation in year 6 has implications on firm's performance starting in year 7, and under the initiation in in year 9, the implications start in year 10. In the second part of the planning periods (between production years 7 – 10), initiating the transfer in year 6 reduced the firm's retained earnings on average 14.37 percent annually compared to initiating in year 9. Since these two transfer initiation timings do not impact the joint farmer productivity

[29] Linear interpolation was used to obtain the data points for productivity indices within the specific age group. However, after age 65, the indices were kept constant (at a level provided in the study) given the author's concerns over the assumptions of the liquidation methods of the farm assets and their implications on the farmer productivity index.

index, the firm's growth is reduced due to the larger consumption withdrawals under transfer initiation year 6, and the lower income generating ability as a result of the reduced asset base under earlier transfer initiation.

Comparing the changes in the firm's growth under transfer initiation years 1, 6 and 9, two major observations are made: (1) earlier transfer initiation allows the firm to capitalize on the younger generation's higher productivity in the first half of the planning horizon, but is outweighed by significantly larger consumption withdrawals, and thus the firm's growth is reduced, and (2) when comparing two transfer initiation years that are further away in the planning horizon (for example, years 6 to 9 rather than 1 to 6), the change in firm's growth between year 6 and 9 will be smaller than between 1 and 6 since in the case of the first set of comparisons (year 6 versus 9) the farm has more production years prior to transfer initiation when no additional consumption is placed on the business, and it can use these funds to generate more wealth earlier in the planning horizon.

Regular Transition Strategy

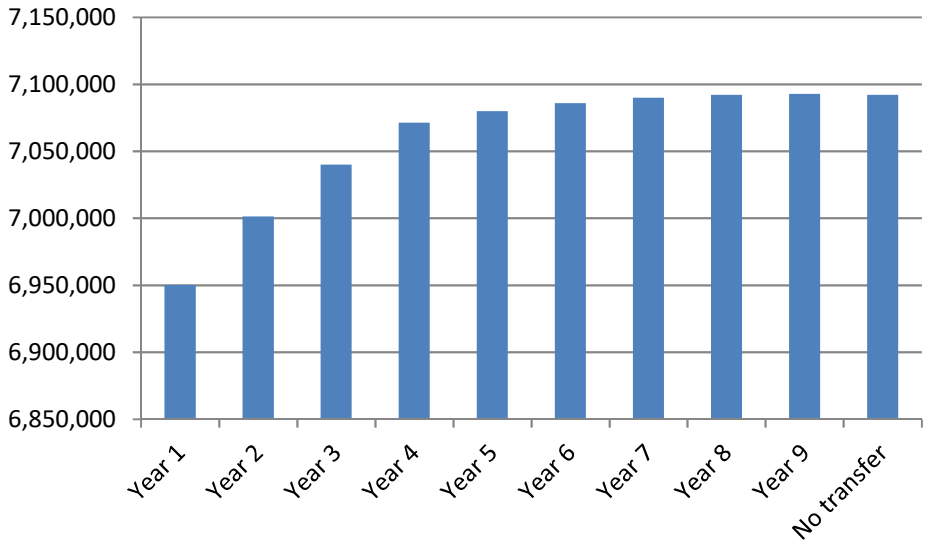

Figure 5.4. Terminal Wealth as a Function of Transfer Initiation Year

From the financial standpoint, under the regular transition strategy, the delayed transfer is always preferred since a later transfer initiation results in a higher level of terminal wealth. When comparing transfer initiation years 1 versus 6, and years 6 versus 9, the reduction in total after-tax wealth is observed under earlier initiation (year 1 compared to year 6, and year 6 compared to year 9). Transfer tax savings associated with earlier transfers do not justify the wealth foregone due to earlier transfer, resulting in a lower total after-tax wealth under both comparisons.

Table 5.6. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	**Transfer initiation year 1 compared to year 6**	**Transfer initiation year 6 compared to year 9**
Total after-tax wealth, $	-208,939	-22,816
(as percent of the first year of two that are being compared)	(2.97%)	(0.31%)
• Total before-tax wealth, $	-275,957	-135,954
• Transfer tax savings, $	67,017	113,138

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

As the firm's transfer is delayed, the tax savings increase but are still not high enough to compensate for the forgone wealth and change the decision on the timing of initiation.

Table 5.7. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	**Average Change, %**	
	Production Years 1 - 6	**Production years 7 – 10**
Retained earnings	-63.35	-8.50
Net income	1.66	-3.74
Consumption withdrawals	43.39	0.00
Joint farmer productivity	0.00956	0.00
Total income and self-employment taxes	-5.36	-3.86

Thus, for this size of estate and the firm's growth, tax savings do not justify the reduction in the firm's growth. A lower total before-tax wealth under transfer initiation year 1 versus 6 is explained using additional insights provided in Table 5.7. The largest differences in retained earnings are observed between production years 1 and 6. Under the earlier initiation (year 1 compared to year 6), the firm's net (after-tax) income was on average 1.66 percent higher during this part of the planning horizon which was primarily due to higher joint farmer productivity and savings on income and self-employment taxes. However, significantly larger consumption withdrawals (on average 43.39 percent higher every year during this period under transfer initiation year 1 compared to year 6) offset the increases in the net income and thus reduce the amount of wealth reinvested back into business and the firm's growth. In the second part of the planning period, we see less difference in the firm's retained earnings because the transfer has already been initiated (under both years 1 and 6), and thus, the farm business incurs identical consumption withdrawals and joint farmer productivity.

Table 5.8. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.00	-41.25
Net income	0.00	1.81
Consumption withdrawals	0.00	37.74
Joint farmer productivity	0.00	0.00
Total income and self-employment taxes	0.00	-5.26

When comparing transfer initiation years 6 and 9, most of the decrease in retained earnings is observed during the second part of the planning period (years 7 through 10) since the firm's performance is affected by the event of transfer initiation that occurs in years 6 and 9. Following the same logic and analysis as provided above, initiating the

transfer in year 6 versus 9 slightly improves income generating ability of the business (1.81 percent higher on average when comparing transfer initiation years 6 and 9).

However, the firm's retained earnings and growth are still reduced under the earlier initiation because the effect of the increase in consumption withdrawals associated with the earlier transfer initiation exceeds the increase in income generating ability of the business. The magnitude of changes under these two transfer initiation years is lower than under transfer initiation year 1 and 6 primarily due to the longer period the firm has been operating without additional consumption withdrawals (financial performance of the firm under these two transfer initiation years is identical until production year 7).

As the results show, the type of transition strategy employed by the company (proactive or regular) impacts the magnitude and direction of results. Provided below are major observations from the comparison of results for both types of transition strategies:

1. Under the regular transition strategy, earlier initiation reduces the firm's growth much more than under the proactive strategy (because of the differences in assumptions on consumption and productivity between the strategies).
2. Generally, under the regular transition strategy, the firm generates higher total after-tax wealth as a result of overall lower consumption withdrawals from the business as specified by the assumption.
3. Preferred transfer timing differs depending on the type of transition strategy prior to the transfer initiation: under proactive strategy, there is an optimal timing for transfer (years 4 through 7), while under regular transition strategy, delay is always preferred.

5.2 Scenario One

Proactive Transition Strategy

Figure 5.5 shows that the availability of off-farm income to help cover the younger generation's consumption indeed alters the preferred timing of the farm transfer intiation. Under scenario 1, plotting the resultsing terminal wealth as a function of transfer intiation year shows that the highest bars are concentrated on the left of Figure 5.5 implying that earlier trasnfer initiation will result in higher terminal wealth generated in the business.

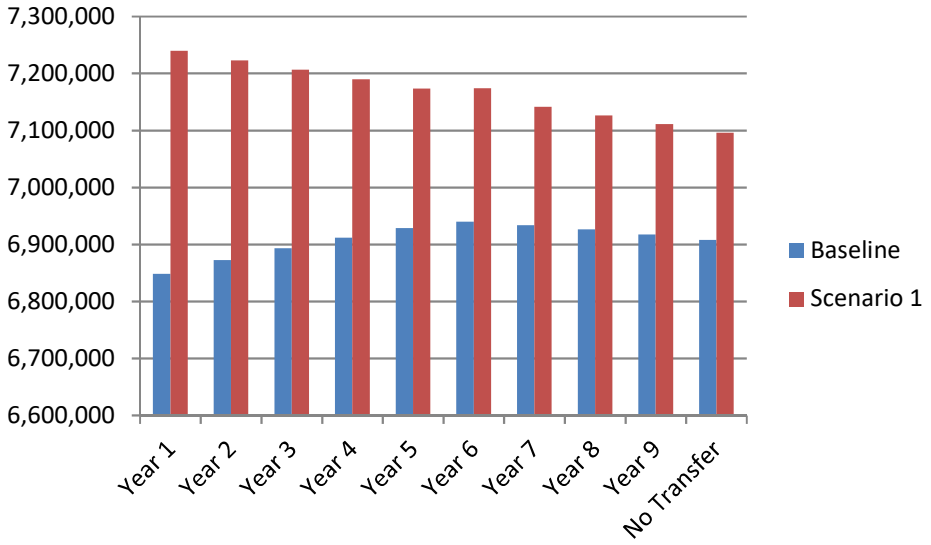

Figure 5.5. Terminal Wealth as a Function of Transfer Initiation Year

The additional income stream not only changes the preferred timing of initiation (compared to the baseline) but also the magnitude of results which we will discuss shortly.

Numerical results from Table 5.9 support the general conclusion provided above: total after-tax wealth is higher if transfer occurs earlier. Under transfer initiation year 1, total after-tax wealth is $126,752 higher than under transfer initiation year 6. If initiated in year 6 compared to year 9, the firm would generate $72,013 more in total after-tax

wealth. Based on the decomposition of terminal wealth into its main elements, it becomes apparent that for both comparisons most of the difference in total after-tax wealth results from potential tax savings rather than higher total before-tax wealth (in other words, the decision is driven by transfer tax savings more than by the firm's improved growth). For example, if transfer is initiated in year 1 (compared to year 6), the firm generates only $267 more in total before-tax wealth. However, the earlier transfer initiation in this case would result in $126,485 less in transfer taxes paid compared to the tax obligation under transfer initiation year 6.

Table 5.9. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	**Transfer initiation year 1 compared to year 6**	**Transfer initiation year 6 compared to year 9**
Total after-tax wealth, $	126,752	72,013
(as percent of the first year of two that are being compared)	(1.69%)	(0.97%)
• Total before-tax wealth, $	267	1,440
• Transfer tax savings, $	126,485	70,573

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

When comparing two transfer initiation years that are later in the planning horizon (years 6 and 9), the magnitude of the differences changes but most of benefits of early transfer still come from tax savings and not improvements in the firm's growth.

The numerical results from Tables 5.10 and 5.11 support the in-depth explanation of how the transfer initiation timing impacts the firm's ability to generate and accumulate wealth throughout the planning horizon.

Generally, the differences in the firm's income generating and saving abilities were very small (less than 1 percent) when comparing the specified sets of transfer

initiation years (1 versus 6, and 6 versus 9) which also explains a small difference in total before-tax wealth shown in Table 5.9 ($267 and $1,440) relative to the size of the business.

Table 5.10. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.11	-0.001
Net income	0.08	-0.07
Consumption withdrawals	0.00	0.00
Joint farmer productivity	0.00953	0.00
Total assets	0.0032	0.0124
Total income and self-employment taxes	-0.08	0.135

A slightly faster growth (on average 0.11 percent annually higher retained earnings) under transfer initiation year 1 compared to year 6 is due to a small increase in net income. This is a result of the firm's ability to capitalize on the higher productivity of the younger generation earlier in the planning period without imposing additional consumption withdraws.

Table 5.11. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.00	0.00268
Net income	0.00	0.19
Consumption withdrawals	0.00	0.00
Joint farmer productivity	0.00	0.00
Total assets	0.00	0.0055
Total income and self-employment taxes	0.00	-0.292

Earlier initiation also reduces income tax obligations and thus increases the amount of assets retained in the business, allowing the firm to generate higher gross revenue in the following periods, thus improving its income generating ability. Comparing transfer

initiation years 6 and 9, changes in the firm's growth are observed only in the later part of the planning horizon[30] and result from a higher net income (on average 0.19 percent annually) generated by the business. Farmer productivity and consumption withdrawals remained unchanged between these two transfer initiation years. The earlier transfer initiation shifts income to a lower income tax bracket of the younger generation, reducing income tax obligations (by 0.092 percent) and allowing the firm to retain more assets in the business (0.0055 percent).

Regular Transition Strategy

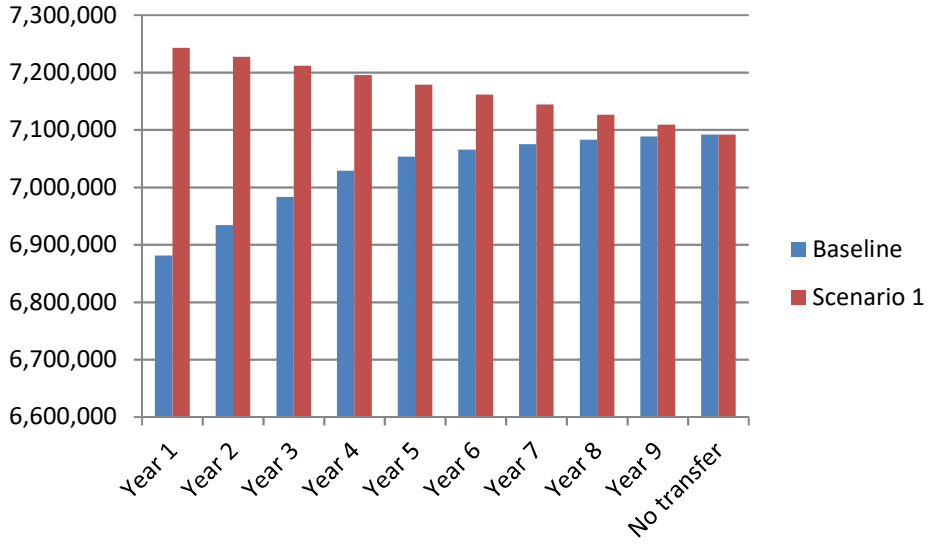

Figure 5.6. Terminal Wealth as a Function of Transfer Initiation Year

The availability of off-farm income when the regular transition strategy is employed changes the magnitude and directionality of results: earlier transfer initiation allows the firm to generate higher total-after tax wealth in the business than the later transfer, and thus, delaying the transfer reduces the firm's total after-tax wealth. The comparison and

[30] Transfer initiation does not impact the firm's performance in the year when it was initiated since the initiation is modelled to occur at the end of the production year and thus, it affects the firm in the year following the transfer initiation. No differences were observed during production years 1 through 6 since both transfer initiation timings start impacting the firm's performance in year 7.

interpretation of the differences between the baseline and scenario 1 will be explained shortly.

Similarly to the results of the baseline scenario, the majority of difference in total after-tax wealth under scenario 1 comes primarily from potential transfer tax savings irrespective of the transfer initiation years that are being compared (as shown in Table 5.12). However, it is important to note that when off-farm income is available, the early initiation does not reduce the firm's growth as much as it does under the baseline scenario. If the transfer is initiated later in the planning horizon (year 6 versus 9), the earlier transfer actually increases the firm's growth.

