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DETERMINANTS OF FARM EXIT IN KOREA

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Farm exit, Farm size, Operator age, Farm characteristics, Farm consolidation

Abstract
This paper assesses the forces driving farm exits over the period 1998 through 2002, using Korean farm-level data, focusing on basic farm and operator characteristics such as farm size and operator age likely to affect exits. This study applies a logistic regression model to the data set to investigate factors that contribute to farm exits and estimate exit probabilities for farms with different characteristics. The results show that exit probability initially declines with operator age until it reaches a retired age but increases after the age. The findings also indicate that the probability of farm exit decreased with very smaller farm size, but then increased for farms with medium sized, and again decreased for larger farm size. Farms with a relatively large number of family members are less likely to exit.

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I. Introduction

The current consensus in Korean agriculture is that expansion of individual farm landholdings via exit of some farms, a process generally labeled 'farm consolidation,' can improve productivity and competitiveness (e.g., Lee, 1998; Kim, 2004). Since Korea's total supply of agricultural land is approximately fixed, the expansion of land per farm has mainly depended on such consolidation. This practice requires that some number of farms cease operations, while their acreage remains in agriculture, thus leaving the remaining farms with greater landholdings. Farm exit of some farms thus can be one factor leading farm consolidation. When the rate of farm exit exceeds the rate of entry plus the rate that land and other resources are removed, remaining land is likely to be left to fewer and larger farms. The number of farm exits thus should be significantly larger than the number of new farms entering.

Korean government policies aiming to achieve farm consolidation have promoted expansion through policy projects and programs. One of purposes of the recent government project, 'Comprehensive Agricultural and Rural Programs', seeking improvement in agricultural structure through a 119 billion won investment during ten years from 2004, is to expand land holdings per farm for improvement of Korean agricultural competitiveness and productivity. One of the programs to promote farm consolidation, direct payments for management transfers are aimed at inducing marginal farmers, who are usually older people, to retire early.[1]

Under the current policy regime, an important question is whether exited farms are marginal farms that are targeted to exit from farming for adjustment of agricultural structure. Here, previous studies showed that marginal farms that locate far from frontier of production function are regarded as old

1 'Direct payment for management transfer' began in 1997, with farmers receiving 2,890,000 won per hectare in the form of a lump sum. Since 2004, these payments have come in the form of pensions totaling 240,000 per hectare each month, until age 70 (temporarily extended to 72 in April 2004); farmers, however, must sell their land to other farmers or KARICO, be 63 to 69 years of age, and have operated a farm for a minimum of 10 years (with the farm having less than 2 hectares in at least 3 of those years).

farmers with small farm sizes (kang, 2005). If exited farms are marginal farms, efforts for farm consolidation via exit of some farms can be evaluated as success results. However, if farms with medium farm sizes exit and transfer their farmland to larger farms, the objective of farm consolidation is achieved, but undesired problems such as polarization in farms will be happened. Desired farm consolidation is accomplished through the expansion of individual farm landholdings via exit of marginal farms, which may be connected to successful ways for adjustment of agricultural structure.

Though the importance of farm exits is widely acknowledged, issues relating to characteristics of exited farms in Korean agriculture are understudied. There has been little empirical work analyzing these issues, particularly at the farm level.

This paper assesses the forces driving farm exits over the period 1998 through 2002, using Korean farm-level data. Especially, this study examines whether marginal farms of older farmers with smaller farm sizes exited from farming to understand farm exits occurring in Korean agriculture.

This paper focuses two fundamental drivers of farm exits, farm size and operator age. Farm size, measured in farmland area, is important in understanding exits. Using the same data set, An and Kim (2004) assessed factors potentially influencing exit decisions. In their analysis, nine factors affecting exits are identified: farm operator age, farmland operated, zone, commodity type, debt, family size, part-or full-time status, land value, and level of non-farming income. Some of these variables though, may lead to endogeneity in estimation. For example, explanatory variables such as part-or full-time status, debt, level of non-farming income and farm exit decisions are typically correlated, although the direction of causation is not clear; for example the probability of exit may increase as a farmer participate off-farm work or, conversely, farms may more participate just prior to exiting. It is also possible that the two trends could feed off one another simultaneously. Ignoring the possibility of endogeneity between these variables and farm exits thus may cause problems in estimation and, furthermore, cloud policy recommendations. Also, their paper did not capture a nonlinear relationship between farm size and farm exit. Accordingly, this paper estimates the impact of exogenous farm characteristics on farmers' exit decisions while taking into account the potential for endogeneity of related variables and nonlinear relationships between variables and exit.

