Credit Migration Analysis of Beginning, Young Farmers' Resilience under Recession

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Abstract

This paper examines the relative financial strength and endurance of several paired classes of farmers according to business maturity (beginning versus mature farm businesses) and farm operators' age and experience (young versus older, more experienced farm operators) by utilizing transition probability approach. Results show that the financial stress resulting from the late 2000s recession did not significantly influence the financial vitality of farms in general, regardless of the farm type. The financial strength of farms operated by young farm operators, and beginning farms during the recessionary period remained at favorable levels, although their performances were lower than their counterparts.

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1. Introduction

Credit access is one factor that enables businesses to take advantage of growth opportunities. Without credit, a business may opt to merely maintain its current production level or worse, opt out of the sector when available equity funds are not adequate enough to sustain business operations. Hence, a lack of access to credit under such financially constrained conditions could result in widespread production and employment declines (Nash and Zeuli, 2011).

Credit access has been an important, pressing issue among businesses operated by younger or beginning entrepreneurs, which are typically relatively smaller in business size compared to thos operated by more experienced, older farmers. Smaller farm businesses usually borrow small amounts of money from lending institutions. However, these farms are considered by lending institutions to have higher rates of failure compared to larger businesses and are usually susceptible to business shocks (Nash and Zeuli, 2011). In addition, lending institutions usually employ the same scoring model regardless of the business sizes of their farm borrowers. This is a disadvantage to small farms given that they have extrinsic characteristics that the scoring model cannot take into account.

Young beginning farmers also pose greater risks to lending institutions because of their usual lower farm equity infusions and the fewer assets they maintain compared with old mature farms. Even when their loan applications are approved, lending institutions would usually set higher collateral requirements to secure their loan accommodations. This is considered one of the barriers to entry to agricultural land ownership, as this scenario leads to higher fixed costs and

cash outlays for young and beginning farmers trying to purchase land. As such, a high level of land ownership is not considered a feasible model for young beginning farmers (Kauffman, 2013).

The financial crisis in 2008 affected the agricultural credit markets. Prices of agricultural products fell by 26 percent from 2008 to 2009. This led to lower farm incomes that created cash flow difficulties for some agricultural institutions, causing loan repayment rates to fall. During this period, the economic conditions and regulatory concerns compelled lenders to impose stringent standards by raising collateral requirements and becoming more cautious and selective in their loan application decisions. The more competitive credit atmosphere barred many farm businesses, especially businesses operated by young, beginning operators, from obtaining adequate credit funds to maintain their business viability. This condition resulted in declining incomes that could affect the borrowers' repayment potential and capability during the recession (Kauffman, 2013).

Even though the overall credit market was affected by the late 2000s recession, the agricultural credit markets fared well compared to other sectors. Most agricultural banks made prudent investment decisions and avoided exposures to structured securities that lost considerable value (Ellinger and Sherick, 2010). Agricultural institutions did not heavily lend money to the real estate industry, which was a major industry affected by the recession. In addition, delinquency rates on agricultural loans were lower compared with the overall delinquency rates in the banking industry during the recessionary period, confirming agricultural lenders' relatively stronger financial health (Li et al., 2013).

After the recession, the agricultural sector continued to grow despite the sluggish economic recovery. The combination of rising farm income and land values pointed toward low levels of problematic loans over the following years (Sundell and Shane, 2012). Meanwhile, the low debt utilization trends in the agricultural sector reduced the sensitivity of returns to agricultural assets. The agricultural sector also benefitted from the relative financial health of its lenders as this gave strong balance sheets and favorable income statements (Henderson and Akers, 2010)

The agricultural sector has been in good condition in recent years. However, based on USDA's USDA Agricultural Projections to 2032, the sector will face challenges in the coming years (USDA, 2023). According to the study, the agricultural sector will adjust to lower prices for most farm commodities over the next several years, and the farm production expenses will also increase after 2026.

