Multiple Generation Farm Households: What Determines Primacy in Management?

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ABSTRACT

This study identifies factors that influence primacy between generations in the management structure of U.S. family farms. The paper fills an important gap in the farm succession literature by exploring succession (in management of the farm) as an incremental process. Estimation with cross-sectional data from the USDA-ERS' Agricultural Resource Management Survey (ARMS) and a limited dependent variable model is used to explain the decision for older generation operators to retain primary farm management duties with a junior operator serving a secondary role. We identify a number of statistically significant attributes that explain variation in the elder farmer's role (primary versus secondary) in management of the farm. Our results suggest that transferring primary operator status is more influenced by family members' characteristics and less so by farm financial and operating characteristics.

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Introduction

U.S. agriculture in the twentieth century evidenced dramatic change. Advances in technology and increased connections between rural locations and urban labor markets simultaneously combined to greatly reduce the number of occupational farmers and the size of the farm population even as agricultural output steadily grew (Huffman, 1991; Mishra and El-Osta, 2008). These factors significantly changed the structure of agriculture in the United States to its current form, with a relatively small percentage of farms producing the majority of agricultural output (and receiving a majority of agricultural income). The structure of U.S. farming continues to be an important policy concern. Political rhetoric surrounding farm program subsidies nearly always makes an appeal to support for family farms. This is a common theme in the developed world where agriculture commands a small share of economic activity and speaks directly to the general population's tendency to disfavor corporate management of countryside resources and acceptance that rural communities should be sustained (Kimhi and Nachlieli, 2001; McNally, 2001).

Huffman (1991) identifies the two main avenues through which rural farm population is lost as: 1) exit of the farm operator to the off-farm job market and 2) the failure of the family farm to pass on management to the next generation. The first of these choices has been covered in an extensive literature dating back to Huffman (1980) and Sumner (1982). The second of Huffman's avenues relates to the general problem of intergenerational farm succession which has been dealt with more sporadically in the literature and is the subject of this paper. The literature on farm succession and its determinants suffers most notably from the lack of quality longitudinal data that tracks families' decisions over time up to and following the transfer of management and assets. The transfer of management and assets is itself an issue confounding the determinants of succession since it is quite possible that assets, responsibility, and claims on earnings pass across generations at different points in time and for different motives (Westhead, Howorth, and Cowling, 2002).

The succession decision is often modeled as a full exit/full entry decision, with the succeeding operator wholly replacing the previous operator at the point of succession. In point of fact, succession takes place over time in most instances, with some (perhaps extensive) period of time in which two operators from differing generations manage the farm business together. This manner of viewing the succession decision is highly consistent with the continued increase in U.S. farm size and the concordant increase in multiple operator farms (Hoppe, 2005; ERS, 2005). With this in mind, data on farm operations and their multiple operators provides a natural vehicle for shedding new light on the process of farm succession and by extension determinants of farm structure.

We use this vehicle to analyze multiple farm operator households and their choice of which generation bears primary responsibility for management of the farm business. Thus, we view the succession decision as a welfare maximizing outcome in which the younger generation operator assumes primacy in management decisions due to a collective rational choice of management structure. In the next section, we review relevant literature on family business succession decisions and how these relate to farm structure and policy. We follow that with discussion of our modeling approach and data, highlighting the differences in our approach from previous literature. The final two sections report estimation results and implications of the findings.

Background

Decision-making in family firms is often characterized by a horizon that extends into the succeeding generation's management term. Several factors contribute to this extended planning horizon including active management participation by the younger generation and the objective of the senior generation to see the family business survive into the future. The family business literature highlights the complexity of the issue focusing in particular on firm survival and how it is influenced by timing of management transfer and the qualifications of successors (Kimhi, 1997). Recent work in the business literature has focused narrowly on family versus non-family succession and subsequent business performance when management control changes hands. These studies tend to find that family firms experience a decline in performance following succession by next generation family members. This initial waning is attributable to family entrenchment in decision-making leading to a lack of innovation and the conflicts that occur between family objectives and competitive business interests (Bennedsen *et al.*, 2007; Hillier and McColgan, 2009).

This finding is not completely general. In particular, certain family enterprises may realize significant post-succession gains from family member involvement. Incentive structures for succeeding family members are somewhat free of agency problems that detract from long run sustainability. Also, where business success depends significantly on firm specific knowledge (i.e. human capital), the extended apprenticeship period that can occur in a family business succession may contribute positively to successful management transition (Hillier and McColgan, 2009). As we begin to think about farm business succession, this possibility is particularly significant since human capital that is specific to a particular farm (e.g. that farm's stock of soil qualities or livestock genetics) may be an important qualification in choosing a successor (Leband and Lentz, 1983). Importantly, Bennedsen *et al.* (2007) are unable to distinguish a gap in performance following succession by a family member in industries with the highest prevalence of family succession such as agriculture. Thus, farm business succession reasonably emerges as a special case of the more general concept and has spawned its own relevant literature.