I apply a logistic regression model to the data set to investigate factors that contribute to farm exits and estimate exit probabilities for farms with different characteristics. This paper first shows how exit rates vary with two fundamental drivers, farm size and operator age. Then the study explores how exit rates vary with several additional farm and operator characteristics, controlled for farm size and operator age.

Knowing which types of farms are more likely to exit might be useful to policy makers interested in the effects of exits on exiting farmers, the remaining farms, and farm communities. Furthermore, understanding farm exits also provides useful information to evaluate policy programs such as 'direct payment for management transfer' and 'larger scale of farming'.

This paper is divided into four sections. Section II specifies how the data are treated for the purpose of implementing the farm exit model and presents descriptive statistics on farms that exited during the five period. Section III presents a framework for analyzing probability of farm exit as a function of conditioning variables, specifically the binominal logit model. Section IV lists and discusses the factors influencing farm exit, focusing on farm size and operator age. Section V describes empirical analysis using the logit models and then provides results.

II. Data Treatment and Descriptive Statistics

This paper uses the data that were collected in a national farm survey from 1998 through 2002. The survey observed individual Korean farms across nine provinces over the five-year period. In these data, an exit from the sample is indicated by removal of the farm identification number in the year following the exit. The survey was organized such that farms remained in the sample unless they exited farming altogether. That is, because of the effectiveness of interview efforts, there was no observation lost to normal survey attrition.

Over the five-year period, about 25 observations ere excluded because the age of operator between two surveys was changed by more than two years. Many of those are likely to be a retirement of the older farmer and replacement by a younger family member. These farms were not considered farm exits[2]. These data thus underestimate overall farmer retirements, because an operator remaining within the family was not considered a farm exit.

Exited farms are displayed between successive years. To distinguish exited from continuing farms in the sample, a new variable, $EXIT_{t\text{-}1,t},$ is gen erated, defined to equal 1 if the farm exited between $t-1$ and t, and 0 otherwise.

Over time, there has been an observed decline in the number of farms in Korean agriculture (Table 1). The percent of decline from 2000 to 2002 in the number of farms is about-7.45%, implying farm exit rate is high.

TABLE 1. Changes in the Number of Farms in Korea

Units: Household, %

Year	1992	1998	2000	2002
Number of farms (household)	1,640,853	1,413,017	1,383,468	1,280,462
Percent of decline from the year to 2002	-21.96%	-9.38%	-7.45%	

Source: KOSIS Statistics DB search, Korea National Statistical Office (www.nso.go.kr).

For our data, Table 2 reports the number of exited farms in each subsequent year, i.e., the number of farms with $EXIT_{t\text{-}1,t}$=1 for each subsequent year. The average rate of exit in each subsequent year, except 2002, is about three percent of the total number farms in the sample.

Comparing Table 2 with Table 1, notice that the rate of farm exit in this sample is greater than the net decline rate for all of Korean agriculture for the period 1998 to 2002. Over this five year period, 11 percent of farms exited nationwide. The reduction in the number of farms in Korea over this period is about 10 percent. However, this is exits minus entrants, so it represents a net figure not simply the percentage of exits.

2 Farm exit, as actually observed, includes natural exit by retirement voluntary exit to find anew job, and business failure. The decision to exit is usually partly planned and partly a response to poor performance. In a case, expected alternative utility must be greater than expected on-farm utility by a factor large enough to cover the cost of exit.

The average exit rate of about 2.6 percent per year is consistent with a constant rate of retirement after about 38 years of farming. So, this exit rate would apply to a sample of farmers who began farming at age 27 and retired at age 65. Of course, as Table 3 shows, there are some exits at every age category.

Table 3 presents descriptive statistics on exited farms in the sample. The mean farm size of exited farms (0.94 hectares) is smaller than the average size of continuing farms (1.47 hectares).