Table 5.12. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	**Transfer Initiation Year 1 compared to year 6**	**Transfer Initiation Year 6 compared to year 9**
Total after-tax wealth, $	126,210	79,829
(as percent of the first year of two that are being compared)	(1.68%)	(1.08%)
• Total before-tax wealth, $	-1,217	12,931
• Transfer tax savings, $	127,427	66,897

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

Initiating the transfer in year 1 compared to year 6 under scenario 1 results in $1,217 less of total before-tax wealth but gives $127,427 of transfer tax savings. When initiating the transfer in year 1 compared to year 6, a slowdown in the firm's growth is observed due to larger consumption withdrawals (on average 8.92 percent higher in each year) in the first six years of the planning horizon (until the transfer initiation in year 6 is enacted).

Table 5.13. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, % Production years 1-6	Production years 7 - 10
Retained earnings	-0.12	-0.11
Net income	2.83	-0.08
Consumption withdrawals	8.92	0.00
Joint farmer productivity	0.0095	0.00
Total assets	-0.02	-0.01
Total income and self-employment taxes	-4.03	0.10

Even though the early transfer allows the firm to capitalize on higher joint farmer productivity (0.0095 percent on average) during the first part of the planning period, additional productivity in combination with lower income taxes (4.03 percent lower on average) allows the firm to generate higher net farm income. But this addition to income is not large enough to offset additional consumption withdrawals which reduces the firm's growth and total before-tax wealth.

Table 5.14. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, % Production years 1-6	Production years 7 - 10
Retained earnings	0.00	2.45
Net income	0.00	2.72
Consumption withdrawals	0.00	3.37
Joint farmer productivity	0.00	0.00
Total assets	0.00	0.08
Total income and self-employment taxes	0.00	-4.097

Under transfer initiation year 6 versus 9, the firm's performance is not affected by the transfer in the first part of the planning horizon, but starting in year 7, higher consumption withdrawals (on average 3.37 annually) associated with the early transfer are indeed justified by a 2.72 percent higher net income annually. Lower income and self-

employment taxes and higher total assets were two main contributors to the increase in net income, as shown in Table 5.14.

Table 5.15. Comparison of KOVs under the Baseline and Scenario 1

Change in	Transfer initiation year 1	Transfer initiation year 9
Total after-tax wealth, $	-502,379	-233,042
• Total before-tax wealth, $	-502,379	-342,482
• Transfer tax savings, $	0.00	109,440
Average annual retained earnings, %	-71.18	-39.01
Average annual net income, %	-2.95	-1.84
Average annual consumption withdrawals, %	45.47	36.44
Average annual total farmer productivity, %	0.0000435	0.00

Numerical evidence in Table 5.15 provides an insight into the differences in the magnitude of terminal wealth under baseline scenario and scenario 1. Under the baseline scenario, irrespective of transfer initiation year, the firm's growth is reduced by higher consumption withdrawals compared to scenario1. Comparing transfer initiation year 1 under both scenarios shows that the lower terminal wealth stems only from the lower total before-tax wealth, and no tax savings are provided by the earlier initiation under the baseline compared to transfer initiation year 1. Other key financial variables provided in the table above provide evidence to conclude that early transfer initiation under scenario 1 (compared to the baseline scenario) improves the firm's growth (on average 71.18 percent higher retained earnings every year compared to the baseline scenario), and the increase is due to a higher income-generating ability of the business and significantly lower consumption withdrawals. The further the initiation is delayed, the lower the difference in the terminal wealth under these two scenarios driven by higher transfer tax savings under the baseline scenario compared to scenario 1.

Comparing the baseline scenario to scenario 1 reveals that the baseline scenario results in a significantly lower terminal wealth when regular transition strategy is used

(primarily due to the firm's reduced growth resulting from significantly higher consumption withdrawals throughout the planning period under the baseline scenario).

Table 5.16. Comparison of Terminal Wealth and Other Key Financial Variables for Baseline and Scenario 1

Change in	Transfer initiation year 1	Transfer initiation year 9
Total after-tax wealth, $	-470,138	-32,344
• Total before-tax wealth, $	-470,977	-47,36
• Transfer tax savings, $	839	15,008
Average annual retained earnings, %	-60.54	-5.2
Average annual net income, %	-3.57	0.00
Average annual consumption withdrawals, %	38.58	4.89
Average annual total farmer productivity, %	0.00002	0.00

Withdrawals reduce the firm's asset base, gross revenue, and the firm's income generating ability. Thus, retained earnings in the business are lowered by both (1) lower income and (2) higher consumption withdrawals, similarly to the case of the proactive transition strategy.

The above analysis and discussion suggest the following:

1. Availability of off-farm income changes the directionality and the magnitude of results for both types of transition strategy compared to the baseline.
2. Under this scenario, significantly lower consumption withdrawals (compared to the baseline scenario) improve income generating and saving abilities of the firm. Thus, a higher growth rate (compared to the baseline) results in higher absolute value of terminal wealth accumulated in the business under any transfer initiation year when off-farm income is available.
3. Within the scenario 1, regardless of the type of transition strategy, earlier transfer is always preferred and is triggered primarily by large tax savings associated with earlier transfer initiation years. Some improvements are observed in the firm's

income generating ability when transfer is initiated earlier (due to the firm's ability to capitalize on the younger generation's higher productivity in early years and to reduce income and self-employment taxes), but their magnitude is small.

5.3 Scenarios Two and Three

Proactive Transition Strategy

Both scenarios 2 and 3 study the responsiveness of the timing of farm transfer initiation to changes in the same variable (consumption withdrawals from the business) but tests different levels of withdrawals[31]. Therefore, to provide a better comparative analysis, results for both scenarios are presented and interpreted together in this section.

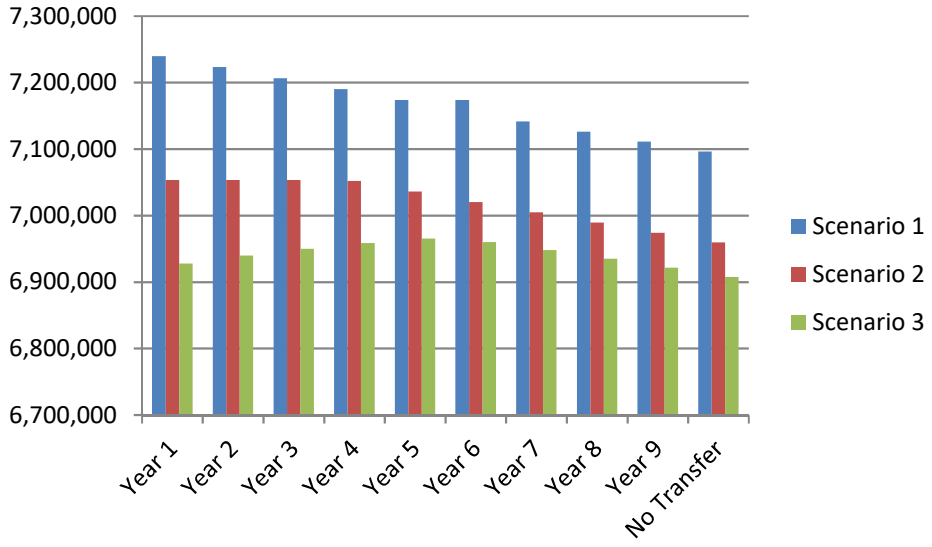

Figure 5.7. Terminal Wealth as a Function of Transfer Initiation Year

The visual results presented on the Figure 5.7 show that the level of consumption withdrawals indeed affects terminal wealth in the business and thus preferred timing of farm transfer initiation. As consumption withdrawals from the business increase (from scenario 1 to scenario 2 to scenario 3), the preferred timing of transfer initiation moves

[31] 50 percent and 80 percent of the younger generation's consumption is assumed to be covered by the farm business under scenario 2 and 3, respectively

from early to the mid-period range. Under scenario 2, the early transfer is still preferred, but the difference in terminal wealth between transfer initiation year 1 through 4 are not very significant (for example, total after-tax wealth under transfer initiation year 1 is only $2,469 higher than under year 4) which explains the almost flat left part of the histogram of terminal wealth positions in Figure 5.7. When the farm covers almost all of the consumption of the younger generation (80 percent under scenario 3), the terminal wealth peaks in year 5, slightly earlier than under the baseline scenario.

Table 5.17. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 4 and 9), Scenario 2

Change in	Transfer initiation year 1 compared to year 4	Transfer initiation year 4 compared to year 9
Total after-tax wealth, $	2,351	119,870
(as percent of the first year of two that are being compared)	(0.03%)	(1.65%)
• Total before-tax wealth, $	-118	1,365
• Transfer tax savings, $	2,469	118,505

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

As shown in Table 5.17, the difference in terminal wealth is mostly driven by transfer tax savings associated with the earlier transfer and not the changes in the firm's growth.

Table 5.18. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 4, Scenario 2

Change in	Average Change, %	
	Production Years 1 - 4	Production years 5 - 10
Retained earnings	0.11	-0.001
Net income	0.06	-0.05
Consumption withdrawals	0.00	0.00
Joint farmer productivity	0.01437	0.00
Total assets	0.0012	0.0090
Total income and self-employment taxes	-0.04	-0.002

The results show relatively small changes in total before-tax wealth of $118 and $1,365 but larger transfer tax savings of $2,469 and $118,505 when comparing transfer initiation years 1 versus 4, and 4 versus 9. Taking a closer look at two timings of farm transfer initiations (year 1 and year 4), shows that the firm experiences a slightly better income generating ability in the first part of the planning horizon under transfer initiation year 1 versus 4 (primarily driven by slightly higher joint farmer productivity, lower income and self-employment taxes, and as a result a higher asset base) and then slows down due to the increase in income and self-employment taxes paid (the younger generation moved up to a higher income tax bracket).

Table 5.19. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 4 versus Year 9, Scenario 2

Change in	Average Change, %	
	Production Years 1 - 4	Production years 5 - 10
Retained earnings	0.00	0.002
Net income	0.00	0.13
Consumption withdrawals	0.00	0.00
Joint farmer productivity	0.00	0.00
Total assets	0.00	0.0042
Total income and self-employment taxes	0.00	-0.153

Comparing the impact of transfer initiation year 4 versus 9 on the firm's growth shows that the earlier initiation (year 4) slightly improves the firm's income generating ability which is again primarily driven by lower income and self-employment taxes and thus a higher asset base. However, it is important to note that these changes in the firm's performance are small in relative terms and do not exceed 1 percent. Thus, for this size of estate and the growth rate experienced under this scenario, the transfer tax savings associated with earlier transfer initiation justify the earlier transfer, but with a marginal

difference in terminal wealth between the transfer initiation years 1 through 4 which explains a relatively flat left side of the histogram. A steeper decline on the right side of the histogram of terminal wealth (as a function of transfer initiation year) is due to the fact that the firm has less time to shift wealth to the younger generation resulting in higher transfer tax savings compared to transfer initiation years later in the planning horizon.

Table 5.20. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 5 and 9), Scenario 3

Change in	Transfer initiation year 1 compared to year 5	Transfer initiation year 5 compared to year 9
Total after-tax wealth, $	-44,530	70,124
• Total before-tax wealth, $	-44,530	-20,528
• Transfer tax savings, $	0	90,652

Increasing the portion of the younger generation's consumption to be covered by the farm business leads to a later preferred transfer initiation timing compared to scenarios 1 and 2.

Table 5.21. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 5, Scenario 3

Change in	Average Change, %	
	Production Years 1 – 5	Production years 6 - 10
Retained earnings	-10.46	-1.25
Net income	-0.12	-0.62
Consumption withdrawals	8.15	1.45
Joint farmer productivity	0.01152	0.00
Total assets	-0.19	-0.60
Total income and self-employment taxes	-0.26	-0.56

If initiated in year 1 compared to year 5, higher consumption withdrawals (8.15 percent) and lower income generating ability (0.12 percent) associated with early transfer reduces the firm's growth. Also, given this size of accumulated estate, the earlier transfer

does not provide any transfer tax savings; thus terminal wealth is lower under transfer initiation year 1 versus year 5. Therefore, year 5 is preferred to year 1.

Comparing transfer years 5 and 9, the firm experiences slower growth under earlier transfer initiation (due to higher average consumption withdrawals and lower income generating ability of the business), but delaying the transfer beyond year 5 results in higher transfer tax obligations.

Table 5.22. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 5 versus Year 9, Scenario 3

Change in	Average Change, %	
	Production Years 1 - 5	Production years 6 - 10
Retained earnings	0.00	-4.8
Net income	0.00	-0.07
Consumption withdrawals	0.00	4.46
Joint farmer productivity	0.00	-0.16
Total assets	0.00	0.00
Total income and self-employment taxes	0.00	-0.31

Thus, transfer tax savings associated with earlier transfer justify the reduction in total before-tax wealth and thus result in higher terminal wealth under transfer initiation year 5 compared to 9.

Regular Transition Strategy

According to the results depicted on Figure 5.8, for the regular transition strategy, relaxing the assumption on the level of consumption of the younger generation covered by the firm changes the preferred timing of the transfer initiation.

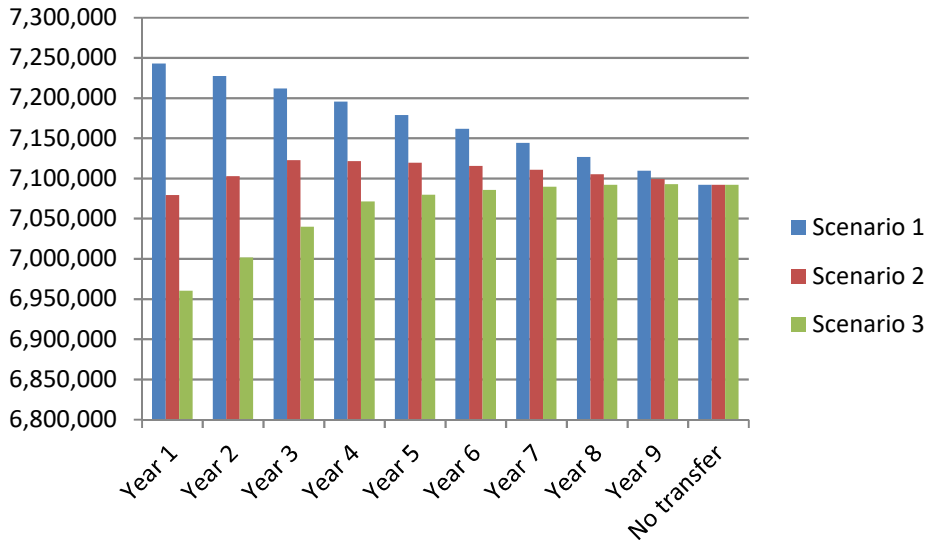

Figure 5.8. Terminal Wealth as a Function of Transfer Initiation Year

Under scenario 2, initiating the transfer earlier or after year 3 will generate a lower terminal wealth in the business for this strategy. However, under scenario 3, when a higher portion of consumption (80 percent) is assumed to be covered by the business, the histogram of terminal wealth positions shifts back to the right and undertakes the shape of the histogram under the baseline scenario, suggesting to further delay the transfer.

Table 5.23. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 3 and 9)

Change in	**Transfer Initiation Year 1 compared to year 3**	**Transfer Initiation Year 3 compared to year 9**
Total after-tax wealth, $	-48,870	57,487
(as percent of the first year of two that are being compared)	(0.67%)	(0.78%)
• Total before-tax wealth, $	-52,142	-126,982
• Transfer tax savings, $	3,272	184,469

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

Analyzing the impact of timing of farm transfer initiation under scenario 2 on the firm's financial performance, in particular the ability to generate and accumulate wealth (firm growth), the following observations are made based on the numerical results

provided in Tables 5.23 through 5.25. In the first part of the planning horizon, the early transfer initiation (year 1 versus year 3) slows down the firm's growth and does not offer large transfer tax savings, thus reducing terminal wealth in the business. In the second part of the planning horizon, the earlier transfer (year 3 versus 9) further reduces the firm's growth but provides high tax savings that justify the amount of total before-tax wealth foregone associated with the earlier transfer. Thus, transfer year 3 is preferred to transfer year 9.