The life cycle view of the farm business has long been a standard approach to viewing farm productivity (Tauer, 1995). In this view, farm operators reach peak productivity at middle age (between 35 and 44 according to Tauer's estimates) due to both physical and human capital accumulation. Beyond this peak, farm productivity will tend to fall for a variety of reasons including the mismatch that may occur between vintages of innovation driven physical capital and human capital present in the aging farm operator. For this and other reasons, the age structure of the farm population maintains as a going policy concern that can often be addressed by co-management of the farm operation by operators from different generations. In particular, the financial capital accumulated to the senior operator may be more complementary with the younger generation's knowledge of agricultural technology (general human capital) (Tauer, 1995).

This co-management period may occur despite the lack of an actual farm succession, often defined via formal plans (via asset transfer). This occurrence is due to the fact that senior farm operators often tend to choose the timing for wholesale transfers associated with succession (assets and full management control) as well as when to retire from full-time work (Kimhi and Lopez, 1999). With succession so closely related to the choice of retirement of the senior operator, most of the literature on farm family succession has focused on attributes of the operator to be succeeded and the characteristics of the farm to be passed on in management and ownership.

Notable in this literature are studies of household surveys in which a farm operator is asked to respond as to whether they have a succession plan currently in place. Based on this binary choice

question, some limited dependent variable econometric investigation follows describing which attributes influence the probability of having a succession plan. For farms in the United States, Mishra and El-Osta (2007) conduct just such an analysis and are able to identify the importance of both operator characteristics (age, education, number of children) and farm characteristics (size, debt, structure) in their influence on succession plan probability. Apart from these standard characteristics, government farm subsidies and location also have been shown to have a significant impact on succession probabilities (Mishra and El-Osta, 2008). The location differences in succession are particularly of interest as they likely reflect regional differences in dominant livestock and crop enterprises on those farms. Other studies have shown that high time-demand enterprises such as dairy farming will tend to have higher succession due to the prevalence of multiple operators on the farm operation (Kimhi and Nachlieli, 2001; Wolf, 2003).

As previously mentioned the use of a single cross-section of data for conducting analysis of succession is problematic and has limited empirical analysis of U.S. farm succession to estimates of the probability of a succession plan being in place. Studies with repeated cross-sections have added to the body of knowledge by showing the importance of the actual timing in which farm management transfers across generations. In particular, characteristics of both the senior and succeeding farm operator (and their families) will be of importance in the succession decision. Individual objectives across generations may be in conflict due to the opportunity costs associated with each generation's alternatives. For instance, a senior operator may need to transfer to a highly educated child sooner than would be optimal from an on-farm experience standpoint merely because of the potential for non-farm employment. Kimhi (1994) is able to confirm this intuition empirically using repeated census data, showing that *ceteris paribus* a more educated heir in Israel succeeds the senior operator at a younger age than one who is less educated.

Our approach to modeling succession detailed in the next section represents a hybrid of the single cross-section estimates on the probability of an in-place succession plan (e.g. Mishra and El-Osta, 2008) and the repeated cross-section analysis of farms that have changed hands (e.g. Kimhi, 1994). We next further conceptualize this approach and present the available data for modeling.

Model and Data

In this paper, we restrict our analysis to farms that currently have two operators (set apart by at least twenty years of age) on the farm and use characteristics of both operators in explaining our outcome variable. The outcome variable we key on is the generation (elder vs. younger) which has primary management responsibility for the farm as determined by response in the household survey. The tie to the farm succession decision of our outcome variable is then a natural extension of the apprenticeship period view on family business succession (Westhead, Howorth, and Cowling, 2002; Tauer, 1995). Here we model the likelihood that a family farm has not yet reached the point where the stream of marginal benefits of the younger generation assuming primary management responsibility outweighs the marginal cost of removing the senior person from management.

Figure 1 illustrates the transition of management responsibility over time between the elder and younger generation of family member operators. Initially, the elder operator assumes the majority of managerial responsibility. Over time, the elder operator relaxes his managerial duties while the younger operator eventually assumes a primary management role. Preceding studies observed data focusing solely on the primary operator looking ahead to the time of management transition (i.e. upper, left corner of the graph). Other studies evaluated the characteristics of a family farm before and after succession took place (i.e. the upper tier of the graph). By focusing on farms

that currently have two operators, where the primary operator may be either the older generation and younger generation, we are able to combat the limited analysis of the single cross-section data of those studies and observe data of both the primary and secondary operator before and after the transition of management responsibilities has taken place. Thus, our analysis can be viewed as a complementary contribution to those studies of U.S. succession that observes the likelihood of an in-place succession plan.