TABLE 2. Average Exit Rates in the Sample

t-1	t	No. of exiting farms between t-1 and t / No. of total farms at t-1	Average exit rate
1998	1999	82 / 2,877	0.029 (0.17)
1999	2000	84 / 2,905	0.029 (0.17)
2000	2001	85 / 2,907	0.029 (0.17)
2001	2002	56 / 2,909	0.019 (0.14)

Note: Standard deviations in parentheses.

TABLE 3. Descriptive Statistics on Exited Farms (1998-2002)

	Exits		Non-exits	
	Mean	Std. Dev.	Mean	Std. Dev.
Average farm size	0.94	(1.075)	1.47	(1.284)
Farm exits by farm size				
ha < 0.5	5.72%	(0.232)		
0.5≤ ha < 1.5	2.45%	(0.155)		
1.5≤ ha < 3.0	1.20%	(0.109)		
3.0≤ ha	1.29%	(0.113)		
Average age	59.29	(13.234)	56.48	(10.506)
Farm exits by age				
Age < 40	4.28%	(0.202)		
39 < Age < 55	1.76%	(0.131)		
54 < Age <65	1.89%	(0.136)		
64 < Age	4.58%	(0.209)		
Average schooling	7.55	(3.541)	8.02	(3.103)
Average family size	2.45	(0.764)	2.81	(0.701)

Farms controlling less than 0.5 hectares recorded an exit rate of 5.72 percent and farms between 1.5 hectares and 1.5 hectares recorded an exit rate of 2.45%, compared to only 1.29 percent for those with more than 3 hectares.

The mean age of exited farm operators is 59.29 years, which is older than the age of continuing farmers (56.48 years). Farm operators less than 40 and above 64 years of age demonstrated the highest rates of exit (above 4 percent) among age groups.

Average schooling of exited farm operators is 7.55 years, which is lower than that of continuing farmers. The average family size of exited farms is 2.45 people per farm, smaller than that of existing farm.

III. Empirical Implementation

1. Methodology: The Logit Model

To examine the characteristics of farms leaving Korean agriculture, the probability of farm exit, as a function of conditioning variables, is estimated. The logit model, as a binary dependent model, is constructed for the empirical analysis[3]. Note that the exit probabilities estimated from the logit model are conceptually different from the simple exit rates calculated by dividing exits by the number of farms in the corresponding categories. Exit probabilities simultaneously control for the operator's age and the size of the farm, while exit rates do not. Probabilities thus estimated from the logit model are called 'exit probabilities' in this research. The term 'exit rate' is reserved for simple exit rates.

With farm exit being observed in pairs of adjacent years, a rational farmer is assumed to have a discrete choice at the end of each year-exit or stay – and this decision shows up in the following year (with the farm reported as continuing or exited).

[3] Logit or probit models are usually chosen for estimation in cases where the object is to analyze the choice between two alternatives, in this case, exit or continued operation. In cases like this one, where the explanatory variables's assumption of normally distributed error terms may not beappropriate Maddala, 1983)

The farmer seeks to maximize the present value of expected utility from each of these options, over a specified time horizon. Let V_{t-1}^E and V_{t-1}^S represent the farmer's present value of expected utility from exit and stay, respectively, evaluated at period $t-1$. The farmer decides to exit if $W_{t-1,t} = V_{t-1}^E - V_{t-1}^S > 0$. $W_{t-1,t}$ can be thought of as the propensity or net benefit of exit between $t-1$ and t. Being a latent variable, $W_{t-1,t}$ is assumed to be a random function of vectors of observed exogenous variables, X_{t-1}, and ex pressed as;

(1) $$W_{t-1,t} = X_{t-1}\beta + u_{t-1},$$

where β is a vector of unknown coefficients and u_{t-1} is assumed to have a specified probability distribution. In the original sample, net benefit of exit is represented by the following observable dummy variable:

(2) $$EXIT_{t-1,t} = 1 \text{ if } W_{t-1,t} > 0$$

(farmer decides to exit at the end of period $t-1$, so that the farm exits in period t),

$$EXIT_{t-1,t} = 0 \text{ otherwise}$$

(farmer decides not to exit at the end of period $t-1$, so that the farm remains in period t).

Given observations for $EXIT_{t-1,t}$ and X_{t-1} and assuming u_{t-1} is *i.i.d.*, logistic, distributed with mean zero and variance σ^2, the logit model specified for farm i between $t-1$ and t is defined as the following (Maddala, 1983):

(3) $$\Pr(EXIT_{it-1,it} = 1 \mid X_{it-1}) = F(X_{it-1}\beta), \text{ for } i = 1,....,n,$$

where $F(z)$ is a logistic function, characterized as $F(z) = \{1 + \exp(-z)\}^{-1}$.

