Credit Quality of Kansas Farms-2015 Data Update

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http://www.agmanager.info/KFMA/Newsletters/Research/CreditQuality_2015.pdf

This article discusses trends in credit quality and the current distribution of credit quality ratings for farms participating in the Kansas Farm Management Association program. Using financial ratios briefly described below, the probability of default for each farm from 1973 to 2015 was computed and summarized. The results indicate that credit quality deteriorated substantially from 2014 to 2015.

In modeling credit risk, financial institutions rely on many measures, including liquidity ratios, profitability ratios, repayment capacity, firm size, and other business performance measures, along with non-economic measures such as character. Typically, a financial institution gives ratings to firms similar to that of a bond index such as the Standard and Poor's (S&P) which, from best to worst, is AAA, AA, A, BBB, BB, B, and CCC.

Using previous research, the probability of default was computing using the following equations:

(1) $dv = -2.3643 – 0.00135\ CDRC – 0.0217\ OE – 0.00399\ WC$

(2) probability of default $= \{(\exp(dv))/(1+(\exp(dv)))\}*100$

where dv is the dependent variable for the credit scoring regression, CDRC represents capital debt repayment capacity, OE represents owner equity percentage, and WC represents working capital percentage. The capital debt repayment capacity (CDRC) variable was computed using information on repayment capacity, estimated principal and interest payments on term loans, working capital, and capital asset replacement. The working capital percentage (WC) variable was computed by dividing working capital by gross farm income. The relatively large absolute value on the coefficient for OE in equation (1) suggests that this variable is an important determinant of the probability of default.

Average ratio values can be used to illustrate how the probability of default was computed. The average values for CDRC, OE, and WC in 2015 were 17%, 76%, and 56%, respectively. Substituting these values into the equations above would result in a probability of default of 1.39%. Because the distribution of ratings is skewed, the probability of default using the average ratio values is lower than the average rating per farm in 2015 (1.85%). The average values for 2014 were 95%, 80%, and 48% for CDRC, OE, and WC, respectively. These values resulted in a probability of default of 1.18% in 2014 with an average across farms of 1.49.

Table 1 provides credit quality mapping information. This mapping is used to examine the trends in credit quality and the current distribution of credit quality among farms below.

Figure 1 presents the probability of default for Kansas farms. The graph also illustrates the range of ratings for the B, B+, BB-, and BB rating categories. In 1973, the average rating was BB. From 1974 to 1979, the average rating was a BB-. For most of the next three decades, the average rating was B+. However, the average rating from 1984 to 1986 and for 2002 was a B. From 2008 through 2015 the rating was a BB-. It is important to note that the probability of default in 2014 was the lowest it had been since 1974. The probability of default from 2014 to 2015 increased substantially. This occurred due to a large decrease in repayment capacity. It is important to note that, historically, the probability of default can change rapidly. For instance, the probability of default went from a BB- rating in 1979 to a relatively low B+ rating in 1981.

The distribution of credit quality for Kansas farms for 2014 and 2015 in presented in Table 2. A majority of the farms are rated BB-, BB, or BB+ in both 2014 and 2015 although the percentage fell from 72.6% to 62.7%. The percentage of farms that are rated BBB- or higher fell slightly from 8.6% to 8.1% from 2014 to 2015. The remaining farms are rated B+ or below. The percentage of farms rated B+ or below increased from 18.8% to 29.3% from 2014 to 2015. Firms with a "B" rating are typically assumed to have the capacity to meet credit obligations. However, adverse conditions could impair their ability to meet credit obligations. Firms with a "CCC" rating are vulnerable to nonpayment. The percentage of farms in this category doubled during the last year increasing from 1.3% to 2.6%. Ability to meet credit obligations for these farms depends heavily on business and economic conditions.

The previous measure of default probabilities uses owner's equity percentage and a working capital ratio. An alternative measure is from Moody's Corporation that provides credit ratings and research across alternative debt instruments including approximately 11,000 corporate issuers. Common rating factors that Moody's uses for corporate debt includes scale, business profile, profitability, leverage, financial policy, market position and business risk. The most common sub-factor used to measure leverage is Debt (or Net Debt) divided by Earnings Before Interest Taxes, Depreciation and Amortization (EBITDA). EBITDA is a commonly-used as a proxy for cash flow being generated by a business prior to debt service and income taxes.

The calculation of Debt to EBITDA ratio is:

3)   Debt to EBITDA$_n$ = $\dfrac{Total\ Liabilities_n}{\frac{EBITDA_n + EBITDA_{n-1}}{2}}$

A two-year average of EBITDA is used to avoid larger annual swings in income.   The Moody's ratings cut-off values used for this analysis are provided in Table 3. Both Kansas Farm Management Association data and data from the USDA are plotted for comparative purposes in Figure 2. The average KFMA farm was near a debt to EBITDA ratio of 2 from 2008 through 2013. In 2014, the debt to EBITDA ratio increased to 2.27. During 2015, the debt to EBITDA ratio increased to 3.64. The

ratings class fell from Baa to Ba during 2015. Given the two-year average of EBITDA, a repeat of 2015 in 2016 will result in another increase in the debt to EBITDA ratio next year.