Data

Data for this analysis are from the 2002 Agricultural Resource Management Survey (ARMS). The Economic Research Service and the National Agricultural Statistics Service conducts the survey in an effort to collect data measuring the financial position and operating characteristics of farm businesses and to evaluate the welfare of farm households. The survey is distributed annually to operators associated with family-owned farm businesses in the 48 contiguous states. Data are collected from the primary operator of the farm who makes most of the day-to-day decisions. For the purpose of this study, we limited the data to only those farms that were family-owned and – operated (i.e. we excluded non-family corporations and farms run by hired managers).

Variables

The dependent variable represents the generation (elder vs. younger) which has primary management responsibility for the farm as determined by response in the household survey. A farm household classification (Keeney, Remble, Ogle, 2010) oriented toward the managerial organization of the farm business was referenced to separate the farms in these two categories. The typology, constructed using ARMS data, first separate family-operated farms into those managed under one operator and those managed under multiple operators. The farms in the latter category were again separated into clusters contingent on whether there existed more than 20 years of age between the primary and secondary operators. If the 20 year age gap is evident, these operators are assumed to be from subsequent generations. It was then determined which generation served as primary operator. For our analysis, the dependent variable was coded "1" if the elder generation still remained as the primary decision maker. The variable was coded "0" if the younger generation held the primary management responsibility, thus indicating that the management transfer decision had already taken place. To analyze this dichotomous variable, we use a limited dependent variable regression to explain differences in farm and family characteristics, financial indicators, and human capital. The variables used in the analysis are summarized in Table 1.

The first group of regressors that are expected to have an effect on the probability that the elder operator remains as the primary operator are the variables representing the human capital characteristics of both the elder and younger operators. These include age, education, off-farm work, and the experience of the younger operator on the farm. Increases in age of both the elder and younger operator (OLDAGE, YNGAGE respectively) is expected to initially decrease the likelihood of the elder generation acting as primary operator, as parents look toward retiring and children become older and more suitable to make management decisions. The education level of the elder generation operator, OLDED, is represented as a binary variable, with "0" indicating the elder operator completed some college or less and "1" indicating they achieved a four-year college degree or higher. The effect the education level of the elder operator has on whether they remain as the primary manager or not is uncertain. For example, more educated parents have a better ability to

evaluate the benefits of timely succession (Kimhi 1995). This could possibly trigger an earlier transfer process, resulting in a negative relationship between education and the dependent variable. On the other hand, educated parents can negotiate a later succession time with their potential successors, implying a positive relationship between the elder operator's education and their time spent as primary operator. The education of the younger operator, YNGED, is also represented as a binary variable, following the same format as the OLDED variable. The younger operator's education is expected to be positively related to farms where the elder operator remains as the primary operator as more educated offspring have more opportunities to pursue other career paths.

The off-farm work days of both operators (OLDOFF, YNGOFF respectively) is expected to have a significant effect on which operator assumes primary management responsibilities. However, the effect of off-farm work is ambiguous. If the elder operator works extensively off the farm, the farm may be considered a part-time farm, in which case a successor is needed less (Kimhi, 1995).Conversely, an older farmer who works extensively off the farm, may need another operator to take a more primary role. The amount of days the younger operator works off the farm is expected to have a positive relationship with farms where the elder operator makes the majority of day-to-day decision. This falls under the idea that a younger operator who works extensively off the farm has pursued other career paths. Both variables representing the off-farm work days of the two operators were converted to binary variables where "1" indicates if the operator has worked 50 or more days of four hours of more off the farm. The variable YNGEXP represents the years of experience the younger generation has on being an operator of the farm. This is expected to have a negative effect on the dependent variable as a more experienced young-generation operator would be suited to take on more managerial duties.

The second group of regressors is used to evaluate family characteristics that may have an influence on whether the younger operator has taken a primary role on the farm. OLDHSIZE represents the number of member living in the household of the elder operator. The effect of this variable on the dependent variable is uncertain. More household members may increase the likelihood that one of the operator's children would prefer to take over managerial duties. On the other hand, having more than one child interested in succeeding could delay the transfer process as the elder operator may need more time to choose his primary successor. The household size of the younger operator, YNGHSIZE, is predicted to have a negative effect on the probability that the elder operator is the primary operator as a younger operator with more dependents is assumed to have a greater need to provide for their family and establish a secure career for the future.