From this model, the log likelihood function for estimation is:

$$(4) \qquad \ln L = \sum_{t=2}^{T} \{EXIT_{it-1,it} \ln F(X_{it-1}\beta) + (1 - EXIT_{it-1,it}) \ln[1 - F(X_{it-1}\beta)]\}.$$

The marginal effect of a parameter on farm exit is denoted as,

$$(5) \qquad \frac{\partial E(y \mid x)}{\partial x_k} = F(\beta' x)[1 - F(\beta' x)]\beta_k.$$

2. Farm Characteristics Influencing Farm Exit

Several farm characteristics are assumed to affect the decision to exit, X_{it}: farm size, farm operator's age and education, and family size. This paper focuses on farm size and operator age as important factors of farm exit. Other independent variables such as operator education and family size are also added to the model in order to measure how variation in that those particular variables affect the probability of exit, after controlling for age and farm size.

Age is a complex variable that, absent more detailed data, is a proxy for several distinct effects: farm experience, vintage experience, schooling, life horizon, and physical depreciation. More experience leads to better management skills and productive ability, suggesting that farmers with more experience are less likely to exit. Experience vintage is associated with the cohort of the farmer; younger cohorts have more schooling, initial wealth, and access to newer initial technology. Since age is positively correlated with education in the data, its effects are similar to those of education. The life cycle of farm operators is also important in understanding farm exits because most Korean farms are fairly small family business and the life of the farm is correlated with the life of the farmer;, aging is an approach to the end of life so that, as farmers become very old, they experience lowers returns to investments in human capital and productive resources. The correlation is not 100 percent because of two reasons. The farm may continue as a business after a retired age because their opportunity cost for off-farm work is very low so they would like to keep staying farming until they die even their farm profit may be not in balance. Also, the farm may continue as a business after an elderly operator leaves, if operation of the farm as a separate business continues under another operator, such as an adult child.

Farm size is associated with exit[4]. Larger farms generally are less likely to exit by economies of scale, at least in the U.S. and Canada (Hoppe and Korb, 2006). However, fixed asset hypothesis in farming can be operated as an impediment for exit of smaller farms. In the context of Johnson's (1958, 1972) analysis, farm produce with existing assets so long as marginal revenue exceeds variable costs when there is asset fixity. Asset fixity, therefore, has been a way to explain whey smaller farms without agricultural profit keep staying farming.

Education has two distinct and offsetting effects. First, higher levels of education make farmers more efficient in farm production. Second, greater amounts of education raise the productivity of off farm work and lead to a high opportunity cost associated with off farm work. It is, therefore, unclear if higher education level increases the probability of farm exit; more educated farmers may be more successful at farming, decreasing the probability of exit, but the higher opportunity cost tied to greater human capital might expedite exit. Also, more education may reduce transition cost because of greater off-farm search ability.

Family size, defined as the number of family members weighted by the labor capacity of each member, can also be considered when examining farm exits. Family members can be thought of as being part of the available

[4] Note that endogeneity (or simultaneity) may be a problem since two variables might act on one another simultaneously; farm size may lead to lower probability of exit, or, inversely, higher probability exit may lead to smaller farm size. An available technique, which can solve the endogeneity problem, is use of instrumental variable. However, it is difficult to find strong instrumental variables. When weak instrumental variables are used for estimation, the results may suffer from a large loss of associated information. Actually, I tried to solve the endogenity problem, so farm size in 1998 year was selected as an instrument variabl for farm size in 2000 and 2001 year However, I found no evidence of improved fit from adding the instrumental variable. Even though the existing literature recognizes these endogeneity problems, they are still not ultimately resolved. For example, Kimhi and Bollman (1999) argue that these problems are not likely to be more serious than in any exit type of study.

labor force for a farm; large families provide a relatively low-cost source of labor, and may be a factor in profitably sustaining the farm. Family size may also reflect higher cost of transition from farm to urban occupation and residence.