Due to differences in relative price, cost, and production trends; credit quality varies by farm type. Table 4 presents the probability of default for common farm types exhibited by KFMA members in 2014 and 2015. The number of farms in parentheses indicates the number of farms of a specific farm type that had data for both years. All but cowherd farms saw a deterioration of the probability of default during the year.

Credit ratings, such as those presented in this article, are important for a couple of reasons. First, it is useful to track a credit rating for an individual firm or group of firms over time to ascertain their ability to handle adverse conditions. During 2015, the ability to be able to managed adverse conditions fell for Kansas farms. Second, interest rates can vary substantially depending on a firm's credit rating. The ratings fell substantially during 2015, with a substantial decrease in the profitability of Kansas farms. Kansas farmers need to look at adjustments that can be made to restore cash flows to a profitable level over the next couple of years to prevent further erosion in credit quality.
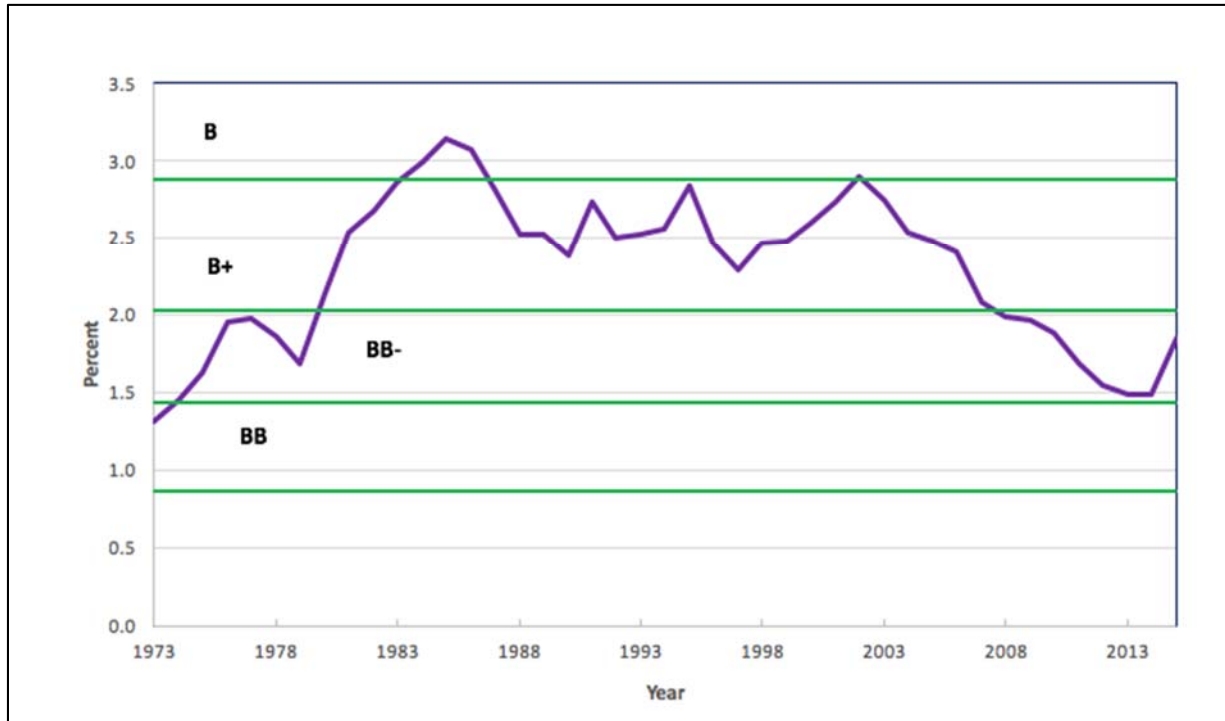
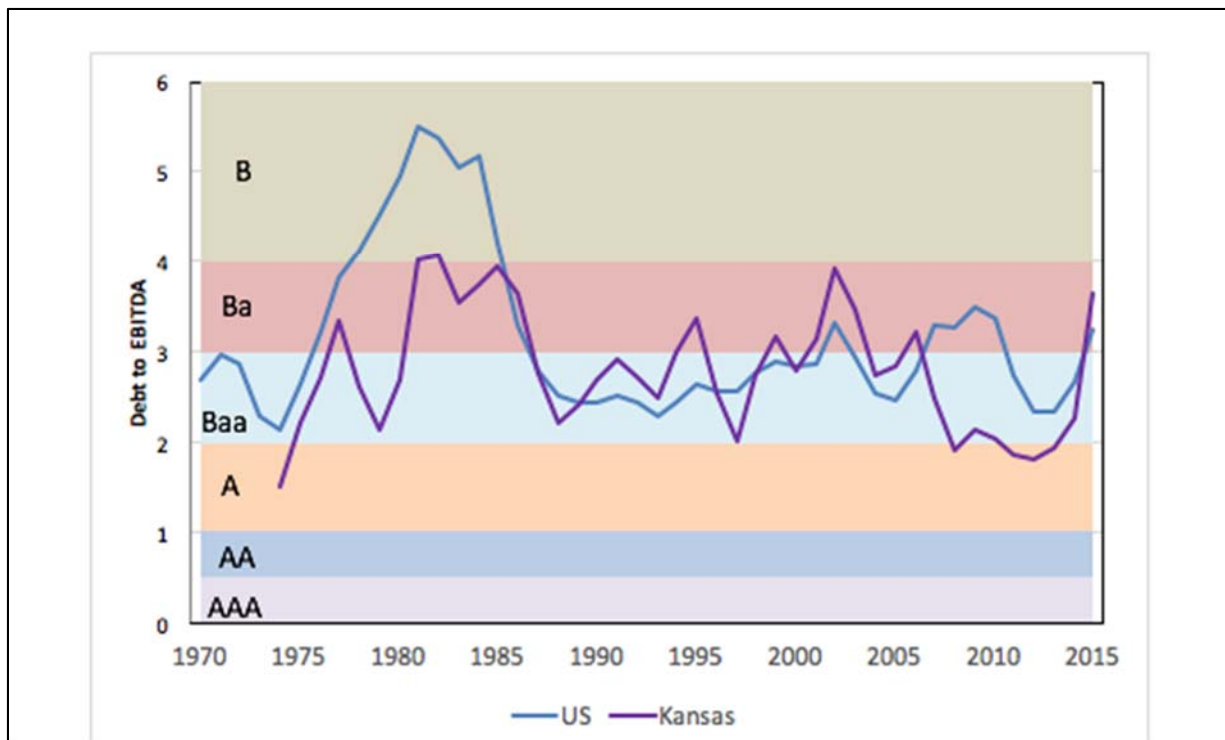**Figure 1. Probability of Default for Kansas Farms**