In light of a looming financial crisis, the agricultural sector will possibly face in the next five years, this research examines the relative financial strength and endurance of several classes of farmers paired according to business maturity (beginning versus mature farm businesses) and farm operators' age/experience (young versus older, more experienced farm operators). This study's time period (2005 to 2012) will allow for the comparative analyses of changes in the financial performance quality of these classes of farms before, during, and after the 2008 recession. Using the transition probability approach, this study will determine whether there are significant differences in migration rates for different types of farmers – from beginning to mature farms – that translate to differences in credit quality and financial performance, especially during periods of economic shocks. Looking at past trends, the results of this study would be helpful in developing predictions about how this forthcoming financial crisis could affect

agriculture, especially its more vulnerable firms (i.e., managed by young and beginning farmers), during the next couple of years.

2. Methodology

2.1 Transition Probability Matrices

This study will employ a transition probability approach to examine credit movements over two consecutive periods. Transition probability rates are calculated by tracking the changes or movements of credit ratings from one class to another.

Figure 1. Transition Probability Matrix

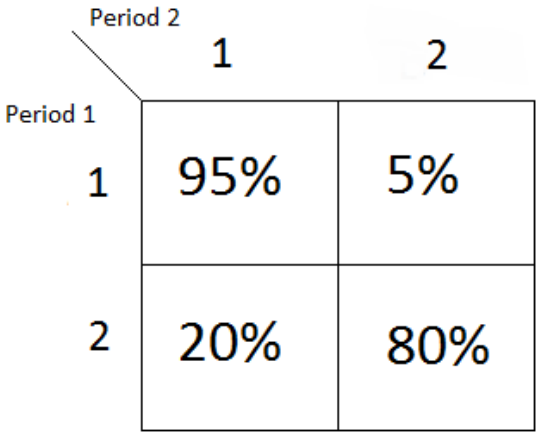

Figure 1 illustrates the derivation of transition probability. Migration rates will be measured using the historical movement of credit risk classifications of farm observations. The example in Figure 1 illustrates several migration possibilities for the farms' credit risk classes. As Figure 1 indicates, historical rates of movements among farms might indicate that class one farms could either remain in the same class 95 percent of the time OR migrate to class two 5 percent of the

time. Class two farms, on the other hand, could remain in the same class 80 percent of the time and migrate to class one 20 percent of the time.

This analysis will estimate transition probabilities using annual credit scores from 2005 to 2012. An average one-period transition matrix (1x1) will be created in order to analyze the overall credit score movements. The values along diagonals represent retention rates, while the off-diagonal values represent upgrades and downgrades in credit score classification.

The data will also be split to compare farms by business type and period. First, farms will be divided in terms of three criteria – by business maturity (beginning versus mature) and by operator's age (young versus old). These categories will be useful in understanding comparative changes in credit quality among pairs of farm types.

Transition matrices will also be developed for each type of farms for every period. Migration matrices will be created for different time periods: pre-recession period (2005 – 2007), during the recession (2008 – 2009), and post-recession (2010 – 2012). This approach will allow the analysis of how migration rates are conditioned by economic conditions for each farm type.

2.2 Comparing Matrices

There are several ways to compare matrices to determine whether there is any significant difference between them. In this paper, L^1 distance metrics will be utilized to compare transition matrices, as demonstrated by Schuermann and Jafry (2003).

L^1 distance metrics is a simple but effective way to compare the distance between two matrices. Specifically, this metric is being computed as:

$$(1) \qquad M_{L1} = \frac{\sum_{i=1}^{N} \sum_{j=1}^{N} \left| P_{A,i,j} - P_{B,i,j} \right|}{N^2}$$

where P_A and P_B denote matrices being compared with *N x N* dimensions, where the average absolute difference between corresponding elements of the matrices are being computed. Using this metric, matrices that represent credit movements for different periods will be compared. This will also be employed to compare matrices of farm types based on business maturity, and operator's age, for each period and for the whole time span of this study. Lastly, transition matrices of different farm type farms for a certain period will be compared to other periods. This way, distance metrics can be used to compare how large each farm's migration behavior in a specific period differs to others.

2.3 Data Sources and Variable Specifications

This analysis will use data from the Farm Service Agency (FSA) compiled for its borrowers from 2005 to 2012. The FSA data set was collected as part of the loan covenants with borrowers that require the provision of periodic financial reports to monitor the borrowers' business and financial progress until their loan obligations have been paid. This study's data set covers a national scope of farm-level data on financial characteristics and past borrowing records of existing FSA clients. The analysis only includes farms that consistently maintained records over the 8-year period, which results in a sample size of 1,432 farms originating from all states (except Hawaii, Alaska, and Washington, DC).