IV. Empirical Results

This paper first estimates two base models with two independent variables of operator age and farm size for the farm[5]. One uses dummy variables that depict four operator age classes and four farm size classes. The other replaces the categorical variables with continuous measures, using hectares of farmland, hectares squared, and hectares cubed as well as age and, age squared, age cubed to capture nonlinear relationships between variables and farm exit. These base model estimates provide a useful point of comparison when we add additional variables.

The logit model estimates a farm's propensity to exit conditioning on explanatory variables. This is accomplished by maximizing the log likelihood function, given equation (4). Note that the coefficients are estimates of the partial derivatives of the tendency to exit with respect to each of the explanatory variables[6]. Marginal effect of a parameter is evaluated at the sample mean of the data.

Table 4 presents results of the first base model that estimate the impact of operator age and farm size on the probability of farms to exit. The model is significant at the one percent level, as indicated by the LR chi-square statistics.

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[5] Using a base mode that includes only operator age and farm size variable does not imply that the decision to exit is simple. As pointed out by Kimhi and Bollman(1999), the decision to exit can be fairly complex even if only age and profitability are considered. Farm size could be considered a proxy for profitability in this paper, given the relationship between farm size and operating profits.

[6] The logit model has an advantage in that the parameters can be directly interpreted in terms of the effects of regressors on the odds ratio-which measures the probability that $EXIT_{t-1,t}=1$ relative to the probability that $EXIT_{t-1,t}=0$ (Maddala, 1983).

Operator age and age squared are significant, but age cubed is not significant. As the operator gets older, farms are less likely to exit, at least until the operator reaches retirement age, 66.7 years old. As retirement age approaches, however, operators are more likely to exit. Age also represents farming experience, older operators, below retirement age, have a lower probability of exit. This result is consistent with the hypothesized effect of successful learning through accumulated experience on farming. A farmer's operations, however, shrink as retirement and natural exit approaches. Another scenario has farmers, above a certain age, exiting because they are unable to adapt to rapidly changing conditions and technology. The probability of exit decreases with operator age at early ages but increases once a threshold age is reached. The number of farmers over 60 years of age has been increasing in Korea because these older operators have relatively lower opportunity costs associated with off farm work and thus end up staying in agriculture until natural retirement.[7] As such, exits of aged farmers in Korea are most likely for the purpose of retiring, as opposed to seeking employment outside of agriculture.

Farm size, size squared and size cubed are all significant in the model. Coefficient signs of the three farm size variables indicate a complex nonlinear relation between farm size and exit. The amount of farmland operated has increased, presumably reducing the likelihood of exit, at least until first threshold size reaches. From the first threshold, as farm size increases, however, farms are more likely to exit until second threshold size. From the second threshold size point, as farm size increases, farms are less likely to exit.

Such result suggests smaller farms and larger farms are less likely to exit, however, medium farms are relatively more likely to exit. This relationship between farm size and exit probability may be explained through scale economies and fixed asset hypothesis. Scale economies (or returns to scale) refer to the change in output resulting from a proportional change in all inputs. Scale economies typically increase with larger farm size (i.e. increasing returns to scale). Conversely, an expanding scale of productions indicates that the as-

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7 The percentage of elderly people (60 and above) in the rural population has been sharply and steadily rising; it has increased form10.% in 1980 to 17.% in 1990 and finally to 39.0% in 2003 (MAF, 2005).

sociated farmer has an incentive to increase output and stay in farming. A reasonable assumption therefore can be made that large farm operators enjoy competitive advantages in agriculture and have less of an inclination to exit. A decreasing scale of production, however, suggests that the corresponding farmer has an incentive to reduce outputs, production capacity, and investment and ultimately relinquish farming. Small farms stay agriculture than medium ones because farmers operating small farms are most the old in Korea. Old operators have low opportunity cost of off-farm work, so old farmers with small farm are going into operation with existing assets so long as marginal revenue exceeds variable costs when there is asset fixity. Furthermore the decline of medium sizes might lead to by polarization problems of farms.