Table 5.24. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 3

Change in	Average Change, %	
	Production years 1-3	Production years 4 - 10
Retained earnings	-16.05	-1.22
Net income	2.25	-0.71
Consumption withdrawals	23.85	0.00
Joint farmer productivity	0.01339	0.00164
Total assets	-0.11	-0.68
Total income and self-employment taxes	-3.01	-0.63

In the second part of the planning horizon, the earlier transfer (year 3 versus 9) further reduces the firm's growth but provides high tax savings that justify the amount of total before-tax wealth foregone associated with the earlier transfer. Thus, transfer year 3 is preferred to transfer year 9. For this growth rate and size of estate, transfer tax savings for early years do not justify the earlier transfer. In later years however, as the business approaches the end of the planning horizon, the transfer tax savings associated with earlier transfer increase and thus, further delay is not advisable.

As shown in Table 5.26, changing the assumption on the level of consumption withdrawals also alters the magnitude of results.

Table 5.25. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 3 versus Year 9

Change in	Average Change, %	
	Production years 1-3	Production years 4 - 10
Retained earnings	0.00	-17.83
Net income	0.00	2.13
Consumption withdrawals	0.00	29.33
Joint farmer productivity	0.00	0.00080
Total assets	0.00	-0.89
Total income and self-employment taxes	0.00	-5.59

Most of the difference in terminal wealth between scenario 1 and 2, and 1 and 3 comes from the changes in total before-tax wealth. Comparing the transfer initiation year 1 under scenarios 1 versus 2 and scenarios 1 versus 3 shows that the firm generates higher total before-tax wealth under scenarios with lower consumption withdrawals. Higher joint farmer productivity (under scenarios 2 and 3 compared to scenario 1) does not justify higher consumption withdrawals and thus results in lower terminal wealth under scenarios 2 and 3 compared to scenario 1. The absolute difference in terminal wealth between scenario 1 and 3 is greater than between scenarios 1 and 2 due to higher consumption withdrawals.

Table 5.26. Comparison of Selected KOVs for Transfer Initiation Year 1 Under Selected Scenarios

Change in	Scenario 1 and Scenario 2	Scenario 1 and Scenario 3
Total after-tax wealth, $	213,416	367,434
(as percent of the first year of two that are being compared)	(2.85%)	(4.9%)
• Total before-tax wealth, $	214,255	368,273
• Transfer tax *obligations* $	839	839
Average annual consumption withdrawals, %	-36.78	-62.93
Average annual joint farmer productivity, %	-0.00001	-0.00002

The following concluding thoughts summarize the analysis provided above:

1. The directionality and magnitude of results are responsive to the level of consumption withdrawals under both transition strategies.
2. As consumption withdrawals from the farm increase, the preferred timing of transfer initiation gradually moves away from earlier years (as suggested by scenario 1) and finally approaches the preferred timing as suggested by the baseline scenario for the respective types of transition strategy.
3. When higher consumption withdrawals are taken out from the farm (moving from the scenario 2 to 3), earlier transition initiation reduces the firm's income generating and saving ability irrespective of the type of transition strategy compared to later transition initiation years. Thus, the preferred timing of transfer initiation depends on whether tax savings associated with the earlier transfer can offset the firm's growth foregone.

5.4 Scenario Four

Proactive Transition Strategy

Relaxing the assumption on constant farmland prices (assuming a more pessimistic land market outlook) changes the magnitude and directionality of results compared to the baseline scenario.

Under this scenario the results suggest that the delayed transfer is preferred since (as shown on Figure 5.9) delaying the transfer from year 1 to year 9 will result in about a $200,000 higher discounted terminal wealth position in the business. Regardless of the transfer initiation time, under this scenario the firm does not incur any transfer tax obligations since these terminal wealth positions do not exceed the lifetime estate and gift exemption amount.

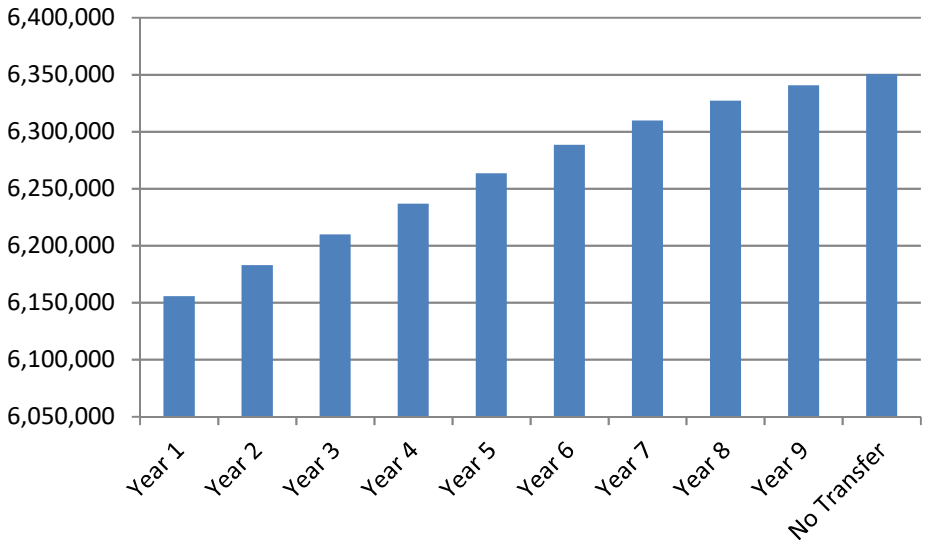

Figure 5.9. Discounted Terminal Wealth as a Function of Transfer Initiation Year

The decomposition of the differences in total after-tax wealth under three transfer initiation years provided in Table 5.27 shows that the difference comes primarily from the total before-tax wealth (no transfer tax savings are observed) suggesting that the timing of farm transfer initiation indeed impacts the firm's financial performance and thus firm's growth and size of estate to be transferred.

Table 5.27. Comparison of Selected KOVs for Three Transfer Initiation Years (1, 6, 9)

Change in	**Transfer initiation year 1 compared to year 6**	**Transfer initiation year 6 compared to year 9**
Total after-tax wealth, $	-165,610	-74,430
(as percent of the first year of two that are being compared)	(2.56%)	(1.12%)
• Total before-tax wealth, $	-165,610	-74,430
• Transfer tax savings, $	0	0

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

Under this scenario, earlier transfer always results in lower total before- and after-tax wealth: initiating transfer in year 1 compared to year 6 results in $165,610 lower total after-tax wealth. The same holds true for the comparison of transfer initiation years 6 and 9, but the magnitude of the change is smaller. Thus, this allows us to conclude that the

shape of the histogram of terminal wealth positions as a function of transfer initiation year is driven primarily by the impact of transfer initiation time on the firm's ability to generate and accumulate wealth (or the firm's growth). To support this conclusion, a closer look was taken at the firm's financial performance on an annual basis within the planning period under various transfer initiation years.

The analysis of the numerical results provided in the tables below allows to conclude that within a given scenario, the earlier transfer initiation lowers the income generating ability of the business and incurs higher consumption withdrawals thus reducing the firm's growth.

Table 5.28. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7-10
Retained earnings	-57.95	-7.5
Net income	-0.66	-2.3
Consumption withdrawals	20.25	0.00
Joint farmer productivity	0.01066	0.00
Total assets	-0.77	-2.47
Total income and self-employment taxes	-0.89	-2.75

The earlier transfer initiation slows down the firm's growth because the improved joint farmer productivity and income tax savings are not large enough to enhance income generating ability of the business to the extent that it can justify the increased consumption withdrawals.

Comparing transfer initiation year 1 to 6, income generating ability of the firm declined due to a decrease in the asset base (under transfer initiation year 1, in the first part of the planning horizon, consumption withdrawals on average were 20 percent higher compared to the withdrawals under transfer initiation year 6). The increases in joint farmer productivity and the availability of income tax savings could not offset the

impact of the reduced asset base on the firm's gross revenue and net income; thus, on average the firm experienced 0.66 percent lower net income between production years 1 and 6 under transfer initiation in year 1 versus 6.

Comparing transfer years 6 and 9, the earlier transfer initiation still suppresses the firm's growth but to a lower extent since there are fewer periods between transfer initiation years. As in the previous case, the reductions in retained earnings results from a lower income generating ability of the business (on average 0.51 percent lower income on annual basis) and higher consumption withdrawals (on average 16.5 percent higher annually).

Table 5.29. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.00	-39.08
Net income	0.00	-0.51
Consumption withdrawals	0.00	16.05
Joint farmer productivity	0.00	0.00
Total assets	0.00	-0.58
Total income and self-employment taxes	0.00	-0.70

Some income tax savings are available when comparing transfer initiation years 6 and 9, but they are not sufficient to offset the negative impact of a lower asset base. Thus, earlier transfer lowers income generating ability of the firm. Given that farmland is the largest category of assets used in production agriculture, changes in farmland prices impact owner equity in the business as well as the firm's asset base and thus its future financial performance.

As shown in Table 5.30, the timing of transfer impacts the change in valuation equity in the business which in turn determines the next period's dollar value of the asset base, and thus the firm's future financial performance.

Table 5.30. Change in Valuation Equity by Production Year under Transfer Initiation Years 1, 6, and 9

	Transfer Initiation Year 1	Transfer Initiation Year 6	Transfer Initiation Year 9
Production year 1	(510,923)	(510,923)	(510,923)
Production year 2	(216,689)	(216,689)	(216,689)
Production year 3	(269,787)	(270,956)	(270,956)
Production year 4	(259,074)	(261,379)	(261,379)
Production year 5	(248,626)	(252,050)	(252,050)
Production year 6	119,218	121,481	121,481
Production year 7	103,102	105,591	105,591
Production year 8	322,538	330,458	331,867
Production year 9	392,891	402,688	405,919
Production year 10	284,239	291,428	294,662

Under earlier transfer initiation years, the firm grows slower and thus will incur lower valuation losses (in absolute amount) during the downturn in farmland prices compared to later transfer initiation years, but will also capitalize less on the increases in farmland prices when the land market recovers.

For example, if transfer is initiated in year 1, the firm will have $6,898 less in downward adjustment[32] of valuation equity compared to transfer year 6, and $29,658 less of upward adjustment in valuation equity when farmland prices level off and start increasing compared to transfer initiation year 6. These adjustments in valuation equity slow down the firm's growth and reduce the dollar value of the owner's equity in the business. Furthermore, the decline in owner's equity lowers the size of the estate to be transferred to the younger generation to the level that that does not trigger transfer taxes. Thus, early initiation neither offers transfer tax savings, nor improves the firm's growth which suggests delayed transfer.

[32] The value is the difference between the sum of all valuation equity adjustments during production years 1 – 5 under transfer initiation year 1 minus the sum of all valuation equity adjustments during production years 1 – 5 under transfer initiation year 6.

The intuition for the differences in results under the baseline scenario and scenario 4 is provided below and is based on the numerical results in Table 5.31. Under the baseline scenario, the firm generates a significantly higher total after-tax wealth ($539,278 more) than under scenario 4. Under both scenarios, the firm does not incur any transfer tax obligations, thus the difference in total after-tax wealth stems only from total before-tax wealth implying the firm's higher growth rate under the baseline scenario compared to scenario 4. Between these two scenarios, only one assumption is relaxed (farmland prices), thus, the difference in terminal wealth position between these two scenarios results from changes in valuation equity and its impact on the firm's growth. As shown in Table 5.31, under scenario 4, the firm experiences a reduction in its asset base due to a negative adjustment in valuation equity of $1,505,099 compared to no adjustment under the baseline. This reduction contracted the firm's growth and reduced the firm's wealth position compared to the baseline scenario. When the land market recovers, the firm adjusts upward its asset base, but by a smaller amount ($1,221,989).

Table 5.31 Comparison of Selected KOVs for Transfer Initiation Year 1

	Baseline Scenario	**Scenario 4**
Total after-tax wealth, $	6,998,955	6,459,677
• Total before-tax wealth, $	6,998,955	6,459,677
• Transfer tax savings, $	0	0
Total change in valuation equity, $		
• During production years 1 – 5	0	-1,505,099
• During production years 5 - 10	0	1,221,989

Thus, the net effect of changes in valuation equity on the firm's growth and size of estate result in a lower terminal wealth when transfer is initiated in year 1 under scenario 4 compared to the baseline scenario.

Regular Transition Strategy

Relaxing the assumption on farmland prices (allowing prices to vary from year to year) does not change the directionality of results for regular transition strategy, but alters their magnitude.

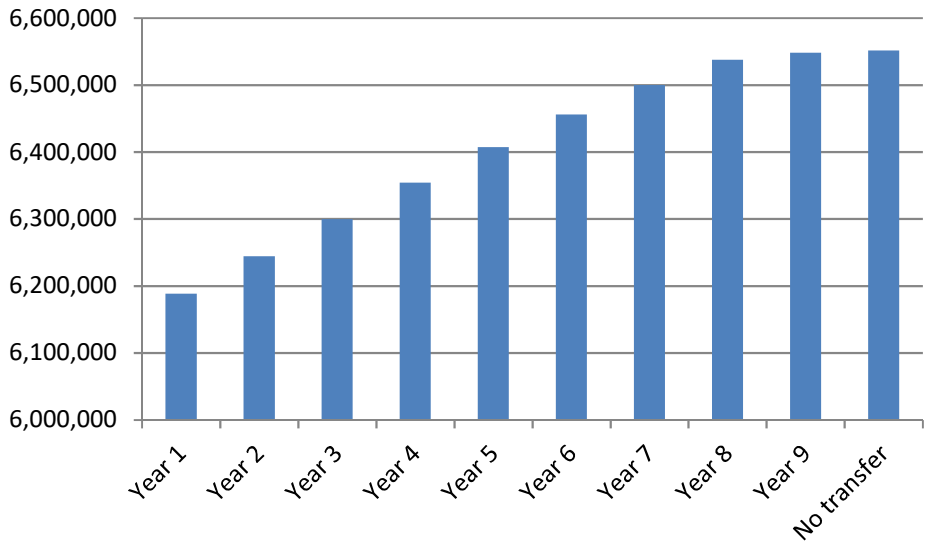

Figure 5.10. Discounted Terminal Wealth as a Function of Transfer Initiation Year

Terminal wealth positions for all transfer initiation years under scenario 4 are lower compared to the respective wealth positions under the baseline scenario, and these changes will be discussed shortly. Under this scenario, the earlier transfer initiation will always result in lower terminal wealth in the business suggesting it is better to delay the transfer to the end of the planning horizon.

Based on the evidence from Table 5.32, total before-tax wealth is a major source of the decline in terminal wealth when comparing transfer initiation years 1 versus 6, and 6 versus 9, implying that earlier transfer initiation reduces the firm's growth.

Earlier transfer provides some transfer tax savings when comparing transfer initiation years in the second part of the planning horizon (e.g., years 6 and 9), but they are not significant enough to justify the slowdown in the firm's growth caused by earlier transfer.

Thus, delaying the transfer until the end of the planning horizon is a preferred timing strategy.