This research defines a "Beginning Farm" as one that has been in the industry for ten years or below in 2005. Beginning farms typically have fewer assets than mature ones (Williamson 2014), which could affect the migration rates. Meanwhile, we refer to operators who are 45 years of age or younger as "Young Farm Operators.". Empirical studies show older farmers are more risk-averse (Patrick, Whitaker, and Blake, 1980), which could also affect the migration rates.

This study will extend the credit-scoring model and classification intervals used by Splett et al. (1994) for five credit class classification classes to a 10-class rating model, with the intervals redefined between the lowest and highest possible ratings, to see if additional volatility in the transition probability ratings will be obtained. The 10-class rating class boundaries are based on the original five-class rating model where, for example, class 1 in the latter model was broken down into classes 1 and 2 of the ten-class rating model. The same trend applies to the subsequent classes in the rating models.

3. Results

3.1 Transition Matrices by Period

Credit scores of 1,432 farms have been divided into three economic periods or episodes (pre-recession, recession, and post-recession) to compare these farms' credit score movements for each period. Table 1 shows credit score movement for these each economic period.

During the pre-recession, the highest retention rate has been observed in class 8 borrowers, which reports a 40.04 percent class retention rate. This is also the case with the recession period, where class 8 also has the highest retention rate of 37.66 percent. Unlike the pre-recession, the recession period has shown high retention rates for high classes.

Table 1. Average One-Period Transition Matrices of Periods (Pre-Recession, Recession, Post Recession) for Credit Scores, Ten Credit Classes, (Percent)

	Period 2 Classes									
Period 1 Classes	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Pre-Recession										
1	19.64	7.14	3.57	12.50	19.64	26.79	7.14	3.57	0.00	0.00
2	11.54	7.69	11.54	17.31	21.15	11.54	11.54	3.85	3.85	0.00
3	4.76	7.14	15.48	19.05	23.81	19.05	5.95	2.38	2.38	0.00
4	0.99	3.45	5.91	18.23	22.17	20.69	16.26	7.88	2.46	1.97
5	0.62	1.25	4.37	10.19	30.77	21.62	17.67	8.52	3.74	1.25
6	0.18	0.88	2.46	7.04	16.55	32.04	23.77	12.15	3.17	1.76
7	0.00	0.16	1.28	3.67	8.31	22.20	37.22	22.52	2.24	2.40
8	0.00	0.19	0.96	2.68	10.15	12.84	19.92	40.04	9.39	3.83
9	0.53	0.00	0.53	3.17	5.82	11.11	15.34	25.93	29.10	8.47
10	0.00	0.00	0.00	0.00	7.23	12.05	13.25	28.92	19.28	19.28
Recession										
1	35.29	11.76	5.88	5.88	29.41	5.88	5.88	0.00	0.00	0.00
2	5.26	28.95	15.79	18.42	10.53	15.79	0.00	2.63	0.00	2.63
3	1.72	1.72	24.14	20.69	13.79	17.24	13.79	6.90	0.00	0.00
4	2.16	2.16	10.07	18.71	20.86	15.11	12.95	14.39	1.44	2.16
5	0.38	2.66	5.70	13.31	30.42	18.25	14.45	11.03	2.28	1.52
6	0.00	1.59	2.23	7.01	16.56	34.39	16.88	15.29	2.55	3.50
7	0.00	1.82	1.45	3.27	14.55	19.64	36.73	17.82	2.91	1.82
8	0.00	0.84	1.26	4.18	8.37	14.64	18.83	37.66	9.21	5.02
9	0.00	0.00	1.49	2.99	5.97	8.96	14.93	31.34	22.39	11.94
10	0.00	0.00	0.00	13.64	4.55	9.09	13.64	40.91	9.09	9.09
Post Recession										
1	44.23	19.23	3.85	11.54	15.38	3.85	1.92	0.00	0.00	0.00
2	18.18	28.28	10.10	14.14	17.17	8.08	1.01	3.03	0.00	0.00
3	7.98	19.02	32.52	14.11	11.04	8.59	5.52	0.61	0.61	0.00
4	3.00	6.01	14.16	26.18	22.32	14.59	9.44	3.43	0.43	0.43
5	0.93	5.22	7.09	11.94	33.77	18.66	11.38	8.02	1.87	1.12
6	0.53	3.54	6.02	5.66	21.24	35.93	16.46	7.26	2.12	1.24
7	0.37	1.12	2.99	4.48	13.99	24.25	33.96	14.55	3.17	1.12
8	0.00	1.97	1.75	3.73	9.43	18.42	21.49	33.77	6.80	2.63
9	0.00	0.00	2.68	2.68	9.40	10.07	10.07	23.49	34.23	7.38
10	0.00	0.00	0.00	4.00	12.00	12.00	18.67	17.33	16.00	20.00