The third group of regessors describes farm characteristics that may have an influence on whether the elder operator has a more important role in day-to-day decisions. Farms that specialize in dairy are more likely to an appointed successor because of its extensive labor requirements and rigorous time demand. This suggests that there is a negative relationship between dairy farms and a farm that is managed primarily by an elder generation operator. A binary variable, DDAIRY, was created to represent dairy farms. "1" represents farms where a majority of the farm's gross income comes from its dairy operation. The same concept can be applied to the effect of a mainly poultry-producing farm.

Finally, we control for financial characteristics. We test for crop sales, CROPSHR, which is represented as a ratio of sales from crops as a portion of total farm sales (crops and livestock). This ratio serves as an indicator of the extent that the farm is specialized in crop production. The debt to asset ratio, RATIO, is used as indicator of leverage position. A larger debt-to-asset ratio is predicted to have a negative relationship with the dependent variable. The ratio of the labor expenses over the annual gross farm income, LABOR, is another financial indicator observed for the model. Farm

expenses, ETOT, are an indicator of farm size. Mishra and El-Osta (2007) found that larger farms are more likely to have an appointed successor or have already transferred management.

The variable means of two family-farm types, those where the older generation operator serves as primary operator and those where the younger generation operator serves as primary operator, are reported in Table 2. A mean-difference z-test was conducted to compare the means of the explanatory variables, along with several other farm characteristics, with respect to the two types of farms. A significant difference ensued for the following variables: work experience on the farm and household size for both the elder and younger generation operators, the education, gender, and off-farm work days of the younger generation operator, as well as the tenure of farm and whether it specializes in dairy.

Young operators who serve as the primary operator have completed a significantly higher level of education than those that serve as secondary operator. This could be explained by the idea that the greater responsibilities associated with becoming a primary manager require more formal education. Additionally, some apprentices may serve as secondary operators while attending school. Also note, the age for both operators does not appear significant. This is a surprising find since other studies (Kimhi, 2001; Wolf, 2003) found operator age to be a significant explanatory variable in determining if a successor had been declared. Another interesting result of the mean-difference test is the difference in gender of the operators. According to the statistics, 30% of elder secondary operators are female, which is twice the number that is primary operators. This could be an indication that many surviving farm wives continue in a management role. Younger females appear much more likely to retain secondary status in farm management.

Estimating Model

We model the farm household's utility derived from the choice of which generation has primary management responsibility as in equation (1) below,

$$U_{ij} = \beta X_{ij} + e_{ij} \tag{1}$$

where i indexes families in the data and j indexes operators which can be assigned primacy in the management team. X_{ij} is a vector of family, farm, and human capital characteristics and financial indicators, β is the estimated coefficient, and e_{ij} is the error term. As we do not observe utilities of the choice made or that foregone among operators, we need to convert the stochastic utility equation in (1) to a model that we can estimate with our data. Thus, we assume that if j are possible primary operators, the one observed is the utility maximizing one and using the inequality in (2) convert the model to a limited dependent variable.

$$\text{Prob}(U_{ij} > U_{ik}) \tag{2}$$

As we only observe information on two operators in the data, the limited dependent variable is a binary choice:

$$Y = \begin{cases} 1, elder = primary \\ 0, otherwise \end{cases} \tag{3}$$

and can be modeled with the logistic equation as:

$$P(Y_i = 1) = \frac{e^{\alpha+\beta X_i}}{1+e^{\alpha+\beta X_i}} \quad (4)$$

Equation (4) estimates how family, farm, and financial characteristics influences the decision for the elder generation operator to resumes primacy in management decision (Y=1). The estimated logit model provides a set of probabilities for the decision and implementation to transfer management responsibilities of a family farm business with characteristics X_i. The magnitudes of the parameters, β, are not directly interpretable. Therefore, it is necessary to report the marginal effects of each variable. These effects are modeled as:

$$\frac{\partial E[y \mid x]}{\partial x} = \frac{e^{\beta X_i}}{(1+e^{\beta X_i})^2}\beta \quad (5)$$

and can then be interpreted as follows: if the estimated marginal effect on variable x_1 is k, then a one unit increase in x_1 is expected to have a k*100 percent increase in the probability that Y=1.

Results

The logit model from equation (3) was used to analyze the effects of farm, financial, and family characteristics of family farm business on the probability that the elder generation operator remained as the primary management decision maker. Table 3 reports the results of the logit model. The first column reports the regression coefficients, and the last column reports the marginal effects of each characteristic on the dependent variable. The interpretation of the marginal effects is the amount that the probability that the older generation operator remains as the primary operator increases per unit of dependent variable increase.