Table 5.32. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	Transfer initiation year 1 compared to year 6	Transfer initiation year 6 compared to year 9
Total after-tax wealth, $	-333,673	-128,965
(as percent of the first year of two that are being compared)	(5.13%)	(1.88%)
• Total before-tax wealth, $	-333,673	-163,056
• Transfer tax savings, $	0	34,091

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

According to the numerical results presented in tables 5.33 and 5.34, the early transfer initiation significantly reduces the firm's growth: significantly higher consumption withdrawals under the earlier transfer initiation (43 percent higher annually) reduce the retained earnings, and a slightly better income generating ability of the firm (on average 0.59 percent higher net income annually) is not able to compensate for the large consumption withdrawals.

Table 5.33. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	-114.04	-15.28
Net income	0.59	-4.74
Consumption withdrawals	43.39	0.00
Joint farmer productivity	0.01061	0.00
Total assets	-1.55	-4.95
Total income and self-employment taxes	-4.44	-5.29

The firm's ability to capitalize on higher joint farmer productivity and income tax savings improves the income generating ability of the firm, but the reduction in the firm's asset base (due to large consumption withdrawals) offsets this benefit. Thus, the net

improvement in income generating ability is not large enough to offset consumption withdrawals.

When comparing transfer initiation years later in the planning horizon (year 6 versus 9), the firm still experiences a drastic decline in retained earnings (on average 77 percent lower retained earnings annually) if transfer is initiated earlier (in year 6 compared to year 9).

Table 5.34. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.00	-77.62
Net income	0.00	0.55
Consumption withdrawals	0.00	37.74
Joint farmer productivity	0.00	0.00
Total assets	0.00	-1.21
Total income and self-employment taxes	0.00	-4.02

As shown in Table 5.34, the decline is caused by the same factors as in the analysis of transfer initiation year 1 versus 6: the improvements in income generating ability of the business (0.55 percent higher annually) cannot offset a large increase in withdrawals (37.74 percent higher annually).

As mentioned earlier, altering the farmland price assumption did not change the directionality of results but altered their magnitude compared to the baseline scenario. If the assumed behavior of farmland prices indeed takes place, the firm will generate $538,108 less in terminal wealth if transfer is initiated in year 1 compared to the baseline scenario.

In this case, the difference in terminal wealth results from the adjustments in owner equity and the firm's asset base associated with the changes in farmland prices that occurred under scenario 4.

Table 5.35. Comparison of Selected KOVs for Transfer Initiation Year 1

	Baseline Scenario	Scenario 4
Total after-tax wealth, $	7,034,441	6,496,333
• Total before-tax wealth, $	7,034,441	6,496,333
• Transfer tax savings, $	0	0
Total change in valuation equity, $		
• During production years 1 – 5	0	-1,510,053
• During production years 5 - 10	0	1,228,660

The total downward adjustment in valuation equity of $1,510,053 in the first five years of the planning horizon reduces the firm's asset base and thus its future income generating ability and borrowing capacity which results in the firm's lower growth and lower terminal wealth. The upward adjustments occur later in the planning period, but they are smaller in magnitude ($1,228,660) and do not offset the reduction in wealth that has already taken place.

The analysis allowed for drawing the following conclusions:

1. Compared to the baseline scenario, relaxing the assumption on the farmland prices as specified under this scenario: (1) reduces the magnitude of results for both types of transition strategy, and (2) alters the directionality of results if proactive transition strategy is employed.
2. Irrespective of the type of transition strategy, delayed transfer is always preferred because transfer tax savings (if any) are not large enough to offset the reduction in the firm's growth associated with the earlier transfer timing.
3. It is important to note that adjustments in the firm's asset and equity positions associated with the changes in farmland prices under this scenario reduce the firm's growth (compared to the baseline scenario) and thus, result in an overall lower magnitude of results. If a proactive transition strategy is employed, the total before-tax wealth to be transferred to the younger generation at the end of

the planning horizon does not exceed the estate and gift tax exemption amount; thus, no tax is paid under any transfer initiation year in this case.

5.5 Scenario Five

Proactive Transition Strategy

Relaxing the assumption of constant farmland prices and applying a more optimistic farmland market outlook changes the magnitude of the results and slightly alters the directionality compared to the baseline scenario. Under this scenario, initiating the transfer between years 4 and 6 results in the highest terminal wealth, peaking at transfer initiation in year 4.

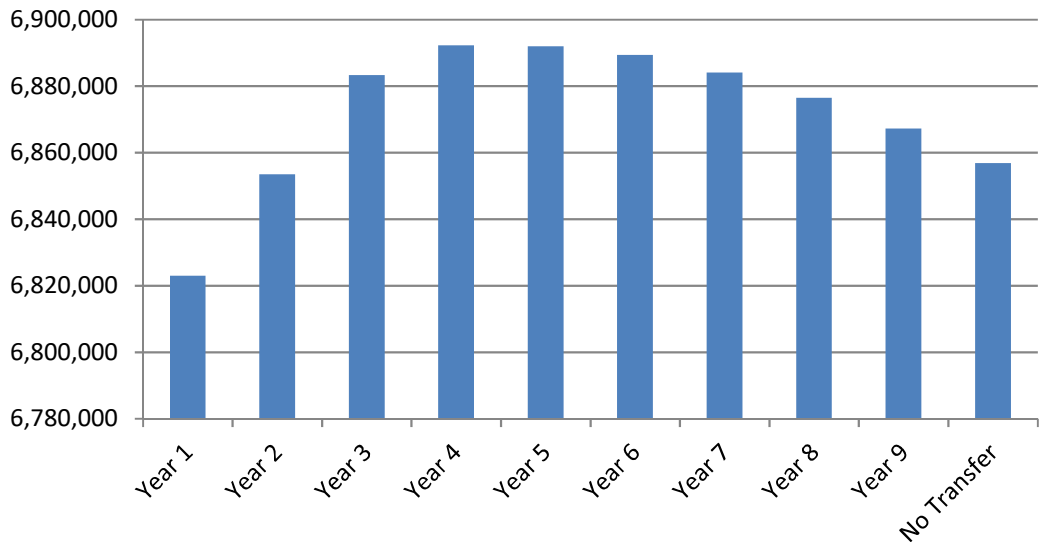

Figure 5.11. Discounted Terminal Wealth as a Function of Transfer Initiation Year

As shown in Table 5.36, initiating the transfer before year 4 reduces the firm's growth ($108,933 less in total before-tax wealth) and does not provide significant tax savings (at that size of estate, only $31,329) to justify the amount of wealth foregone. However, delaying the transfer beyond year 4 (for example, year 9) results in significantly higher tax obligations.

Table 5.36. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 4 and 9)

Change in	Transfer initiation year 1 compared to year 4	Transfer initiation year 4 compared to year 9
Total after-tax wealth, $	-77,604	55,680
(as percent of the first year of two that are being compared)	(1.06%)	(0.75%)
• Total before-tax wealth, $	-108,933	-126,037
• Transfer tax savings, $	31,329	181,718

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

Thus, when comparing transfer year 4 to 9, the amount of tax savings ($181,718) due to earlier transfer initiation offsets the reduction in total before-tax wealth of $126,037, resulting in a higher total after-tax wealth. This suggests that delaying the transfer beyond year 4 will reduce the level of terminal wealth in the business.

Table 5.37. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 4

Change in	Average Change, %	
	Production Years 1 - 4	Production years 5 - 10
Retained earnings	-43.11	-4.04
Net income	-0.26	-1.31
Consumption withdrawals	17.90	0.00
Joint farmer productivity	0.01598	0.00
Total assets	-0.33	-1.41
Total income and self-employment taxes	-0.38	-1.42

Results provided in tables 5.37 and 5.38 show that earlier transfer initiation under this scenario (comparing transfer initiation year 1 to 4, and year 4 to 9) always reduces the firm's growth and thus, results in a lower total before-tax wealth. The slowdown in growth occurs because earlier initiation (1) imposes higher consumption withdrawals on the business and (2) weakens the income-generating ability of the business. For example, comparing transfer initiation year 1 to 4, the increase in joint farmer productivity associated with the early transfer initiation (on average 0.01598 percent higher annually in the first four years of the planning period) and income tax savings (0.38 percent lower

income taxes paid every year under transfer year 1 compared to year 4) cannot offset the impact of the decline in the asset base on the income-generating ability of the business.

Table 5.38. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 4 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 4	Production years 5 - 10
Retained earnings	0.00	-36.56
Net income	0.00	-0.81
Consumption withdrawals	0.00	16.63
Joint farmer productivity	0.00	0.00
Total assets	0.00	-0.93
Total income and self-employment taxes	0.00	-1.12

The slowdown in the firm's growth in the second part of the planning horizon under the earlier transfer initiation year (year 4 compared to year 9) is explained by the same argument as used for the comparison of year 1 and 4. The numerical results for this comparison are provided in Table 5.38.

Table 5.39. Comparison of Selected KOVs for Transfer Initiation Year 1

	Baseline Scenario	Scenario 5
Total after-tax wealth, $	6,998,955	7,317,399
• Total before-tax wealth, $	6,998,955	7,317,399
• Transfer tax savings, $	0	0
Total change in valuation equity, $		
• During production years 1 – 4	0	-1,142,319
• During production years 5 - 10	0	1,626,952
Decomposition of equity in production year 10, %	6,918,566	6,915,871
• *Beginning year equity*	80,389	80,055
• Change in retained earnings	0	321,437
• Valuation equity		
Ending equity in production year 10, $	6,998,955	7,317,399

Compared to the baseline scenario, these results suggest a slightly earlier transfer initiation time (year 4 compared to year 6). Under the baseline scenario, the firm shows stronger financial performance (higher retained earnings) throughout the planning horizon, but the terminal wealth under the baseline scenario is lower than under scenario

5 for all transfer initiation years. This is a result of the fact that under scenario 5, under any transfer initiation year, the difference in the terminal wealth in the firm comes from a significant appreciation in farmland values in the last production year (year 10, as assumed in the model), increasing the size of estate compared to the baseline scenario. Thus, earlier transfer initiation years under scenario 5 offer higher transfer tax savings because of a larger size of estate compared to the baseline. It is important to note that this change in the terminal wealth is not driven by the variation in the firm's performance under different scenarios. The difference in terminal wealth is rather the outcome of the changes in the farmland market.

Regular Transition Strategy

Initiating transfer earlier (in year 1 versus 5, and year 5 versus 9) results in lower terminal wealth in the firm suggesting that the delayed transfer is preferred.

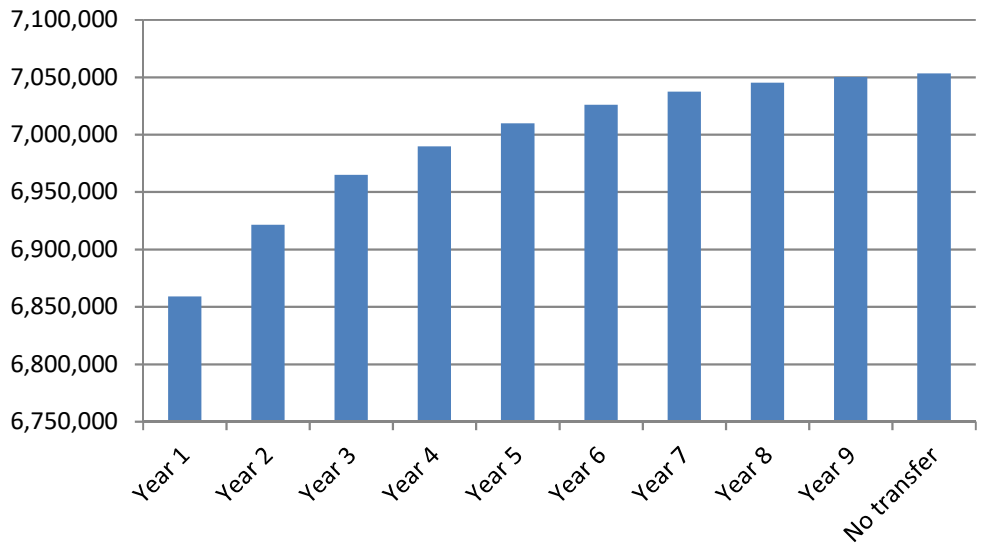

Figure 5.12. Discounted Terminal Wealth as a Function of Transfer Initiation Year

As shown in Table 5.40, the earlier transfer initiation provides some transfer tax savings, and the magnitude of savings increases as the transfer initiation moves further

towards the end of the planning horizon ($133,754 of transfer tax savings if initiated the transfer in year 1 versus 5, and $181,464 if initiate the transfer in year 5 versus 9).

Table 5.40. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 5 and 9)

Change in	Transfer initiation year 1 compared to year 5	Transfer initiation year 5 compared to year 9
Total after-tax wealth, $	-159,074	-39,029
(as percent of the first year of two that are being compared)	(2.16%)	(0.52%)
• Total before-tax wealth, $	-292,828	-220,493
• Transfer tax savings, $	133,754	181,464

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

However, the transfer tax savings associated with earlier transfer are not large enough to offset the firm's reduced growth and thus, as a result, the amount of total before-tax wealth foregone (if initiated earlier).

Thus, the net result of the trade-off between the reduction of firm's growth and increase in transfer tax savings suggest that the delay in transfer initiation is preferred since it yields a higher discounted terminal wealth position in the business.

Table 5.41. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 5

Change in	Average Change, %	
	Production Years 1 - 5	Production years 6 - 10
Retained earnings	-97.70	-10.25
Net income	1.03	-3.77
Consumption withdrawals	41.82	0.00
Joint farmer productivity	0.01272	0.00
Total assets	-1.09	-3.81
Total income and self-employment taxes	-3.83	-3.87

The numerical results presented in tables 5.41 and 5.42 give additional insight into how the firm's growth changes under different transfer initiation years. Early transfer always reduces the firm's growth as was shown in Table 5.40. Comparing transfer

initiation year 1 and 5, the improved income generating ability of the business does not justify higher consumption withdrawals. Under transfer earlier initiations, the income generating ability is improved due to a higher joint farmer productivity (on average productivity is higher by 0.01272 in the first part of the planning horizon) and substantial income tax savings (on average 3.83 percent lower per year).

These two factors together offset the impact of the decline in total assets (1.09 percent lower) on the firm's income generating ability. Thus, the net effect is positive, and the earlier initiation improves the income generating ability of the business under this scenario and for the selected transfer initiation years that are being compared.

Table 5.42. Comparison of the Firm's Key Financial Variables under Transfer Initiation Year 5 versus Year 9

Change in	Average Change, %	
	Production Years 1 - 5	Production years 6 - 10
Retained earnings	0.00	-66.10
Net income	0.00	0.90
Consumption withdrawals	0.00	40.44
Joint farmer productivity	0.00	0.00
Total assets	0.00	-1.49
Total income and self-employment taxes	0.00	-5.29

If comparing transfer initiation years later in the planning horizon (year 5 and 9), the same outcome is observed: earlier transfer reduces the firm's growth since the improvements in income generating ability of the business (0.9 percent higher) cannot justify the given consumption withdrawals (40.44 percent higher). Thus, earlier transfer reduces the firm's retained earnings, its growth and thus the total before-tax wealth.

Under scenario 5, the firm grows slower than under the baseline scenarios due to changes in the firm's asset base (declined by $1,145,433 in the first four production years and increased by $1,635,698 in the rest of the planning period) and thus lower income

generating ability. However, as reported in Table 5.43, the total before-tax wealth is higher under scenario 5 than under the baseline scenario.

A closer look in the firm's year-to-year financial performance shows that the increase in terminal wealth under scenario 5 compared to the baseline scenario is driven mainly by the increase in valuation equity in the last year of the planning horizon caused by the increase in farmland values. For example, under scenario 5, at the beginning of year 10, the firm has only $918 more in total equity compared to the baseline. However, at the end of that year, the total before-tax wealth in the business under scenario 5 exceeds the total before-tax wealth under the baseline by over $300,000, given that the firm generated lower retained earnings ($80,988 under scenario 5 compared to $81,234 under the baseline scenario).