Meanwhile, class 1 has the highest retention rate of 44.23 percent in the post-recession period. It has also been observed that the retention rates for higher classes are even higher compared to recession. This is an indication that overall, farms have improved after the recessionary period. This is in line with the results of Phillips and Kachova's (2004) study that observed improved financial status of farms after the recession.

Table 2. Summary Transition Rates by Period

	Pre-Recession	Recession	Post-Recession
Migration Trends: Year-to-Year			
Upgrade	32.19	32.05	39.07
Retention	31.70	31.63	33.21
Downgrade	36.10	36.31	27.72

Comparing the total transitions for each period (Table 2), pre-recession and recession periods have almost the same percentage of migration movements. Downgrades are the highest for pre-recession and recession, translating to 36.10 percent and 36.31 percent, respectively. This is followed by upgrades that account for 32.19 percent and 32.05 percent for pre-recession and recession. The results for these two periods suggest farms' resiliency during recession as the economic change had minimal effect on their credit score.

In the post-recession period, upgrades account for the highest percentage (39.07 percent) of movements. Upgrades were followed by retentions that account for 33.21 percent, and then downgrade, which tallies 27.72 percent. Both upgrades and retentions are higher, while a portion of downgrades is lower when these migration trends are compared to the two previous periods. The higher percentage of upgrades during this period represents a better financial capacity of farms in general after recession.

Table 3. L^1 Distance metrics Between Periods

	L^1
Comparing Periods	
Pre-recession and recession	0.034
Pre-recession and post-recession	0.039
Recession and post-recession	0.036

Table 3 shows that the differences between transition matrices between the three periods are small. The L^1 for the difference between the pre-recession and recession is 0.034, while the L^1 between pre-recession and post-recession is 0.039. The distance metric for recession and post-recession and post-recession meanwhile is 0.036.

3.2 Transition Matrices by Farm Type

Farms were also classified into different farm types. To compare the relative financial strength and endurance of several paired classes of farmers, tables have been made according to farm operators' age/experience (young versus older, more experienced farm operators) and business maturity (beginning versus mature farm businesses).

3.2.1 Young versus Old Farm Operators

Young farm operators have the highest retention rate in class 8, which translates to 36.81 percent (Table 4). The retention rate for these operators ranges from 36.81 percent to 18.56 percent. Older farm operators, meanwhile, have the highest retention rate of 50.00 percent for class 1 borrowers. There are relatively higher retention rates between classes 4 and 8, which would imply what kind of farm the agency caters to. However, the old farmers' transition matrix was observed to have no value for some cells, indicating less dispersed credit scores in these farmers.

Table 4. Average One-Period Transition Matrices of Young and Old Farms for Credit Scores, Ten Credit Classes, 2005-2012 (Percent)