TABLE 4. Base Model I: Impacts of Operator Age and Farm Size on the Probability of Farms to Exit

	Dependent variable: $EXIT_{t-1,t}$	
	Estimates	Marginal Effects
Operator age	-0.9731	-0.0102
	(0.1887)**	(0.0037)
Operator age ^{2}	0.0073	0.00014
	(0.0034)*	(0.00007)
Operator age ^{3}	-0..00003	-6.01e-07
	(0.00002)	(0.00000)
Farm size	-1.6401	-0.0327
	(0.2401)***	(0.0044)
Farm size ^{2}	0.4154	0.0083
	(0.0976)***	(0.0019)
Farm size ^{3}	-0.0285	-0.00057
	(0.0098)**	(0.0002)
Constant	8.2754	
	(3.3473)*	
LR chi ^{2}	170.73***	
Log Likelihood	-1332.45	

Note: Standard errors in parenthesis.
* p<0.05; ** p<0.01; *** p<0.001.

Table 5 reports impacts of operator age and farm size dummy variables on the probability of farms to exit. The age dummy variables are represented by 'Age < 40', '39 < Age < 55', '54 < Age < 65', and 'Age > 64'. For instance, 'Age < 40'=1 if the farm operator's age is under 40 and 'Age < 40'=0 otherwise. The farm size dummy variables are represented by 'Below 0.5ha', '0.5-1.5ha', '1.5-3.0ha', and 'Above 3.0ha'. For the estimation, dummy variables for '39 < Age > 55' and '0.5-1.5ha' are excluded. Thus, coefficients of age dummy variables are relative to ages of 40-55 years, and coefficients of farm size dummy variables are relative to 0.5-1.5ha.

The significant coefficients of 'Age < 40' and 'Age > 64' among age dummy variables have positive signs, suggesting that the exit probability is lowest among farmers aged 40-55, while rising fastest for those below ages of 40 years and over ages of 65 years.

TABLE 5. Base Model II: Impacts of Operator Age and Farm Size Dummy Variables on the Probability of Farms to Exit

	Dependent variable: $EXIT_{t-1,t}$	
	Estimates	Marginal Effects
Operator's years of age		
Age < 40	0.8183	0.0247
	(0.2216) ***	(0.0091)
54 < Age < 65	0.0479	0.0010
	(0.1680)	(0.0036)
64 < Age	0.7415	0.0190
	(0.1554) ***	(0.0048)
Farm Size		
Below 0.5ha	0.8228	0.0224
	(0.1284) ***	(0.0044)
1.5 - 3.0ha	-0.6019	-0.0112
	(0.1902) **	(0.0031)
Above 3.0ha	-0.4886	-0.0085
	(0.2883) *	(0.0041)
Constant	-4.0237	
	(0.1437) ***	
LR chi ^{2}	141.68 *	
Log likelihood	-1346.98	

Note: Standard errors in parenthesis.

'39 < Age < 55 years' and '0.5-1.5ha' are dropped as the reference age and size dummy variables.

* p<0.05; ** p<0.01; *** p<0.001.

All farm size dummy variables are significant. The signs of '1.5-3.0ha', and 'Above 3.0ha' are negative and the sign of 'Below 0.5ha' is positive, suggesting that the exit probability for farms of 0.5-1.5ha is higher than over 1.5ha, but lower than for those below 0.5ha. These findings are a little different with results of the first model. All models tested produce significant LR statistics. The second base model provided a weaker fit to the data, however, compared with the first base model using age and size cubed. Accordingly, this paper accepts the results from the first base model.

The analysis also examines the effects of including additional independent variables, namely, operator education and farm size. Table 6 and Table 7 indicate results from model with continuous measures of all variables (called 'extended model I') and from dummy variables of age and size and other continuous variables (called 'extended model II'), respectively. Findings for operator age and farm size are consistent with the findings of the base models.

Results in the two models show little evidence that education affect exit, holding age, farm size and family size constant. The probability of exit decreases as the education level of the farm operator increased up to 9.6 years and increases thereafter, even the coefficients are not significant. This result is related to higher opportunity cost at off-farm work of highly educated operators combined with higher productivity on farm.

Family size is significant in all models. Farms with a relatively large number of family members are less likely to exit, holding other variables constant. Since family size represents the number of full-time working family members weighted by labor capacity of each member, it is reasonable that availability of family labor is inversely related to exit.

The first extended model provides a stronger fit to the data, compared with the second extended model using age and size cubed because LR statistic is highly significant in the first one. The first extended model also suggests a stronger fit to the data than the first base model by the comparison of LR statistics.