Table 5.43. Comparison of Selected KOVs for Transfer Initiation Year 1

	Baseline Scenario	**Scenario 5**
Total after-tax wealth, $	7,034,441	7,358,365
• Total before-tax wealth, $	7,034,441	7,358,365
• Transfer tax savings, $	0	0
Total change in valuation equity, $		
• During production years 1 – 4	0	-1,145,433
• During production years 5 - 10	0	1,635,698
Decomposition of equity in production year 10, %	6,953,207	6,954,125
• *Beginning year equity*	81,234	80,988
• Change in retained earnings	0	323,251
• Valuation equity		
Ending equity in production year 10, $	7,034,441	7,358,365

This decomposition indicates that the increase in terminal wealth is driven only by the appreciated value of farmland in the last period, and not the firm's performance. The following concluding thoughts summarize the analysis provided above:

1. *Comparing to the baseline*: relaxing the assumption on farmland prices as specified in scenario 5 does not change the preferred timing strategy for firms that

employ regular types of transition strategy but suggests a slightly earlier transfer for those that follow proactive transition strategy (year 4 compared to year 6).

2. In the latter case, a slightly earlier initiation is preferred because under this scenario the firm generates higher (in nominal terms) total before-tax wealth regardless of the transfer initiation year than under the baseline scenario, and thus earlier years provide higher transfer tax savings that drive the transfer timing decision.
3. Finally, the higher total before-tax wealth (in nominal terms) under scenario 5 compared to the baseline scenario is driven primarily by a favorable farmland market outlook in the last several years of the planning horizon and not by the firm's improved performance. Indeed, the firm had stronger financial performance under the baseline scenario but generated a higher total before-tax and after-tax wealth (in nominal terms) under scenario 5 due to a large appreciation of equity in the last production year of the planning horizon.

5.6 Scenario Six

Proactive Transition Strategy

Aggressive gifting does not change the preferred timing of transfer initiation, but slightly alters (by no more than $12,000) the magnitude of the firm's terminal wealth (under all transfer initiation years) compared to the baseline scenario. Figure 5.13 shows that initiating the transfer in year 6 results in the highest terminal wealth position under both scenarios.

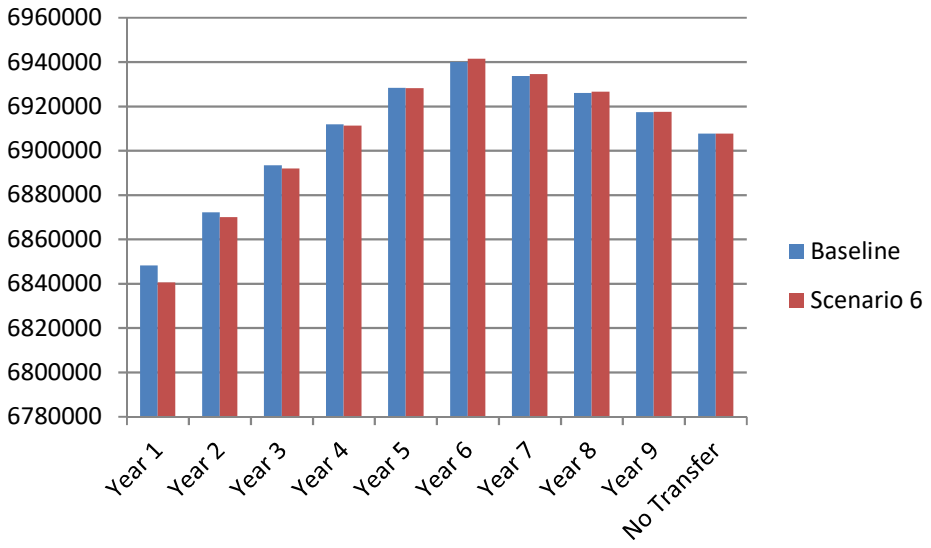

Figure 5.13. Discounted Terminal Wealth as a Function of Transfer Initiation Year

As shown in Table 5.44, the early transfer initiation (year 1 compared to year 6) provides low transfer tax savings ($1,759) that are not sufficient to compensate for the reduction in the firm's growth ($125,500) associated with the early transfer.

Table 5.44. Comparison of Selected KOVs for Three Selected Transfer Initiation Years (1, 6 and 9)

Change in	Transfer initiation year 1 compared to year 6	Transfer initiation year 6 compared to year 9
Total after-tax wealth, $	-123,741	41,090
(as percent of the first year of two that are being compared)	(1.77%)	(0.58%)
• Total before-tax wealth, $	-125,500	-44,598
• Transfer tax savings, $	1,759	85,688

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

However, delaying the transfer initiation beyond year 6 imposes significant tax obligations (compared to the earlier transfer) which exceed the increase in firm's growth associated with the delayed transfer. Thus, the net effect suggests year 6 as a preferred timing of transfer initiation since it allows for the largest discounted terminal wealth position.

Table 5.45. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 1 versus Year 6

Change in	Average Change, % Production Years 2 - 6	Production years 7 - 10
Retained earnings	-31.59	-7.95
Net income	-0.51	-2.29
Consumption withdrawals	19.15	1.74
Joint farmer productivity	0.0205811	0
Total assets	-0.49	-0.49
Total income and self-employment taxes	-0.784	-1.58

Table 5.45 and 5.46 suggest that early transfer always reduces the firm's growth under this scenario due to: (1) lower income generating ability of the firm, and (2) higher consumption withdrawals. If the initiation takes place between years 1 and 6, the firm can capitalize on the farmer's higher productivity in early years, but the increases in net income associated with higher joint productivity index do not justify the reduction in asset base as a result of a high consumption withdrawals under earlier transfer initiation assumptions.

Table 5.46. Comparison of Firm's Key Financial Variables under Transfer Initiation Year 6 versus Year 9

Change in	Average Change, % Production Years 1 - 6	Production years 7 - 10
Retained earnings	0.00	-14.35
Net income	0.00	-0.22
Consumption withdrawals	0.00	10.89
Joint farmer productivity	0.00	0
Total income and self-employment taxes	0.00	-0.48

The above discussion shows that aggressive gifting does not alter the preferred timing strategy; however, it slightly affects the level of terminal wealth compared to the baseline scenario. As shown on Figure 5.13, until transfer initiation year 5, aggressive

gifting results in lower terminal wealth in the firm: for example, if the transfer is initiated in year 1, terminal wealth is $11,786 lower under scenario 6 compared to the baseline scenario.

Based on results from Table 5.47, the difference in terminal wealth results solely from different firm growth rates under the two scenarios given that terminal wealth positions under neither of these scenarios trigger transfer taxes. A closer look into the firm's performance under these two scenarios for transfer year 1 provide several important insights.

Table 5.47. Comparison of Selected KOVs for Transfer Initiation Year 1

Change in	Baseline Scenario	Scenario 6	Difference between Baseline and Scenario 6
Total after-tax wealth, $	6,998,955	6,987,169	11,786
• Total before-tax wealth, $	6,998,955	6,987,169	11,786
- Owned by the older generation, $	5,066,871	4,650,767	416,104
• Total taxable gifts, $	0	396,000	-396,000
• Total taxable estate, $	5,066,871	5,046,767	20,104
• Transfer tax obligation, $	0	0	0

First, income generating and saving abilities of the business improve slightly at the beginning of the planning horizon, but then deteriorate under scenario 6 compared to the baseline scenario. The improvement in the firm's performance in the early period is primarily due to the firm's ability to capitalize on a higher productivity of the younger generation[33] and to capture some income tax savings resulting from the rapid shift of income to the younger generation's lower tax bracket, under scenario 6 compared to the baseline scenario. As shown in Appendix E, the deterioration of the firm's performance

[33] This is due to larger weights on the younger generation's productivity index compared to the baseline scenario where shares are changing slower than under scenario 6 due to a less aggressive shifting of wealth.

in the second part of the planning horizon under scenario 6 results from two major factors: higher level of family living expenses of the younger generation in the last production year and trade-offs between reduction in income taxes and increases in self-employment taxes. Under scenario 6 compared to the baseline, the younger generation moves into the range with a higher level of family living expenses in the last production year (year 10) since a more rapid shift of wealth helped younger generation to move from the size of operation 1 to 2 (as specified in Table 1, Appendix D) which increased consumption withdrawals in year 10 by $7,243. In addition, the aggressive gifting helps reduce income tax obligations by shifting income more rapidly to the younger generation's lower income tax rate; however, potential increases in self-employment taxes can offset the savings in income taxes and indeed increase the tax obligations when aggressive gifting is used. As shown in Table 1 in Appendix E, in the first part of the planning horizon, the firm generated higher gross revenue and net income under aggressive gifting strategy: for example, in production year 2, scenario 6 yielded $36 higher income before tax compared to the baseline but resulted in $16 lower tax obligations (income and self-employment) as shown in Table 2, Appendix E. As shown in Table 3, decomposing the taxes that were paid in this production year under two scenarios gives the following insights: the firm paid $248 less in income taxes but $231 more in self-employment taxes under scenario 6 compared to the baseline. Thus, overall, the aggressive gifting in this year resulted in lower total income and self-employment taxes (by $16). In the second part of the planning horizon, however, under scenario 6 the firm generated $57 less in income before-tax (compared to the baseline), but paid $1,415 more in total income and self-employment taxes. Tables 4 and 5 help explain this

phenomenon. Both generations pay identical rate on self-employment tax (15.3 percent). By construction of the tax itself, an individual pays 12.4 percent of Social Security tax on the first $118,000 of their income and 2.9 percent of Medicare tax on the remaining amount of income (above the $118,000 threshold). If the income is below 118,000, a total of 15.3 percent tax is applied to the whole amount. For this representative farm, the younger generation's income does not exceed $118,000, while the older generation's income is above that threshold. Thus, every dollar that is shifted from the older to the younger generation is being taxed at 15.3 percent instead of only 2.9 percent when under the older generation's income bracket. Even though these changes are very small in absolute value, they provide important intuition into the economic drivers that impact the timing of the transfer initiation and need to be further studied.

As mentioned earlier, if the transfer is initiated after year 5, aggressive gifting yields to a slightly higher terminal wealth. For example, if initiated in year 6, scenario 6 results in $2,159 higher terminal wealth compared to the baseline scenario (Table 5.48).

Table 5.48. Comparison of Selected KOVs for Transfer Initiation Year 6

	Baseline Scenario	**Scenario 6**	**Difference between Baseline and Scenario 6**
Total after-tax wealth, $	7,108,751	7,110,910	-2,159
• Total before-tax wealth, $	7,112,533	7,112,669	-136
- Owned by the older generation, $	5,459,455	5,278,398	181,058
• Total taxable gifts, $	0	176,000	-176,000
• Total taxable estate, $	5,459,455	5,454,398	5,057
• Transfer tax obligation, $	3,782	1,759	2,023

Based on the results provided in Table 5.48, aggressive gifting slightly increases the firm's growth (the difference in total before-tax wealth is $149 between scenario 6

and the baseline scenario) when transfer is initiated later in the planning horizon (e.g., year 6).

The difference in terminal wealth primarily comes from lower transfer tax savings associated with the aggressive strategy (by $2,023). Only $136 of the difference results from the firm's higher growth under scenario 6 compared to the baseline scenario.

Regular Transition Strategy

As shown on Figure 13, the aggressive strategy does not change the preferred timing of transfer initiation and only slightly alters the terminal wealth position (by no more than $2,200) if a regular transition strategy is employed by the firm.

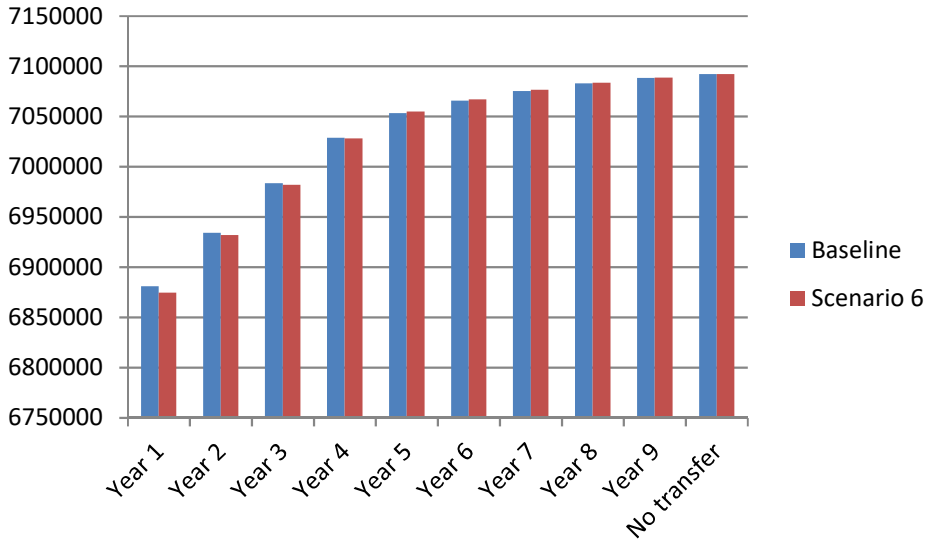

Figure 5.14. Discounted Terminal Wealth as a Function of Transfer Initiation Year

Similarly to the results for the proactive transition strategy, the aggressive gifting almost does not alter firm's growth compared to the baseline scenario. The difference in total before-tax wealth is $101 and the majority of the difference in terminal wealth between these two scenarios comes from transfer tax savings associated with the aggressive gifting strategy.

Table 5.49. Comparison of Selected KOVs for Transfer Initiation Year 6

Change in	Baseline Scenario	Scenario 6	Difference between Baseline and Scenario 6
Total after-tax wealth, $	7,243,380	7,245,578	-2,198
• Total before-tax wealth, $	7,310,398	7,310,499	-101
- Owned by the older generation, $	5,617,544	5,436,302	181,242
• Total taxable gifts, $	0	176,000	-176,000
• Total taxable estate, $	5,617,544	5,612,302	5,242
• Transfer tax obligation, $	67,017	64,921	2,096

Note: Absolute values for terminal wealth used to compute calculations are provided in Appendix G.

The above analysis results in the following conclusions:

1. Regardless of the type of transition strategy, aggressive gifting does not change the preferred timing strategy compared to the baseline scenario.
2. A more aggressive shifting of wealth to the younger generation helps reduce income tax obligations, however, these savings can be offset by an increase in the self-employment taxes paid as a result of a higher level of income generated by the younger generation due to the construction of the self-employment tax. For details, please see the analysis above.
3. Shifting wealth more aggressively also implies that the younger generation approaches a higher range of family living expenses[34] more rapidly and will withdraw more funds from the business to cover their consumption.
4. Finally, by definition and construction of gifting tax, aggressive gifting (beyond the tax-free gifting amount) does not reduce the transfer taxes paid. However, recognizing that aggressive gifting shifts not only current wealth but also future

[34] To populate family living expenses, this study uses a methodology that bases these expenses on two major variables: the age of the head of the household and the size of their operation.

profits allows a reduction in the taxable estate by redirecting more profits to the younger generation, thus reducing the amount of total before-tax wealth owned by the older generation and transfer taxes.

5.7 Summary of Results

The previous section provided a detailed discussion of the analysis for each scenario and offered an economic intuition for the observed results. The comparative analysis, however, was mainly done for various transfer initiation years *within each scenario* or *between each individual scenario and the baseline*. A brief overview of the summary of results *across all scenarios* is provided below using radar charts and supporting discussions.