	Period 2 Classes									
Period 1 Classes	1	2	3	4	5	6	7	8	9	10
Young										
1	32.12	11.68	5.84	11.68	16.79	15.33	5.11	1.46	0.00	0.00
2	12.61	25.23	12.61	13.51	17.12	10.36	4.50	3.15	0.45	0.45
3	6.05	11.59	24.69	17.88	15.11	13.85	6.55	3.02	1.26	0.00
4	1.79	3.85	9.62	21.28	24.87	17.31	11.79	7.18	1.28	1.03
5	0.89	2.66	5.92	12.08	32.45	19.78	13.97	8.47	2.55	1.24
6	0.30	1.93	3.70	6.80	18.21	33.89	19.08	11.87	2.54	1.67
7	0.25	0.85	1.86	4.42	12.61	21.95	35.86	17.83	2.81	1.56
8	0.00	0.76	1.16	3.90	10.25	14.21	20.85	36.81	8.39	3.67
9	0.19	0.38	1.35	2.69	7.12	10.58	13.27	26.54	28.85	9.04
10	0.00	0.38	0.00	2.27	10.61	12.88	13.26	25.38	16.67	18.56
Old										
1	50.00	25.00	8.33	0.00	16.67	0.00	0.00	0.00	0.00	0.00
2	31.25	18.75	12.50	18.75	0.00	12.50	0.00	0.00	6.25	0.00
3	5.26	10.53	15.79	15.79	21.05	21.05	5.26	5.26	0.00	0.00
4	12.50	9.38	9.38	28.13	15.63	9.38	15.63	0.00	0.00	0.00
5	0.00	7.02	5.26	17.54	33.33	21.05	8.77	3.51	1.75	1.75
6	0.00	2.74	6.85	4.11	19.18	31.51	17.81	10.96	6.85	0.00
7	0.00	1.82	3.64	1.82	12.73	30.91	29.09	18.18	1.82	0.00
8	0.00	0.00	2.44	12.20	4.88	34.15	14.63	21.95	7.32	2.44
9	0.00	0.00	4.17	4.17	8.33	20.83	12.50	16.67	29.17	4.17
10	0.00	0.00	0.00	0.00	0.00	0.00	14.29	28.57	28.57	28.57

Comparing these two farm classes within the study's timeline (Table 5), older farm operators are in a better credit position than younger farm operators. Upgrades account for 40.48 percent, while downgrades share 30.65 percent for old farm operators. Young farm operators have upgrades of 35.53 percent of total class transition compared to downgrades that have 32.22 percent. This means that regardless of the period, old farm operators are in a better position to get loans, reflecting their financial stability and probable risk aversion (Patrick et al., 1980).

Table 5. Summary Transition Rates of Young and Old Farms, 2005-2012

	Young	Old
Migration Trends: Year-to-Year		
Upgrade	35.53	40.48
Retention	32.26	28.87
Downgrade	32.22	30.65

Looking at L^1 distance metrics (Table 6), the difference between the young and old farm operators is 0.043, which is the higher value obtained among the three paired comparisons. One possible explanation for this is the concentration of old farm operators on only a few credit classes in the scope of the study.

Table 6. L^1 Distance metrics Between Farm Types

	L^1
Comparing Farm Types	
Young and old farm operators	0.043
Beginning and mature farms	0.022
Small and large farms	0.032

3.2.2 Beginning versus Mature Farms

Table 7 shows the transition rates of beginning and mature farms. The retention rates of beginning farms range from a high of 38.07 percent for class 7 borrowers to a low of 20.60 percent for class 4 borrowers. On the other hand, the retention rates of mature farms range from 37.65 percent for class 1 borrowers to a low of 14.77 percent for class 10 borrowers. The retention rate for each farm class for these farm types shows that mature farms have a higher rate for higher classes than the beginning farms. The transition matrix for mature farms behaves quite similarly to the results of the studies by Barry et al. (2002) and Escalante et al. (2004).

Table 7. Average One-Period Transition Matrices of Beginning and Mature Farms for Credit Scores, Ten Credit Classes, 2005-2012 (Percent)