Consistent with our predictions, the age of the elder operator had a significant effect, at the 1% level, on whether that operator remained as the primary manager. The age of the elder operator has a negative relationship with the probability that this operator is the primary operator. For example, with every year the elder generation operator gets older, they are 1.68 percent less likely to remain as the primary operator. As the elder generation operator gets older and approaches retirement, he becomes more aware of the need to pass off duties to his successor. When the age of the elder operator is graphed against the probability that the younger operator is the primary operator, Figure 2, we see there is a positive relationship. Thus an increase in the elder operator's age, the more likely that operator has released managerial control to the succeeding operator. This relationship is also expected since elder farmers reaching retirement are more likely to start planning for the future of their farm.

The work experience on the farm of the younger operator was also negatively related to the probability that the older operator remained as the primary manager at a significant level (at the 10% level). With every year of experience working on the farm, the younger operator is 0.12 percent more likely to have taken on the primary management responsibilities. This relationship can be explained by the idea that younger generation farmers who have been working on the farm for an extended amount of time experience some apprenticeship benefits prior to taking on management responsibilities (Westhead et. al., 2002).

Another characteristic that increased the probability that the primary management responsibilities had been passed off to the younger generation operator was if the farm specialized as a dairy operation. If a majority of the farm's gross income comes from its dairy operation, the

younger generation is 0.02 percent more likely to have taken over as primary manager. This is significant at the 5% level. Kimhi and Nachlieli (2001) argue that parents have an incentive to declare a successor early due to the relatively large amount of work require for this type of operation. Also, dairy farms are more attractive to potential successors, as they tend to be a relatively stable and reliable source of income and that these farms are likely to remain specialized dairy farms in the future. (Wolf, 2003) Other types of farms may likely be considered, however poultry did not prove to be significant in this model.

The model identified that off-farm work hours of the younger operator had a significant impact on whether the farm had transferred the primary management responsibilities. Significant at the 1% level, an increase in the off-farm work had a negative impact on the probability that the senior operator remained in control. In other words, if the younger operator worked off the farm more than 50 days a year, for at least four hours per day, they were 20.65 percent more likely to have taken a primary, decision-making role on the farm. The negative sign of the estimated coefficient was inconsistent with our predictions, but further consideration reveals that this relationship may be explained by a number of farms operations drawing income from other business ventures.

The household size of the younger generation operator significantly affected which generation operator assumed the role of primary manager. The coefficient of the size of the younger operator's household is negative and statistically significant at the 1% level. Therefore, as reported in Table 3, with every additional member of the young operator's household, that operator is 0.20 percent more likely to assume the primary management role.

Other characteristics that were statistically significant in the model were the age of the younger operator, the household size of the elder operator, and the total expenses of the farm. The coefficient of the age of the younger operator was positive and statistically significant at the 10% level. This means that the younger operator's age had a positive influence on the elder operator remaining in the primary management position. The marginal effect indicates that with every year the younger operator gets older, the younger operator is 0.81 percent more likely to remain in a secondary role (Figure 3). This is inconsistent with our prediction, however further investigation reveals the idea that the younger operator may have already pursued other career paths instead of investing in eventual transition of primary management.

Using the results from the model, we can observe the changes in the probability that the younger operator is the primary operator with changes in the age of both operators. Figure 4 illustrates the likelihood of the younger generation operator being primary operator against changes solely in the age of the elder generation operator, holding constant the gap between elder and younger operator ages. We now evaluate the age gap between the two operators at three different levels (20, 25, and 30 years). First note that as the age of elder operator increases, the probability that the younger operator assumes a primary role increases regardless of the age gap. When the elder generation operator approaches their mid-50s, they are more likely to have passed off managerial responsibilities when there is a 30 year age gap as opposed to a 20 year age discrepancy. However, as the elder generation operator reaches their 70s, the age gap between the two operators become less prevalent as the elder operator looks towards retirement. Thus, the age gap between the two operators is a more influencing factor earlier in the elder operator's life than later.

The household size of the elder operator was also positively related to the dependent variable. The coefficient was significant at the 5% level. We can interpret this variable by stating that an additional member in the elder operator's household makes them 0.41 percent more likely to remain as primary manager. This indication may be a result of the fact that the operator's family

depends on a steady and sufficient income. Plus, more household members may complicate the inheritance process and delay the choice a dynastic successor.

The only financial indicator that proved statistically significant in the model was total cash expenses. The coefficient of total farm expenses was positive and statistically significant at the 5% level. This means that increases in expenses increase the probability that the elder generation operator still controls a majority of the operations. The marginal effects suggest that with every thousand dollar increase in cash expenses, the older generation operator is 0.01 percent more likely to remain as the primary operator.