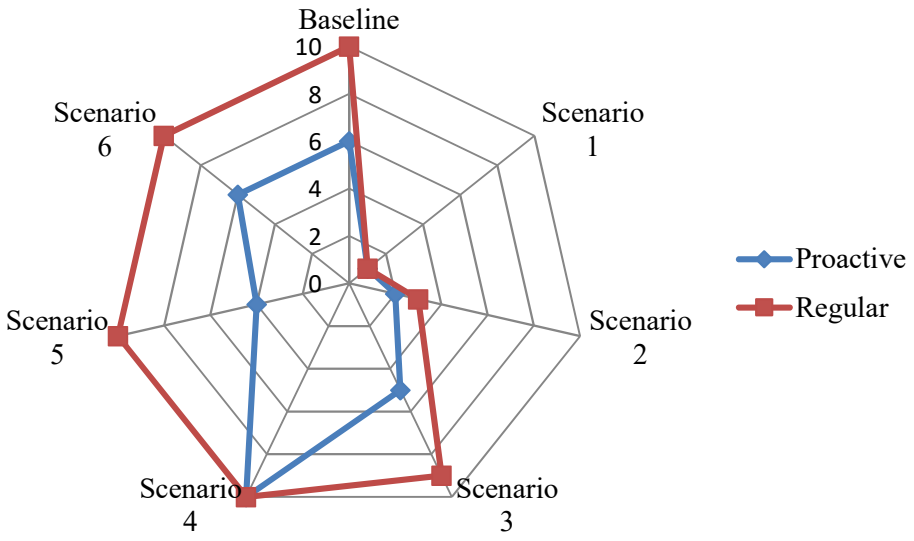

Figure 5.15. Depiction of Preferred Timing of Transfer Initiation for All Scenarios and Both Types of Transition Strategy

Note: numbers on the gridlines indicate the transfer initiation year, with "10" representing "no transfer initiation"

Appendix F provides information for comparative analysis across all scenarios and for both types of transition strategies and includes: (1) preferred timing of transfer initiation, (2) dollar value of terminal wealth for the preferred transfer initiation years

under each scenario, and (3) major economic drivers of the timing decisions for the transfer initiation.

Figure 5.15 shows preferred timing of transfer initiation under each scenario for both types of transition strategy (proactive and regular). The center circle represents the earliest transfer initiation timing (year 1) and the farther away circles – the delayed transfer, with year 10 representing no transfer initiation. This figure provides three important insights. First, generally, when a proactive transition strategy is used, the preferred timing of the transfer initiation occurs earlier than under the regular transition strategy (under all scenarios, except scenario 4). Second, under the proactive transition strategy, the firm's preferred timing is responsive to a greater number of assumptions made in the model compared to the case under the regular transition strategy. Visually this can be observed in the following way: under regular transition strategy (denoted by the red line on the figure), the preferred timing has changed only when the first three assumptions were relaxed (assumptions on the availability of off-farm income and the level of consumption withdrawals from the business for the younger generation's family living expenses). If a proactive transition strategy is used (denoted in a blue line), relaxing assumptions under all scenarios (except scenario 6) changes the preferred timing of transfer initiation.

Finally, the largest magnitude in the response of the baseline scenario to the assumptions relaxed is observed under scenarios 1 and 2 irrespective of transition strategies. This observation is not surprising because the above analysis showed that high consumption withdrawals are a major driver of the firm's reduced growth and contributed to or drove the later transfer initiation years. These scenarios assume that the

consumption withdrawals from the business are much lower compared to the baseline[35] which when applied to the model improves the firm's growth and increases total before-tax wealth. The latter factors, in their turn, increase tax savings associated with the early transfer suggesting to initiate the transfer earlier than under the baseline.

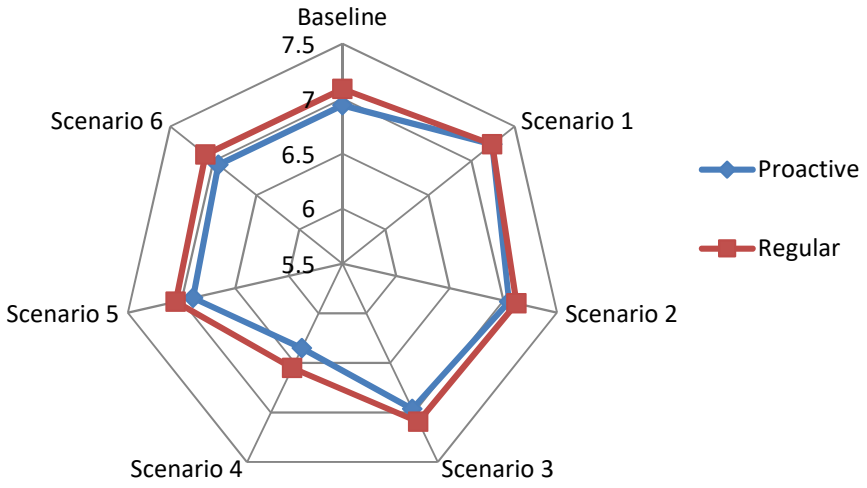

Figure 5.16. Depiction of Terminal Wealth Positions in Preferred Transfer Initiation Years for Each Scenario and Both Types of Transition Strategy

Note: numbers on the gridlines indicate the dollar value of terminal wealth, rounded to the first decimal and discounted back to the beginning of year 1.

Figure 5.16 presents and compares dollar value of terminal wealth position in the preferred transfer initiation year by each scenario and type of transition strategy. For example, under the baseline scenario the preferred transfer initiation year (year 6 and no transfer initiation for proactive and regular strategies respectively) allows the firm to generate a terminal wealth around $7 million. If a regular transition strategy is employed, the firm will generate a slightly higher terminal wealth ($7.08 million) compared to a lower ($6.94 million) terminal wealth if the firm follows a proactive transition strategy.

[35] For explanation of scenarios, see the section on Description of Scenarios in Chapter 3.

This visual representation of results provides two major observations: (1) if the firm employs a proactive transition strategy, it generates a lower terminal wealth position compared to the situation when the regular strategy is followed (blue circle lies completely within the red circle), and (2) most of terminal wealth positions are located around the second from the outside circle ($7 million mark) with the exception of two scenarios. Irrespective of the type of transition strategy, scenario 1 yields the largest terminal wealth and scenario 4 the lowest. The highest terminal wealth position under scenario 1 is explained by the firm's higher growth under this scenario compared to other scenarios (due to lower consumption withdrawals associated with the availability of off-farm income), while the lowest terminal wealth observed under scenario 4 results from downward adjustments in the firm's asset bases and equity positions due to changes in farmland prices.

Another important point of discussion is the economic drivers of the preferred timing of farm transfer initiation. In most cases the earlier transfer normally reduces the firm's growth. The only exceptions to this generalization are: scenarios 1 and 2 when a proactive transition strategy is used, and scenario 1 under a regular transition strategy. In these particular three cases, the firm's improved income generating ability associated with the early transfer was not offset by high consumption withdrawals placed on the farm if earlier transfer takes place. Relaxing the assumption on the availability of off-farm income (scenario 1) or assumption on the portion of the younger generation's consumption covered by the farm business reduces the amount of consumption withdrawals and thus increases the firm's retained earnings and future periods' earnings and savings. The resulting higher terminal wealth triggers large transfer taxes if the

transfer is delayed. Therefore, the earlier transfer under these scenarios: (1) improves the firm's growth and (2) provides significant tax savings. Under the baseline scenario, the firm exhibits higher income generating ability[36] if the transfer is initiated earlier, but high consumption withdrawals placed on the farm business (according to the assumption of the baseline scenario) suppress the saving ability of the firm and thus reduce the firm's growth.

Based on the summary of results provided in Appendix F, in most cases, both factors - firm's growth and transfer tax savings - impact the decision on the preferred timing of the transfer initiation. The results suggest that under the proactive transition strategy, the preferred timing is primarily driven by transfer tax savings. If a regular transition strategy is employed, the opposite observation is made: the reduction in growth rate associated with earlier transfers generally has a greater impact on the preferred timing of the transfer initiation than the tax savings. This difference between two types of transition strategy results from the assumption on the construction of total consumption withdrawals from the business prior to the transfer initiation. The younger generation is not allowed to withdraw funds until the transfer is initiated, thus, earlier initiation imposes some significantly higher consumption withdrawals which is not justified by the improvements in the firm's growth. Under the proactive transition strategy, the difference between consumption withdrawals before and after the transfer initiation is lower (in absolute magnitude)[37] and thus, reduces the firm's growth compared to the regular strategy.

[36] When regular transition strategy is employed.
[37] Compared to that value under the regular strategy.

CHAPTER 6: CONCLUSIONS

The delay of farmer retirement and lack of succession planning in the U.S. agriculture sector create growing concern about the intergenerational farm transfer, particularly in the last decade due to the aging farmer population, highly-elevated farmland prices and increasing capital investments in the production agriculture sector. Past works have studied the above aspects of this issue; however, the gap in the literature and research remains when it comes to the impact of timing of farm transfer initiation on the firm's financial performance and future continuity. In addition, the presence of life-cycle patterns in farmer productivity and consumption was found in the past research but these findings have never been applied in the intergenerational farm transfer modelling. This study recognizes that farm businesses that have the goal of remaining in a family have multiple operators (the older and younger) from two different generations and their respective family units. Therefore, according to the findings from the literature, these life-cycle differences can be critical for the firm's growth particularly when the business prepares for and undergoes the intergenerational transfer.

This study fills the existing gap in the literature by presenting a conceptual framework and empirical farm-level model of wealth creation and accumulation that incorporates the life-cycle patterns of farmer productivity and consumption to analyze how the timing of farm transfer initiation impacts the terminal wealth in the business. Serving as a basis of the model, a set of three dynamic financial statements appropriately linked within a year and over time (1) reflect the process of wealth creation, (2) incorporate the impact of life-cycle patterns in farmer productivity and consumption on wealth accumulation, and (3) account for the imposed decision variables.

The results for a representative large coarse grain farm (corn-soybean operation) confirm that the timing of the transfer is determined by two major tradeoffs: *first*, between the younger generation's productivity and consumption withdrawals and, *second*, between the firm's growth and transfer taxes. The analysis also suggests that the preferred timing of transfer initiation depends on the type of the transition strategy employed.

Under the baseline scenario, irrespective of the type of the transition strategy employed, the earlier transfer reduces the firm's income generating and savings abilities resulting in the firm's slower growth. In other words, if no off-farm income is available, the cost of bringing the younger generation (additional consumption withdrawals) outweighs the benefits (additional gross revenue generated due to a higher joint farmer productivity and potential income tax savings resulting from the shifting of income into a lower tax rate/bracket), and thus reduces the firm's growth, suggesting to delay the farm transfer initiation. The earlier initiation has a greater (negative) impact on the firm's growth if the regular transition strategy is used (compared to the case of proactive transition strategy) due to the assumptions on the consumption withdrawals under each type of strategy. The difference in consumption withdrawals before and upon transfer initiation for farms that employ the regular strategy is much larger than for the proactive strategy. That is why the earlier transfer reduces the firm's growth more rapidly under the regular strategy than under the proactive strategy.

However, when the trade-off between the firm's growth and transfer tax obligations is taken into consideration, the results suggest initiating the transfer in year 6 if the proactive strategy is followed and delaying the transfer if the regular transition

strategy is used. Under a *proactive transition strategy*, prior to year 6 transfer tax savings do not justify the firm's growth foregone due to early transfer, but delaying the initiation beyond year 6 imposes transfer tax obligations which exceed the higher growth associated with the later initiation years. Therefore, initiating the transfer in year 6 provides the maximum terminal wealth in the firm. Under the *regular transition strategy*, transfer tax savings do not justify the reduction in the firm's growth under any transfer initiation year, thus the results suggest avoiding the initiation during the 10 year planning horizon and transferring the wealth via final transfer tool. Thus, the results under the baseline scenario show that the optimal transfer initiation timing depends on the absolute difference between the firm's reduced growth and potential transfer tax savings.

Sensitivity analysis was conducted to test the responsiveness of the results to the following key assumptions: (1) the level of consumption withdrawals by the younger generation (by allowing the availability of off-farm income (Scenario 1) or allowing only a partial (50 or 80 percent) coverage of the younger generation's family living expenses by the farm business (Scenario 3 and 4), (2) farmland prices (by imposing a more pessimistic farmland outlook -Scenario 4- and a less pessimistic farmland outlook - Scenario 5), and (3) the level of annual gifting (allowing a more aggressive annual gifting – Scenario 6).

Sensitivity analysis shows that relaxing the assumption on the availability of off-farm income changes the magnitude and directionality of the results compared to the baseline scenario. If the off-farm income is available to support the younger generation's consumption, the early transfer initiation results in the firm's higher growth and larger tax savings regardless of the type of transition strategy (proactive or regular); thus, earlier

transfer is preferred under both types of transition strategy. When no off-farm income is available and the farm covers only a portion of the younger generation's family living expenses (50 or 80 percent), the preferred timing of transfer initiation gradually moves away from the results under scenario 1 (with off-farm income) to the results under the baseline scenario (no off-farm income and full coverage of the younger generation's family living expenses by the farm business). These results also match the insights obtained from scenario 1: as the consumption withdrawals taken out from the business to cover the younger generation's family living expenses decrease, the earlier farm transfer initiation is preferred.

Relaxing the assumption on farmland prices (scenarios 4 and 5) shows that changes in the land market reduce the terminal wealth for all considered cases in this study and alter the preferred strategy when the proactive transition strategy is employed. The impact of the pro-longed and moderate decline in farmland prices (under scenario 4) on the firm's financial performance, terminal wealth and thus preferred timing of farm transfer is twofold. First, significant and prolonged declines in farmland prices devalue the firm's asset base which reduces its income generating ability and thus future growth and total before-tax wealth. Second, the firm also experiences a decline in equity position due to a prolonged downward adjustment in farmland values (because of a negative change in valuation equity). Thus, the above mentioned factors lower the taxable estate and thus the level and/or likelihood of transfer taxes. Therefore, if these conditions hold, the results suggest not initiating the transfer during the planning horizon (or further delaying the transfer) irrespective of the type of transition strategy followed. A more optimistic farmland outlook (scenario 5) results in lower terminal wealth positions

compared to the baseline scenario irrespective of the transfer initiation year or the type of the transition strategy. As for the preferred timing strategy, under this scenario, a slightly earlier transfer initiation is preferred when the firm employs the proactive transition strategy (year 4 compared to year 6 under the baseline scenario). This is due to the fact that under this scenario the firm generates higher (in nominal terms) total before-tax wealth than under the baseline scenario and thus, earlier years provide higher transfer tax savings suggesting year 4 instead of year 6 as a preferred timing of transfer initiation.

Testing the responsiveness of the results to the level of annual gifting shows that aggressive gifting does not change the preferred timing of farm transfer initiation for this representative farm. The results suggest that using a more aggressive gifting strategy provides the firm with benefits but can potentially impose extra costs. The benefits as discussed in the analysis include the firm's ability (1) to better capitalize on the higher productivity of the younger generation in the first period of the planning horizon, (2) to generate some income tax savings as a result of a more rapid shift of wealth to the younger generation with a lower income tax rate, and (3) to shift the firm's future earnings more rapidly than under the normal gifting. The potential costs associated with a more aggressive gifting strategy are (1) larger consumption withdrawals taken out from the farm business to cover higher family living expenses of the younger generation and (2) potentially higher self-employment taxes paid by the younger generation that reduce or offset the income tax benefits associated with a more aggressive gifting strategy.