	Period 2 Classes									
Period 1 Classes	1	2	3	4	5	6	7	8	9	10
Beginning Farms										
1	28.13	4.69	6.25	7.81	23.44	20.31	9.38	0.00	0.00	0.00
2	17.24	27.59	10.34	5.17	17.24	8.62	6.90	6.90	0.00	0.00
3	4.96	11.57	22.31	17.36	17.36	13.22	5.79	4.96	2.48	0.00
4	1.87	3.00	7.49	20.60	22.10	19.48	12.73	10.11	0.75	1.87
5	0.88	1.94	4.42	10.95	32.86	21.38	14.13	9.54	2.83	1.06
6	0.29	1.29	3.86	7.43	16.57	35.29	19.29	11.71	3.14	1.14
7	0.28	0.28	1.52	4.28	12.97	21.52	38.07	16.97	2.90	1.24
8	0.00	0.52	0.86	2.94	10.02	15.37	23.32	35.06	8.98	2.94
9	0.00	0.00	0.00	2.81	8.99	9.55	12.92	24.72	30.34	10.67
10	0.00	0.00	0.00	2.11	6.32	14.74	10.53	25.26	14.74	26.32
Mature Farms										
1	37.65	18.82	5.88	12.94	11.76	9.41	1.18	2.35	0.00	0.00
2	12.78	23.89	13.33	16.67	15.56	11.11	3.33	1.67	1.11	0.56
3	6.44	11.53	25.08	17.97	14.58	14.58	6.78	2.37	0.68	0.00
4	2.39	4.59	10.64	22.02	25.69	15.78	11.56	5.32	1.47	0.55
5	0.85	3.22	6.61	12.88	32.29	19.07	13.64	7.71	2.37	1.36
6	0.30	2.31	3.79	6.32	19.12	33.04	18.90	11.90	2.46	1.86
7	0.23	1.21	2.12	4.39	12.41	22.56	34.37	18.32	2.73	1.67
8	0.00	0.85	1.36	4.66	10.18	14.33	19.42	37.15	8.06	3.99
9	0.27	0.55	2.19	2.73	6.28	11.75	13.39	26.78	28.14	7.92
10	0.00	0.57	0.00	2.27	12.50	11.36	14.77	25.57	18.18	14.77

Examining Table 8, results show that beginning farms fare well during the scope of the study. Both beginning and mature farms have the highest average transitions in upgrades that translate to 34.30 percent and 36.40 percent, respectively. Downgrades comprise the lowest for two classes of farms, which translates to 32.69 percent and 31.90 percent for young and mature farms, respectively. Meanwhile, L^1 distance metrics between these two types of farm is 0.22, which is lower than the distance metrics between young and old farm operators (Table 6).

Table 8. Summary Transition Rates of Beginning and Mature Farms, 2005-2012

	Beginning	Mature
Migration Trends: Year-to-Year		
Upgrade	34.30	36.40
Retention	33.02	31.70
Downgrade	32.69	31.90

3.3 Transition Rates of Each Farm Type for Each Period

This section will examine whether there are significant differences in migration rates for different types of farms that translate to differences in credit quality, especially during periods of economic shocks.

Table 9 shows how different economic periods have affected average migration rates for each type of farm.

Table 9. Summary Transition Rates of Paired Classes of Farmers for Each Period

Young versus Old Farm Operators						
	Upgrade		**Retention**		**Downgrade**	
	Young	Old	Young	Old	Young	Old
Pre-Recession	31.86	41.67	31.97	23.96	36.16	34.38
Recession	31.79	39.58	31.79	27.08	36.42	33.33
Post-Recession	39.16	36.46	33.09	36.46	27.75	27.08
Beginning versus Mature Farms						
	Beginning	Mature	Beginning	Mature	Beginning	Mature
Pre-Recession	30.58	33.00	31.32	31.90	38.10	35.10
Recession	30.27	32.95	32.78	31.06	36.95	35.99
Post-Recession	38.94	39.14	34.03	32.79	27.04	28.07

Looking at the young and old farm operators, results suggest that young operators were quick to recover from the economic recession. Old farm operators, meanwhile, were relatively stable during this period. During pre-recession, old farm operators had a higher percentage of upgrades of 41.67 percent, compared with 31.86 percent of young farm operators. Also, in this period,

31.97 percent of the total transitions of young farm operators were retentions, compared with the average retention rates of old farms of 23.96 percent.