Figure 2. Debt to EBITDA for Kansas Farms

Table 1. Credit Quality Mappings

S&P Rating	Probability of Default Range
AAA	(0.00, 0.02]
AA+	(0.02, 0.03]
AA	(0.03, 0.04]
AA-	(0.04, 0.05]
A+	(0.05, 0.07]
A	(0.07, 0.09]
A-	(0.09, 0.14]
BBB+	(0.14, 0.21]
BBB	(0.21, 0.31]
BBB-	(0.31, 0.52]
BB+	(0.52, 0.86]
BB	(0.86, 1.43]
BB-	(1.43, 2.03]
B+	(2.03, 2.88]
B	(2.88, 4.09]
B-	(4.09, 6.94]
CCC+	(6.94, 11.78]
CCC	(11.78, 14.00]
CCC-	(14.00, 16.70]

Source: Lopez, J.A. "The Empirical Relationship between Average Asset Correlation, Firm Probability of Default and Asset Size." Federal Reserve Bank of San Francisco Working Paper, June 2002.

Table 2. Distribution of Credit Quality for Kansas Farms, 2014 and 2015

S&P Rating	2014	2015
BBB+	0.10%	0.21%
BBB	0.84%	0.63%
BBB-	7.65%	7.23%
BB+	25.58%	20.55%
BB	30.40%	24.84%
BB-	16.67%	17.30%
B+	9.75%	13.00%
B	4.82%	7.97%
B-	2.94%	5.66%
CCC+	1.26%	2.52%
CCC	0.00%	0.10%
CCC-	0.00%	0.00%

Table 3. Rating Matrix for Debt to EBITDA Ratio

Rating Category	Debt to EBITDA Ratio
AAA	0 to 0.50
AA	0.51 to 1.00
A	1.01 to 2.00
Baa	2.01 to 3.00
Ba	3.01 to 4.00
B	4.01 to 6.00
Caa	6.01 to 8.00
Ca	> 8.00 or < 0

Ellinger, P.N., A.M. Featherstone, and M.D. Boehlje. "Leverage of U.S. Farmers: A Deeper Perspective." Choices, 31(1st Quarter, 2016):1-6, http://www.choicesmagazine.org/choices-magazine/theme-articles/farm-fiance-theme-are-the-good-times-really-over/leverage-of-us-farmers-a-deeper-perspective.

Table 4. Probability of Default by Farm Type, 2014 and 2015

Farm Type	2014	2015
Crop – Non-Irrigated (700 farms)	1.50%	1.89%
Crop – Irrigated (41 farms)	1.86%	2.26%
Crop – Beef (23 farms)	1.50%	1.97%
Crop – Beef Backgrounding (15 farms)	1.87%	2.51%
Crop – Cow Herd (85 farms)	1.14%	1.39%
Cow Herd (27 farms)	1.76%	1.65%
Dairy (17 farms)	1.69%	1.89%
General Farm (13 farms)	1.11%	1.20%