It is critical to acknowledge that the changes in terminal wealth between the transfer initiation years and/or scenarios found in this study are small if put in relative terms and range between 0.75% and 5.63% for this representative farm. However,

changes in key input variables used to populate the model (such as size of asset base, operating and financial efficiency, off-farm income, age of older and younger operators, and perceived productivity of both generations) can change the magnitude of results. For example, higher asset turnover ratio or higher off-farm income available to cover the younger generation's consumption can potentially change the firm's growth, total before-tax wealth and thus transfer tax obligations and timing of transfer initiation. An example of this scenario is a commonly used business strategy where a grain farm adds an additional enterprise unit that does not require large capital investments but allows for a quick generation of cash flow to support the farm's liquidity position (such as a hog operation). This approach allows the older generation to bring the younger generation into the business and capitalize on their higher productivity without large additional withdrawals from the business, on the one hand, and take advantage of transfer tax savings associated with the early transfer initiation, on the other hand.

Another important fact to consider is that the analysis was conducted assuming that the older generation has only one transfer tax exemption amount. As discussed in Chapter 2 current legislation allows for transferring the unused estate and gift exemption amounts between spouses. Thus, if the older generation (a couple) has total of $10.9 million, given the representative farm's size of estate, the transfer tax would not have triggered under any of the scenarios (including the baseline scenario). Thus, only under scenario 1 (when the off-farm income is available) would the early transfer still be preferred since earlier initiation improves the firm's growth and results in higher total before-tax (and in this case, after-tax) wealth. Under all other scenarios, earlier transfer initiation results in lower firm's growth or the preferred timing was driven by the transfer

tax savings associated with the early transfer. Thus, under all these scenarios (the baseline and scenarios 2 - 6), when no tax savings are available and given that the early transfer initiation reduces the firm's growth, the results suggest to delay the transfer initiation as it allows to generate a higher terminal wealth position in the business.

As discussed in detailed in Chapter 5, given the initial age of the operators (at the beginning of the planning horizon) and the assumed age differential between the generations, a very small difference in the farmer productivity is observed between the two operators. For the representative farm used in this study, the younger generation's productivity is higher only in the first four production years of the planning horizon, and after that year, both operators exhibit identical productivity. Thus, it is important to note that the earlier transfer initiation would allow the firm to better capture a higher productivity of the younger generation (for more years and larger difference between the generations) and thus improve the firm's income generating ability.

Finally, according to the farm tax experts and agricultural lending specialists, large farm businesses utilize multiple business ownership structure for different types of assets to minimize tax obligations and ease the transfer process of those assets from the older to the younger generation. The business ownership structure is hypothesized to have an impact on the key output variable, but testing the response of the preferred timing of the farm transfer initiation to changes in this assumption is left for future research due to the complexity of its construction.

CHAPTER 7: IMPLICATIONS AND FUTURE RESEARCH

A careful examination of the results and their comparison across scenarios (Appendix F) shed light on several key implications of this study. First, the availability of off-farm income allows farm business to bring the younger generation in the business earlier and still generate higher terminal wealth compared to the wealth position when the transfer is delayed (as shown in Scenario 1). It is critical to mention that when off-farm income is available, the early transfer initiation triggers higher transfer taxes but also a significantly higher growth rate of the firm which offsets the impact of higher transfer taxes resulting in a higher terminal after-tax wealth. This observation proves that both generations should focus on generating additional income stream and utilizing the business equity more effectively rather than minimizing transfer taxes only. If the latter is the only goal of both generations, the course of actions undertaken by the operation will result in a lower level of terminal after-tax wealth reducing the likelihood of the firm's future continuity.

Second, while this study reveals some valuable insights into the timing decisions for the intergenerational farm transfer, it is crucial to address two exogenous variables that have strong and direct impact on the timing decision of the farm transfer initiation (farmland prices and the regulatory environment). The model confirms that the transfer decisions are heavily dependent on the expectations about the farmland prices. Their importance is due to the fact that changes in farmland values can create sudden and often large upward or downward adjustments of farms' equity positions directly changing the taxable estate and thus the potential transfer tax obligations. The regulatory environment surrounding the estate taxes (tax rates and exemption limits) has important implications on the results of this research. If the tax rate is increased to 45 percent and the exemption

limit is reduced down to $3.5 million per individual as proposed by democratic party, the issue of loss of person and business wealth during the farm transfer and future continuity of farm businesses will be even a greater issue to the farms of the size analyzed in this study and will have implications on smaller farms as well.

The applicability of this research is two-fold. First, these results will serve as a basis to develop a case study to be used in farmer workshops on farm finances, succession planning, as well as in agribusiness management classrooms. Second, the model developed in this study eventually can be converted in a decision-making tool that will help producers make more informed decisions related to succession planning and farm transfer.

Finally, recognizing the limitations of the study helps determine the areas for further research and analysis that will make the results of the study more accurate and robust. The limitations of this study are identified in the following three areas: (1) improving the parameters used in the model, (2) addressing the deterministic nature of the model, and (3) attempting to quantify and incorporate in the model the impact of "soft" factors on the success of the farm transfer process and its future continuity. The farmer productivity parameters used in the model were taken from the existing empirical studies. Further work in this area will add value to the existing model since the existing parameters were estimated more than a decade ago prior to a spike in farm capital investments which might have altered the farmer productivity. In addition, instead of focusing on famer productivity (technology use and/or efficiency), it might be worthwhile to invest future research time into identifying an alternative measure of farmer productivity for financial models (e.g., farmer's efficiency of asset utilization by

age rather than productivity). Another existing limitation of this study – deterministic nature - must be addressed by introducing stochastic components to certain endogenous and exogenous variables in the model such as farmland values, off-farm income, etc. Finally, this research recognizes the importance of the "soft", intangible factors on the decision-making related to the intergenerational farm transfer; however, none of them were incorporated in this model and thus were left for future research. While still difficult to be quantified, it is crucial for future research to attempt to quantify the impact of such "soft" issues as disputes between siblings that lead to the unexpected and forced buyout of off-farm heirs.

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APPENDIX A. FINANCIAL FLOWS IN THE MODEL

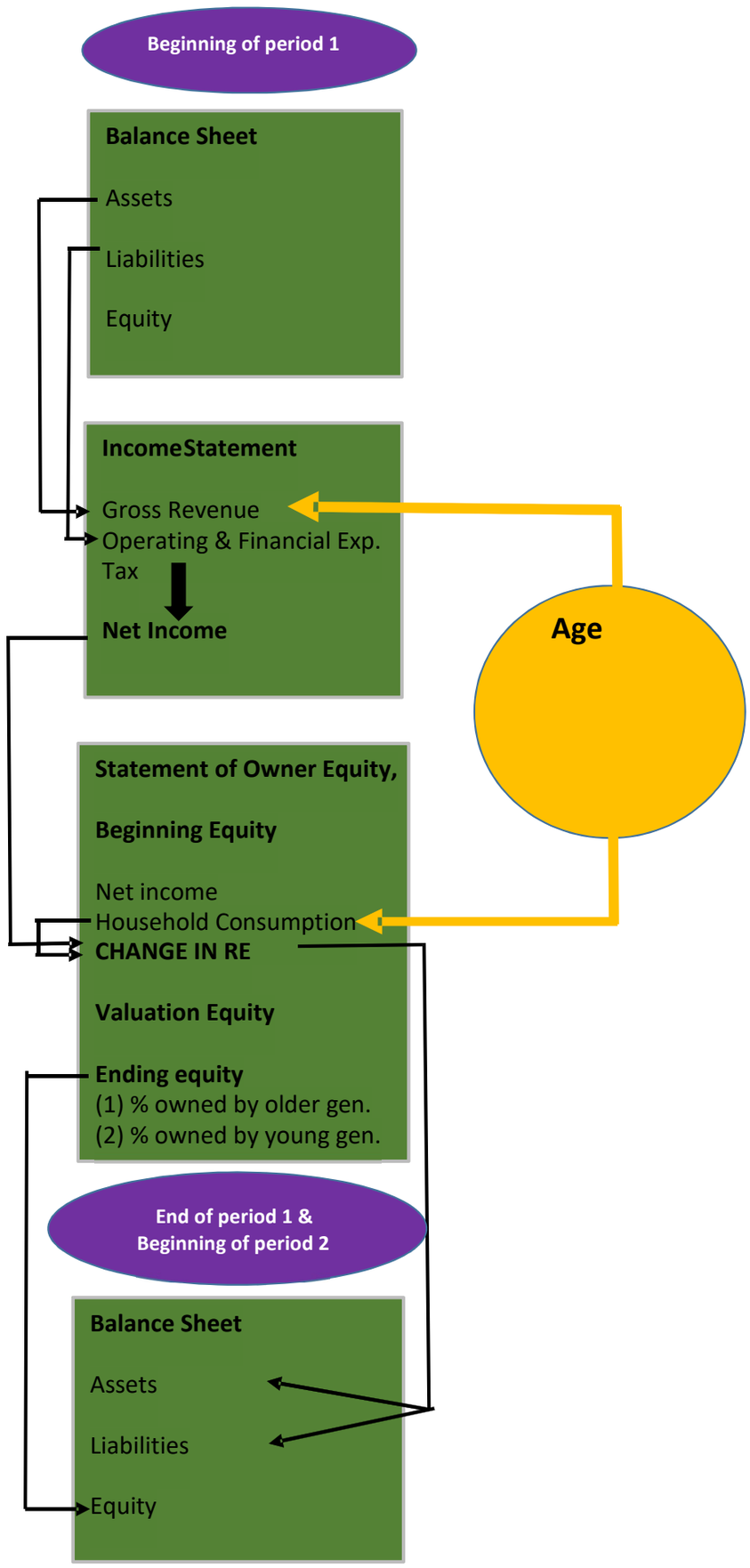

Figure 1. Financial Flows in the Model

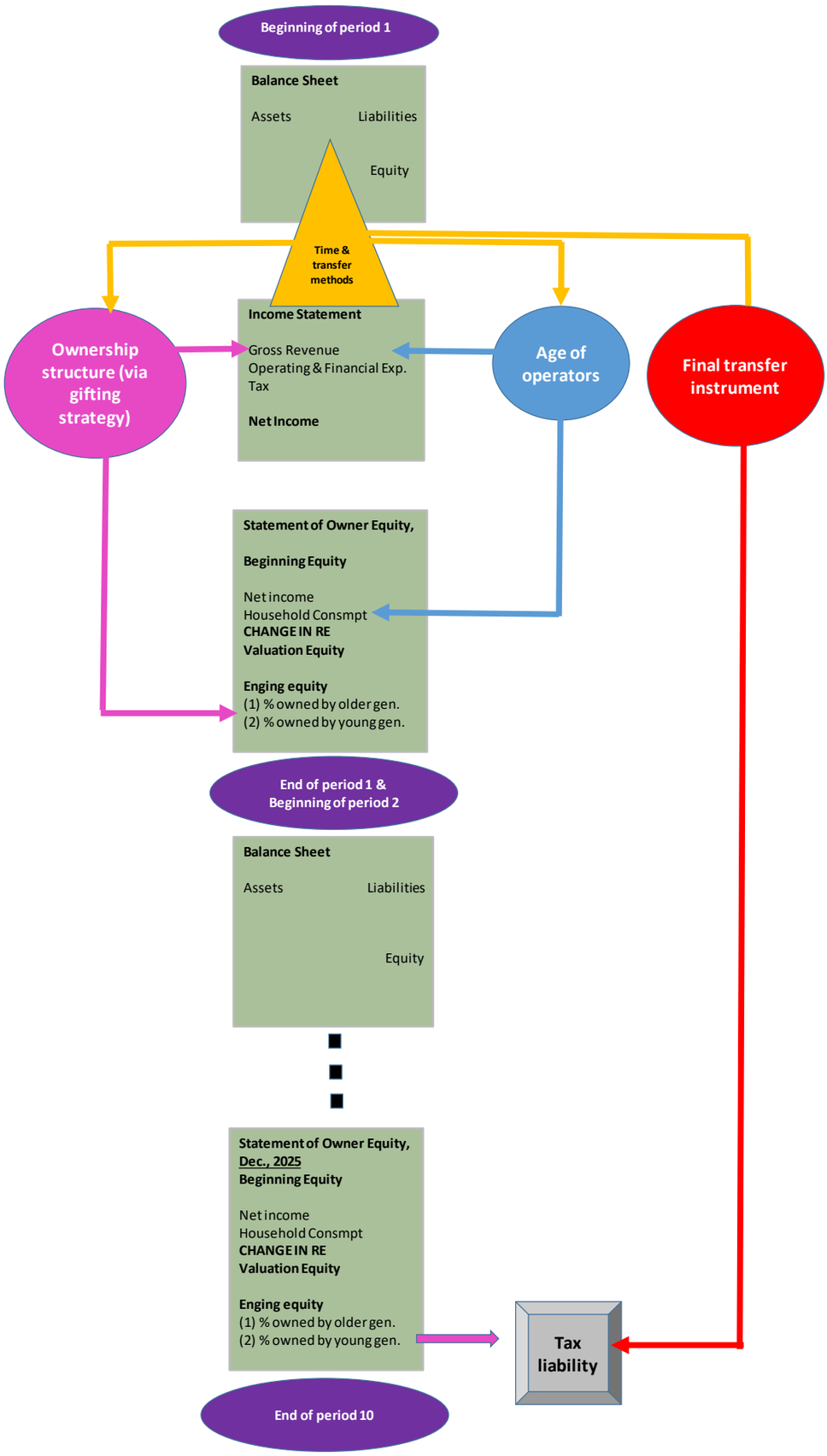

Figure 2. Impact of Decision Variables on Financial Flows

APPENDIX B. STATISTICAL TESTS FOR EQUITY OD SAMPLES. PRODUCTIVITY INDICES

Table 1. Variance Ratio Test, Iowa and Nebraska

Variable	Observations	Mean	Standard Error	Standard Deviation
Iowa sample, equity	90	6,172,080	160,091	1,518,765
Nebraska sample, equity	46	5,516,804	146,559	994,011

H_0: sd (Iowa sample, equity)/ sd Nebraska sample, equity) = 1
F statistic = 2.3345
Degrees of freedom = 89, 45

Table 2. Two-Sample t Test with Unequal Variances, Iowa and Nebraska

Variable	Observations	Mean	Standard Error	Standard Deviation
Iowa sample, equity	90	6,172,080	160,091	1,518,765
Nebraska sample, equity	46	5,516,804	146,559	994,011

H_0: mean (Iowa sample, equity)/ mean Nebraska sample, equity) = 0
t statistic = 3.0191
Satterthwaite's degrees of freedom = 125.856

Table 3. Farmer Productivity Index by Age (Tauer and Lordkipanidze 2000).

State	Age 25-34	Age 35-44	Age 45-54	Age 55-64
IA	1.24	1.10	1.07	1.14
IL	1.18	1.09	1.11	1.03
IN	1.30	1.23	1.23	1.13
KS	1.41	1.32	1.31	1.09
MI	1.07	1.10	1.07	0.95
MN	1.05	1.05	1.05	1.03
MO	1.35	1.12	1.16	1.15
ND	1.22	1.09	1.13	1.05
NE	1.26	1.21	1.17	0.97
OH	1.26	1.15	1.15	1.10
SD	1.15	1.09	1.09	1.08
WI	1.12	1.10	0.03	1.06
Average	1.22	1.14	1.13	1.07

Source: Tauer and Lordkipanidze 2000.