TABLE 6. Extended Model I: Impacts of Farm Characteristics on the Probability of Farms to Exit

	Dependent variable: $EXIT_{t-1,t}$	
	Estimates	Marginal Effects
Operator age	-0.9889	-0.0123
	(0.1900) ***	(0.0037)
Operator age ^{2}	0.0076	0.00019
	(0.0035) **	(0.00007)
Operator age ^{3}	-0.000045	-8.80e-07
	(0.00002)	(0.00000)
Farm size	-1.3462	-0.0263
	(0.2499) ***	(0.0046)
Farm size ^{2}	0.3516	0.0069
	(0.0977) ***	(0.0018)
Farm size ^{3}	-0.0243	-0.00047
	(0.0097) *	(0.0002)
Operator education	-0.0785	-0.0015
	(0.0714)	(0.0014)
Operator education ^{2}	0.0041	0.00008
	(0.0040)	(0.00008)
Family size	-0.3575	-0.0070
	(0.0903) ****	(0.0018)
Constant	11.1676	
	(3.4215) **	
LR chi ^{2}	188.44 ***	
Log Likelihood	-1323.60	

Note: Standard errors in parenthesis.

* p<0.05; ** p<0.01; *** p<0.001.

TABLE 7. Extended Model II: Impacts of Farm Characteristics Dummy Variables on the Probability of Farms to Exit

	Dependent variable: $EXIT_{t-1,t}$	
	Estimates	Marginal Effects
Operator's years of age		
Age < 40	0.8703	0.0259
	(0.2350) ***	(0.0091)
54 < Age < 65	0.09412	0.0019
	(0.1716)	(0.0036)
64 < Age	0.7221	0.0177
	(0.1684) ***	(0.0049)
Farm Size		
Below 0.5ha	0.6131	0.0150
	(0.1357) ***	(0.0040)
1.5 - 3.0ha	-0.4473	-0.0082
	(0.1928) *	(0.0032)
Above 3.0ha	-0.2587	-0.0047
	(0.2925)	(0.0048)
Operator education	-0.1215	-0.0025
	(0.0684)	(0.0014)
Operator education ^{2}	0.0062	0.0001
	(0.0039)	(0.00008)
Family size	-0.4264	-0.0086
	(0.0884) ***	(0.0018)
Constant	-2.3898	
	(0.3751) ***	
LR chi ^{2}	170.74 *	
Log likelihood	-1332.45	

Note: Standard errors in parenthesis.
'39 < Age < 55 years' and '0.5-1.5ha' are dropped as the reference age and size dummy variables.
* p<0.05; ** p<0.01; *** p<0.001.

V. Summary and Conclusions

This paper provides some basic information useful in understanding farm exits over the period 1998 through 2002, focusing on basic farm and operator characteristics such as farm size and operator age likely to affect exits.

The results indicate that, as the operator gets older, farms are less likely to exit, until the operator reaches retirement age. As retirement age approaches, however, operators are more likely to exit. The probability of farm exit decreased with very smaller farm size, but then increased for farms with medium sized, and again decreased for larger farm size. Farms with a relatively large number of family members are less likely to exit.

Farm exits are a prerequisite for consolidation in Korean agriculture but substantial farmers out of farming were not farms with smaller farm size, in perspective of farm size. Most old farmers operating very small farms in Korea are less likely to exit and keep their farmland until they die and produce non commercial corps for self consumption with very low farm income. The other hand, younger farmers operating medium farm size will leave farming by their higher opportunity cost or degenerate into smaller farms by a business failure. These results might lead to by polarization problems in Korean agriculture.

Accordingly, plans that induce older operators with very small to retire smoothly are worth considering for further farm consolidation. Of course, to ensure that the farmland of exiting farmers is transferred to relatively younger and larger operators, a highly efficient and flexible land market should be formed. Farm consolidation could be also sustained through effective income stabilization programs for exiting older operator with small farms. When farms with medium size fall into lower classes by a bad luck or business failure, policies to protect these farms are needed. Further, extension of direct payments and findings of high add valued products for raising farm income of small farms with developing potential are required.

The contribution to the exit literature of this paper is to provide a straightforward procedure for estimating exit probabilities that can be applied to any group of farms. Other characteristics, including land tenure, receipt of government payments, and urban influence, may also affect exit probabilities and may warrant estimation. To perform a more detailed analysis of farm exit including these variables, an ample longitudinal file is required.

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