During the recession period, the percentage of each migration trend for young operators was almost the same as in pre-recession. There were only decreases for upgrades and retentions of 0.07 percent and 0.18 percent, respectively, and increase for downgrades of 0.26 percent. This only shows the flexibility of these farms during a weak economy. After the recession, young farm operators showed improvement as it increased its upgrade percentage to 39.16 percent, which is way higher compared to its upgrade rates during the recession. Curiously, the upgrade percentage of old farm operators is lower during post-recession, tallying 36.46 percent, which would be the effect of the increased retention percentage to 36.46 percent, which translates to 9.38 percent difference from the retention rates during recession.

Table 10. L^1 Distance metrics of Paired Farm Types for Each Period

Farm Types for Each Period	
	L^1
Pre-Recession	
Young and old farm operators	0.087
Beginning and mature farms	0.036
Recession	
Young and old farm operators	0.105
Beginning and mature farms	0.054
Post-Recession	
Young and old farm operators	0.067
Beginning and mature farms	0.037

Looking at L^1 distance metrics (Table 10) of these two farms for different periods, recession tallied the highest distance, registering 0.105. Pre-recession and post-recession periods, meanwhile, show lower L^1, tallying 0.087 and 0.067, respectively. One possible explanation for these values is these farms' higher activity or credit movements during recession period.

Comparing the beginning and mature farms, results imply that beginning farms managed to survive the recession, while mature farms also showed resiliency during the time period. During the recession period, 36.95 percent of total transitions were downgrades for beginning farms, but it decreased to 27.04 percent during the post-recession period. Upgrades for beginning farms, meanwhile, had increased from 30.27 percent during the recession period to 38.94 percent during the post-recession period. On the other hand, mature farms also increased the portion of upgrades from 32.95 percent during the recession to 39.14 percent post-recession. Retention rates had almost the same portion during three periods for mature farms, ranging from 31.90 percent to 32.79 percent.

L^1 distance metrics between beginning and mature farms show that the recession period had the highest distance of 0.054. These two farms' L^1 for pre-recession and post-recession are pretty much the same, recording 0.036 and 0.037, respectively. Results behave the same as young and old farm operators have.

4. Conclusions

The results show that the late 2000s recession had minimal effect on farms in terms of credit rating movement, regardless of farm type. This is in line with the previous studies that show farms had relatively better financial health during the last economic recession, with agricultural

banks experiencing significantly lower loan delinquency rates as a number of non-agricultural banking failures were recorded during the period (Li et al., 2013). In this study, all farms showed better credit scores after the recession, which provides evidence of the resiliency of the farm sector in general.

While the farm sector has shown financial endurance through the economic recessionary period, it is still apparent that the sector was somehow affected by the changing economic conditions, as reflected by higher distance metrics of each farm type during the recession compared to other periods. This means that, in general, there was more mobility or transition, as evident in the higher levels of credit movements compared to pre- and post–recessionary periods. Economic shocks, such as the recent recession, could create some instability in business operations as more volatile macroeconomic conditions somehow exert pressure on decisions made by business operators. This is true even for sectors that eventually are able to withstand the overall economic shock. As such, the government should consider the nature and magnitude of its support for the sector, especially among the more vulnerable firms, as they try to withstand volatile, more challenging economic conditions.

The results suggest that the financial strength of farms with young farm operators and beginning farms during the recessionary period remained at a favorable level. Although their counterpart classes were in better credit classes during and post-recession periods, these farms showed financial strength with a higher upgrade rate, and better or almost the same retention rates for the higher classes. This result provides an important implication for lenders' decisions on borrowers with different credit risk profiles. The positive results obtained in this analysis for borrowers initially perceived as having a relatively lower likelihood of obtaining a loan may be attributed to at least two things. First, FSA's usual loan screening criteria that place some premium on

business and borrower potentials (such as giving new and younger farm operators the chance to implement their projects even in the absence of a lengthy business and credit track record) could have probably worked as their loan clients showed in this study's results.

Moreover, one can cite the effectiveness of a supervised credit scheme whereby FSA periodically monitors their borrowers' business progress. Such a scheme could either induce borrowers to put forth their best efforts to report business progress or help borrowers pinpoint quickly any faltering area of business operation that can be remedied quickly before it is too late. Overall, this study provides encouraging evidence that supports the FSA's commitment to provide financially disadvantaged borrowers with promising business potentials with essential and necessary financial support so these businesses could continue to operate and grow in a thriving farm sector.

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