Conclusions

A growing literature in agricultural economics has surfaced to identify the determinants of family farm succession. This literature has well-established the importance of understanding the farm transfer decision for drawing relevant sector-level implications of farm structure (size and specialization) as well as the continued prevalence of farm household pluriactivity (Glauben, Tietje, and Weiss; Kimhi and Nachlieli; Mishra and El-Osta). While this literature has relied primarily on cross-sectional information and stated intentions of farmers to declare a family member a successor in management, it provides only limited guidance on the more general question of the optimality of succession with respect to timing (i.e. age of senior-most operator) and how it interacts with relative educational and farming experience of the younger generation in the intergenerational transfer of farm businesses.

We use cross-sectional data from the USDA-ERS' Agricultural Resource Management Survey (ARMS), an annual survey of farm household activity (farm and non-farm earnings, business and household expenses, etc.) Using a typology of farm households (Keeney, Remble, Truax, 2010) we restrict our analysis to farms that currently have two operators (set apart by at least twenty years of age) and use characteristics of both operators in explaining our outcome variable. The outcome variable we key on is the generation (elder vs. younger) which has primary management responsibility for the farm as determined by response in the household survey. We estimate the probability of older generation primacy using a logit model and farm, family, and operator characteristics as the covariate.

Results from comparing household, business, and financial characteristics of the two types of multi-generational farm businesses indicate some striking similarities and important differences (at the means) which will be useful in explaining the decision between generations for primary operator assignment. As expected, the age of both operators proved to be significantly different between the two types of farm groups. Further investigation revealed that the age gap between the two operators has a stronger influence before the elder operator reaches an age of retirement. We may attribute this behavior to the idea that senior farmers hand off responsibilities sooner to ensure farm continuation. Human capital and family characteristics, such as the work experience, off-farm work, and household size of the younger operator were statistically significant, though surprisingly the education of the elder and younger operators was not, despite the discrepancies in means. Of particular interest is the finding that an increase in off-farm work of the younger generation operator tends to increase the probability that they serve as primary manager. In terms of financial characteristics, we find that the only variable proved significant was household expenses. The differences in these significant variables point towards the decision to transfer primary operator status being influenced by family and human characteristics and less related to financial and farm characteristics.

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Figure 1: Conceptual Graph of a Farm Management Succession against Time.