APPENDIX C. FAMILY LIVING EXPENSES

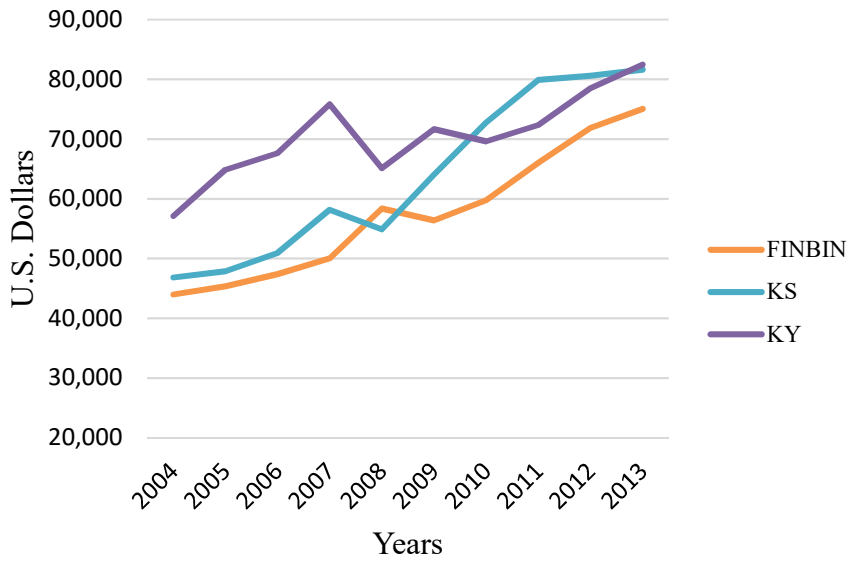

Figure 1. Comparison of Family Living Expenses by Three Sources

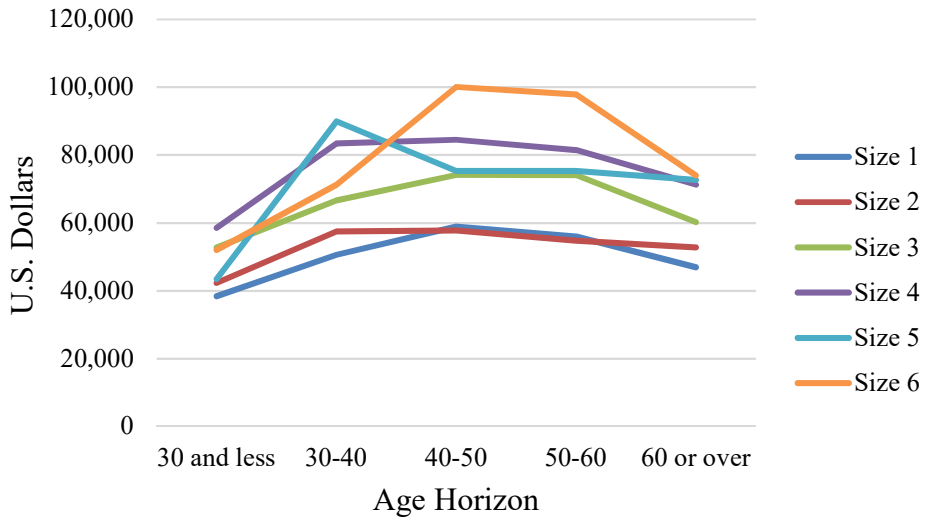

Figure 2. Comparison of Family Living Expenses by Farm Size over the Age Horizon

APPENDIX D. FAMILY LIVING EXPENSES: LOOKUP TABLE

Table 1. Definition of Size Categories

Size Category	Value, acres
Size 1	<250
Size 2	251-500
Size 3	501-1,000
Size 4	1,001-1,500
Size 5	1,501-2,000
Size 6	2,001-5,000

Table 2. Family Living Expenses, 2013

Age group	Size 1	Size 2	Size 3	Size 4	Size 5	Size 6
30 or younger	38,373	42,288	52,720	58,543	43,439	52,023
31-40	50,646	57,469	66,658	83,421	89,974	71,307
41-50	58,912	57,804	74,139	84,519	75,282	100,086
51-60	55,947	54,777	74,128	81,430	75,282	97,865
60 or older	46,977	52,832	60,213	71,254	72,721	74,034

Source: FINBIN, report generated in April, 2015.

APPENDIX E. ADDITIONAL NUMERICAL EVIDENCE FOR SCENARIO 6.

Table 1. Comparison of Key Financial Variables Under Baseline and Scenario 6 for Transfer Initiation Year 1.

Production year	Retained earnings	Consumption withdrawals	Difference in Net income	Gross revenue	Income and SE taxes
1	0	0	0	0	0
2	-67	0	-67	-149	16
3	-112	0	-113	-211	41
4	-134	0	-135	-181	75
5	-91	0	-92	-53	78
6	90	0	91	-69	-108
7	588	0	589	-54	-602
8	1,098	0	1,099	46	-1,088
9	1,472	0	1,473	235	-1,415
10	8,941	-7,243	1,698	487	-1,579

Table 2. Firm's Performance in Production Year 2 Under Transfer Initiation Year 1: Comparison Between Baseline Scenario and Scenario 6.

	Baseline	Scenario 6	Difference
Gross revenue	1,095,539	1095688	-149
Operating and financing expenses	720,101	720,199	-98
Depreciation	107,285	107,300	-15
Income before-tax	268,153	268,189	-36
• Income before-tax, older	212,163	210,339	1,824
• Income before-tax, younger	55,988	57,849	-1,860
Income and SE taxes	103,794	103,778	16
Net income	271,644	271,711	-67
Ownership share, older generation	0.7912	0.7842	0.01
Ownership share, younger generation	0.2087	0.2157	-0.01

Table 3. Decomposition of Income and Self-Employment Taxes Paid in Production Year 2 Under Transfer Initiation Year 1, Comparison Between the Baseline Scenario and Scenario 6.

Taxes in Production Year 2	Baseline	Scenario 6	Difference	Net change
Federal income tax				
• Older	46,390	45,880	510	231
• Younger	7,470	7,749	-279	
State income tax				
• Older	17,238	17,074	163	16
• Younger	3,342	3,490	-147	
Self-employment tax				
• Older	20,784	20,731	52	-231
• Younger	8,566	8,850	-284	

Table 4. Firm's Performance in Production Year 9 Under Transfer Initiation Year 1: Comparison Between Baseline Scenario and Scenario 6.

	Baseline	Scenario 6	Difference
Gross revenue	1,172,045	1,171,810	235
Operating and financing expenses	770,388	770,234	154
Depreciation	114,778	114,755	23
Income before-tax	286,878	286,821	57
• Income before-tax, older	210,007	194,649	15,357
• Income before-tax, younger	76,871	92,171	-15,299
Income and SE taxes	111,164	112,579	-1,415
Net income	290,492	288,996	1,495
Ownership share, older generation	0.7320	0.6786	0.05
Ownership share, younger generation	0.2679	0.3213	-0.05

Table 5. Decomposition of Income and Self-Employment Taxes Paid in Production Year 9 Under Transfer Initiation Year 1, Comparison Between the Baseline Scenario and Scenario 6.

Taxes in Production Year 2	Baseline	Scenario 6	Difference	Net change
Federal income tax				
• Older	45,786	41,486	4,300	475
• Younger	10,759	14,584	-3,824	
State income tax				
• Older	17,044	15.665	1,379	5
• Younger	5,089	6,462	-1,373	
Self-employment tax				
• Older	20,722	20,276	445	-1,895
• Younger	11,761	14,102	-2,340	

APPENDIX F. COMPARISON OF RESULTS ACROSS SCENARIOS

	Proactive transition strategy		Regular transition strategy	
	Preferred timing	Major economic driver(s) of preferred timing	Preferred timing	Major economic driver(s) of preferred timing
Baseline	Year 6 (Terminal wealth: $7,108,751)	Transfer years 1-6: mostly growth rate Transfer years 7-9: growth rate and transfer tax savings*	Do not initiate the transfer ($7,271,800)	Growth rate* and transfer tax savings
Scenario 1	Year 1 ($7,501,334)	Mostly transfer tax savings	Year 1 ($7,504,579)	Transfer years 1-6: Mostly transfer tax savings. Transfer years 6-9: Growth rate and transfer tax savings*
Scenario 2	Year 2 ($7,263,001)	Mostly transfer tax savings	Year 3 ($7,340,033)	Transfer years 1-3: Mostly growth rate Transfer years 4-9: Growth rate and transfer tax savings*
Scenario 3	Year 5 ($7,146,191)	Transfer years 1-5: growth rate only. Transfer years 6 – 9: growth rate and transfer taxes*	Year 9 ($7,272,736)	Growth rate* and transfer tax savings
Scenario 4	Do not initiate the transfer ($6,714,985)	Growth rate only	Do not initiate the transfer ($6,964,252)	Transfer years 1-6: Growth rate only. Transfer years 7-9: Growth rate* and transfer tax savings
Scenario 5	Year 4 ($7,395,003)	Transfer years 1-4: growth rate* & transfer taxes Transfer years 5-9: growth rate & transfer taxes*	Do not initiate the transfer ($7,560,998)	Transfer years 1-4: Growth rate* and transfer tax savings. Transfer years 5-9: Growth rate and transfer tax savings*
Scenario 6	Year 6 ($7,110,910)	Transfer years 1-6: growth rate* & transfer taxes Transfer years 7-9: growth rate & transfer taxes*	Do not initiate the transfer ($7,271,800)	Growth rate* and transfer tax savings

Note: asterisk denotes the driver that has a higher impact on the terminal wealth. The term “mostly” implies that more than 90% of the difference in terminal wealth stems from that particular driver.

APPENDIX G. ABSOLUTE VALUE OF TERMINAL WEALTH FOR TRANSFER INITIATION YEARS DISCUSSED IN CHAPTER 5.

Table 1. Selected Output Variables Under Baseline Scenario, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	6,998,955	7,108,751	7,069,525
Total before-tax wealth, $	6,998,955	7,112,533	7,157,144
Transfer tax, $	0	3,782	87,619
Average retained earnings, $	71,689	83,047	87,508
Average net income, $	170,397	171,953	172,114
Average consumption withdrawals, $	98,708	88,906	84,606

Table 2. Selected Output Variables Under Baseline Scenario, Regular Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	7,034,441	7,243,380	7,266,196
Total before-tax wealth, $	7,034,441	7,310,398	7,446,351
Transfer tax, $	0	67,017	180,155
Average retained earnings, $	75,237	102,833	116,429
Average net income, $	170,575	171,543	170,238
Average consumption withdrawals, $	95,338	68,710	53,809

Table 3. Selected Output Variables Under Scenario1, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	7,501,334	7,374,581	7,302,568
Total before-tax wealth, $	7,501,334	7,501,067	7,499,627
Transfer tax, $	0	126,485	197,059
Average retained earnings, $	121,927	121,900	121,756
Average net income, $	175,506	175,480	175,335
Average consumption withdrawals, $	53,579	53,579	53,579

Table 4. Selected Output Variables Under Scenario1, Regular Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	7,504,579	7,378,369	7,298,541
Total before-tax wealth, $	7,505,418	7,506,636	7,493,704
Transfer tax, $	839	128,266	195,164
Average retained earnings, $	122,335	122,457	121,164
Average net income, $	175,055	172,226	170,238
Average consumption withdrawals, $	52,720	49,769	49,074

Table 5. Selected Output Variables Under Scenario 2, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 4**	**Transfer Year 9**
Total after-tax wealth, $	7,262,867	7,260,517	7,140,647
Total before-tax wealth, $	7,262,867	7,262,985	7,261,620
Transfer tax, $	0	2,469	120,973
Average retained earnings, $	98,080	98,092	97,955
Average net income, $	173,057	173,069	172,933
Average consumption withdrawals, $	74,977	74,977	74,977

Table 6. Selected Output Variables Under Scenario 2, Regular Transition Plan

	Transfer Year 1	**Transfer Year 3**	**Transfer Year 9**
Total after-tax wealth, $	7,291,163	7,340,033	7,282,546
Total before-tax wealth, $	7,291,163	7,343,306	7,470,288
Transfer tax, $	0	3,273	187,742
Average retained earnings, $	100,910	106,124	118,822
Average net income, $	173,090	172,844	170,238
Average consumption withdrawals, $	72,180	66,720	51,416

Table 7. Selected Output Variables Under Scenario 4, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	6,459,677	6,625,287	6,699,718
Total before-tax wealth, $	6,459,677	6,625,287	6,699,718
• Owned by older generation, $	4,574,271	5,039,085	5,300,588
Transfer tax, $	0	0	0
Average retained earnings, $	46,072	60,357	67,013
Average net income, $	144,780	146,641	146,956
Average consumption withdrawals, $	98,708	86,284	79,943

Table 8. Selected Output Variables Under Scenario 4, Regular Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	6,496,333	6,830,006	6,958,971
Total before-tax wealth, $	6,496,333	6,830,006	6,993,063
• Owned by older generation, $	4,603,326	5,202,560	5,535,230
Transfer tax, $	0	0	34,092
Average retained earnings, $	49,566	78,370	92,997
Average net income, $	144,904	147,080	146,806
Average consumption withdrawals, $	95,338	68,710	53,809

Table 9. Selected Output Variables Under Scenario 5, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 4**	**Transfer Year 9**
Total after-tax wealth, $	7,317,399	7,395,003	7,339,322
Total before-tax wealth, $	7,317,399	7,426,332	7,552,370
• Owned by older generation, $	5,225,288	5,528,323	5,982,619
Transfer tax, $	0	31,329	213,048
Average retained earnings, $	55,070	63,925	74,687
Average net income, $	153,778	155,245	156,051
Average consumption withdrawals, $	98,708	91,320	81,364

Table 10. Selected Output Variables Under Scenario 5, Regular Transition Plan

	Transfer Year 1	**Transfer Year 5**	**Transfer Year 9**
Total after-tax wealth, $	7,358,365	7,517,439	7,556,468
Total before-tax wealth, $	7,358,365	7,651,194	7,871,687
• owned by older generation	5,257,804	5,784,386	6,238,046
Transfer tax, $	0	133,754	315,218
Average retained earnings, $	58,603	82,323	101,723
Average net income, $	153,941	156,179	155,533
Average consumption withdrawals, $	95,338	73,856	53,809

Table 11. Selected Output Variables Under Scenario 6, Proactive Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	6,987,169	7,110,910	7,069,820
Total before-tax wealth, $	6,987,169	7,112,669	7,157,267
• owned by older generation, $	4,640,767	5,278,398	5,624,619
Amount of total taxable gifts, $	396,000	176,000	44,000
Total taxable estate	5,036,767	5,454,398	5,668,619
Transfer tax, $	0	1,759	87,448
Average retained earnings, $	70,510	83,060	87,520
Average net income, $	169,943	171,966	172,126
Average consumption withdrawals, $	99,432	88,906	84,606

Table 12. Selected Output Variables Under Scenario 6, Regular Transition Plan

	Transfer Year 1	**Transfer Year 6**	**Transfer Year 9**
Total after-tax wealth, $	7,024,650	7,245,578	7,266,499
Total before-tax wealth, $	7,024,650	7,310,499	7,446,474
• owned by older generation, $	4,670,150	5,436,302	5,855,939
Amount of total taxable gifts, $	396,000	176,000	44,000
Total taxable estate	5,066,150	5,612,302	5,899,939
Transfer tax, $	0	64,921	179,976
Average retained earnings, $	74,258	102,843	116,441
Average net income, $	170,111	171,553	170,250
Average consumption withdrawals, $	95,853	68,710	53,809