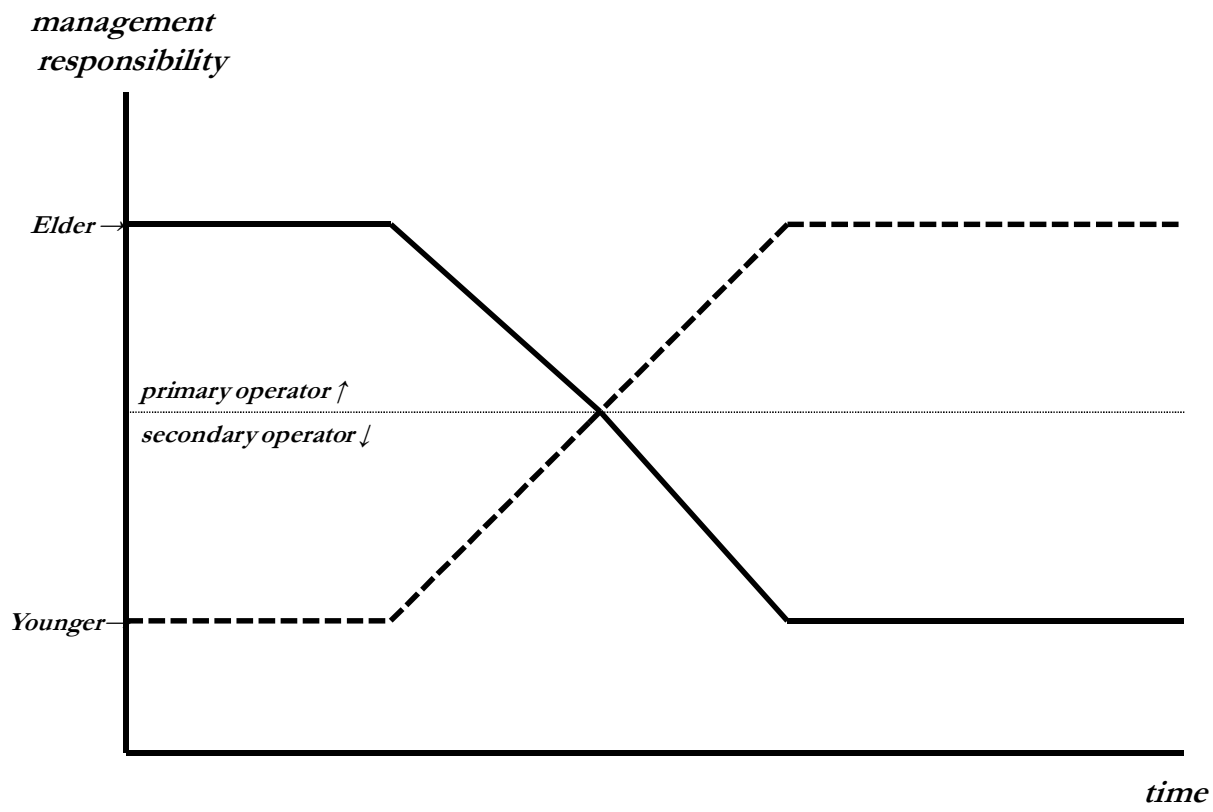

Table 1: List and Description of Dependent Variables in the Model

Variable	Description and Units
OLDAGE	The age of the elder generation operator.
YNGAGE	The age of the younger generation operator.
OLDED	"1" if the elder generation completed a four-year college degree or more, "0" otherwise.
YNGED	"1" if the younger generation completed a four-year college degree or more, "0" otherwise.
YNGEXP	Years the younger generation operator has worked on the farm.
OLDOFF	"1" if the elder generation has worked 50 days or more at least 4 hours per day in 2002, "0" otherwise.
YNGOFF	"1" if the younger generation has worked 50 days or more at least 4 hours per day in 2002, "0" otherwise.
OLDHSIZE	Number of persons living in the elder generation's household.
YNGHSIZE	Number of persons living in the younger generation's household.
DDAIRY	"1" if the dairy operation represents the largest portion of gross annual income, "0" otherwise.
DPOULTRY	"1" if the poultry operation represents the largest portion of gross annual income, "0" otherwise.
CROPSHR	Ratio of crop sales over total sales (crop + livestock).
RATIO	Total debt to total asset ratio.
ETOT	Total annual expenses.
LABOR	Ratio of labor expenses over gross farm income.

Table 2: Reported Means and Z-Scores for Explanatory Variables

VARIABLE	TYPE 4	TYPE 5	COMBINED	Z-Score
Age				
Elder Operator	66	70.82	67.43	-1.28
Younger Operator	37.87	43.04	39.4	-1.57
Age Difference	28.13	27.78	28.03	0.22
Work Experience on Farm				
Elder Operator	27.05	32.33	28.61	-1.66***
Younger Operator	12.71	17.46	14.12	-2.47*
Education				
Elder Operator	0.26	0.16	0.23	1.18
Younger Operator	0.21	0.46	0.29	-2.14**
Gender				
Elder Operator	0.17	0.3	0.21	-0.91
Younger Operator	0.23	0.07	0.18	1.98**
Household Size				
Elder Operator	1.97	3.41	2.39	-4.02*
Younger Operator	2.42	1.35	2.1	4.27*
Off-Farm Work Days				
Elder Operator	0.32	0.19	0.28	1.38
Younger Operator	0	0.68	0.2	-13.60*
Crop Share	0.32	0.3	0.32	0.24
Gross Farm Income	213393.97	195214.1	208000.2	0.35
Net Farm Income	36051.3	30532.19	34413.84	0.38
Total Expenditures	157.77	149.26	155.25	0.20
Labor Expenditures	29524.99	16781.96	25744.28	1.02
Value of Real Estate	734296.01	571724.4	686062.91	1.28
Net Worth	884400.32	724732.7	837028.78	1.03
Total Assets	984518.04	819143.6	935453.36	0.96
Tenure	0.77	0.58	0.71	1.85***
Acres Operated	1140.01	852.47	1054.7	0.59
Dairy Operation	0.1	0.06	0.09	1.79***
Poultry Operation	0.01	0.01	0.01	0.00

Table3: Logit Estimates of the Effect of Variables on the Probability of the Older Generation Resuming Primary Management Responsibility

Variable	Estimate	Marginal Effect
Age		
Elder Operator	-0.10 *	-1.68
Younger Operator	0.07 *	0.81
Education		
Elder Operator	0.84	0.05
Younger Operator	-0.15	-0.01
Work Experience on Farm (Younger Operator)	-0.04 **	-0.12
Household Size		
Elder Operator	0.81 *	0.41
Younger Operator	-0.36 *	-0.20
Off-Farm Work Days		
Elder Operator	0.31	0.02
Younger Operator	-20.65 *	-0.96
Dairy Operation	-0.87 *	-0.02
Poultry Operation	0.02	0.00
Crop Share	-0.55	-0.04
Debt/Asset Ratio	-0.15	0.00
Total Farm Expenditures	0.00 *	-0.01
Labor Expenses	1.87	0.10
Intercept	6.56 *	--

Notes: Author's estimates using 2002 Agricultural Resource Management Survey Data. Estimates for which p <= 0.05 indicated by *, those falling within p = (0.05, 0.10] are indicated by **. Standard errors for estimates are calculated using the jackknife replicate weight estimator as detailed in Dubman (2000) and Kott (1998). (Marginal effects are calculated at sample means. Marginal effects for dichotomous explanatory variables are calculated for Pr(Dep. Var. = 1 | X = 1) – Pr(Dep. Var. =1 | X = 0).

Figure 2: Effect of the Older Operator's Age on the Predicted Probability of the Younger Operator Assuming Primary Management Responsibility.

Figure 3: Effect of the Younger Operator's Age on the Predicted Probability of the Younger Operator Assuming Primary Management Responsibility

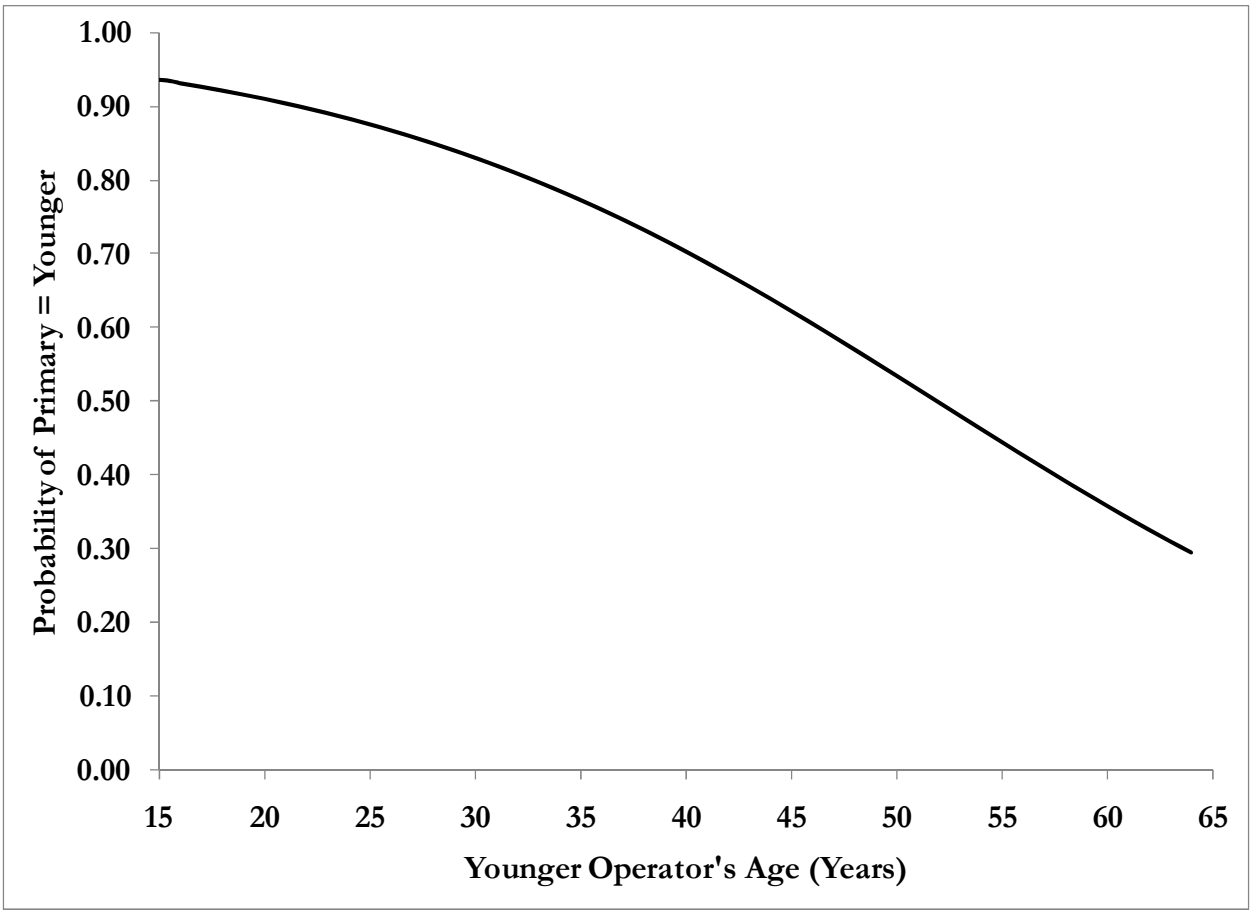

Figure 4: Effect of the Old to Young Age Gap on the Predicted Probability of the Younger Operator Assuming Primary Management Responsibility.