Effects of Asset Values, Price Expectations, and Bank Regulations on Availability of Agricultural Credit

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Abstract

Credit is a vital input into the production system of agriculture. Credit allows the farmer to buy productive assets and inputs needed to plant crops and harvest for a profit. The availability of credit can have lasting impacts on the growth and vitality of the agricultural sector. To date, no studies to the authors' knowledge have examined the factors affecting the availability of credit in a comprehensive framework using bank data. This study analyzed the impact of farmland values, price expectations, and bank regulations on the dollar amount of farm loans made. Results show that an increase in farmland values increases the amount of agricultural credit, an increase in bank regulation decreases the amount of agricultural credit, and the price expectation did not impact the amount of agricultural credit.

Keywords: Banking, Credit Rationing, Agriculture

Introduction/Motivation

Credit is a vital input into the production system of agriculture. Figure 1 shows the increase in agricultural credit by dollar amount from 1990 to 2014. Credit allows the farmer to buy productive assets and inputs needed to plant crops and harvest for a profit. The availability of credit can have lasting impacts on the growth and vitality of the agricultural sector. To date, no studies to the authors' knowledge have examined the factors affecting the availability of credit in a comprehensive framework using bank data. Most work has instead focused on the impact that credit has on farm productivity (Saleem and Jan, 2010; Briggeman, Towe, and Morehart, 2009) or credit constraints in developing countries (David and Meyer, 1979; Kochar, 1997; Feder and Just, 1984; Feder, Lau, Lin and Luo, 1990; Ali, Deininger, Duponchel, 2014). What these studies ignore is that credit availability is not exogenous to farm productivity. Three key factors are analyzed in this study: asset prices, commodity price expectations, and bank capital regulation.

Asset prices (e.g. farmland prices) affect collateralization of loans. Farmland is often used as collateral for all types of loans a farmer may require. Thus, equity in farmland is seen as a positive to lenders because it can be collateralized. In addition to collateral, a key metric lenders use to assess the long term capital position of farmers are solvency measures such as the debt-to-asset ratio or debt-to-equity ratio. Having a larger equity base in land decreases the capital risk a farmer poses to a lender and increases the probability of the lender approving the

loan. One risk asset that land prices, which makes up a significant portion of a farmers balance sheet (USDA ERS, 2016), pose to lender is that the price could drastically decline, resulting in loss of equity. This would decrease the amount of collateral available and may cause the lender to withhold credit. Conversely, as asset prices increase, the farmer's balance sheet becomes less risky as the dollar value of assets increases relative to the amount of debt the farmer has and increases the likelihood a lender will extend credit. Thus, farmland values are a key determinant of the amount of credit available to farmers.

Commodity price expectations affect future income and cash flows of the farm. If a lender is expecting high cash flows for the farm business, they will be willing to lend more money knowing there is a higher probability of being repaid. In addition to this, farmers, who are now expecting higher profits, will purchase more inputs as marginal revenue increases. This increases the demand for credit as farmers purchase more inputs for the production cycle.

Lastly, on the lender side of the credit transaction, new bank regulations and capital requirements for lenders may affect the amount lending institutions can lend, further decreasing (or increasing) credit available. There are two different types of regulations that may affect lending: administrative and capital. Bank regulations that have been implemented in response to the 2008 financial crisis have further restricted lending institutions by placing administrative and capital requirements on banks assets and have increased over the time period of this study (Figure 2). These regulations have the intended purposes of making banks safer and less risky. However, this may cause a reduction in available credit as the lending institution adheres to these regulations that restrict the banks' capital usage.

Administrative regulations increase the amount of fixed costs lenders incur to stay in operation. The increase in fixed costs increase the price banks must receive for their products and services which may result in farmers being unable to afford credit. Capital regulations stipulate requirements lenders must adhere to given the riskiness of their portfolio and their leverage positions. These regulations may keep lenders for extending credit depending on the existing riskiness of their loan portfolio or leverage ratio.

These factors may increase or decrease the amount of credit available; this is important because availability of credit has been shown to have major impacts on business cycles (Beranke, Gertler, and Gilchrist, 1999) and it is no surprise that credit has played a key role in boom and bust cycles in the agricultural sector in the past. Bernanke and Gertler (1989) show that as balance sheets of businesses improve, lenders relax credit constraints. This in turns results in the buying of more assets and prolongs the business cycle expansion. Credit affects the accumulation of capital and facilitates growth. Thus, knowing how certain factors affect credit availability would be useful to predict issues with renewal of lines of credit for farmers, know how these factors affect growth within the agricultural sector and to help better predict the agricultural business cycle.

Data

We use bank level data from SNL, a data company that compiles all the Federal Reserve call report data into one database. Data are from 1990 through 2015. Summary statistics are

found in Table 1. Since Dodd-Frank is a federal law and call report data contain information on all banks in the US, all 50 states are represented in the data. It is also important to note that because all banks are required by law to submit call reports, the data is a population as it represents every bank within the United States. Because of this, we will refer to our statistical summaries within this paper as precision estimates.

The regulatory data is from RegData, a regulatory data base (Al-Ubaydli et al., 2015). The main variable of interest is a probability weighted index of the regulatory restriction by Title 12 on credit intermediaries (NAICS code 522). In addition to the probability weighted index, a word count index is also used to test for robustness of results. This is an index of all words in Title 12 of the Code of Federal Regulations. The index is normalized so that 2001 is equal to 1. The data is from 1970 to 2014. Figure 3 shows the increase in the probability weighted index after the Dodd-Frank Act was passed.

Researchers have used many proxies for regulatory policies. Two previous measures include page count and word count of the Code of Federal Regulations (Al-Ubaydli et al., 2015). While simple in nature, these two methods can fail to produce accurate results as neither page count nor word count reflect the number of restrictive policies a piece of legislation may contain. To account for this, Al-Ubaydli et al. (2015) create a probability weighted index to determine the extent to which a given regulation applies to an industry. A benefit of this index is that it allows for the analysis of one specific industry according to its respective NAICS code. It also accounts for the fact that one regulation may have multiple restrictive impacts on the lending institution.

Farmland value data is from USDA NASS. The farmland value used is the national average farmland value for both cropland and pastureland. Corn price data is the September contract price in February.

Methods

To assess the impact that asset values, price expectations, and bank regulations have on credit availability, econometric analysis will be used to analyze the impact the factors have on credit availability. For this study, the following model will be used to identify the effects on credit availability:

$$y_{ist} = \alpha + \sum \gamma X_{ist} + \Gamma \lambda_{st} + \theta \tau_t + \delta D_t + \varepsilon_{it}$$

where y_{ist} is the amount of agricultural loans bank i in region s for time period t has in its portfolio, X_{ist} is a vector of individual bank characteristics and macroeconomic variables that affect each bank, $\lambda_{st}$is average farmland price for region s for time period t, τ_t is a vector of commodity price expectations for time period t, D_t is a regulatory index variable capturing the administrative and capital regulations imposed on each bank for time period t, and e_{it} is a normally distributed error term distributed $(0, \sigma^2)$.

To analyze this problem, we use bank level data from SNL, a data company that compiles all the Federal Reserve call report data into one database. Data are from 1990 through 2014. This is a database of every bank in the U.S. containing all information reported for

regulatory reasons to the banks regulator. In addition to bank variables, data from USDA on land values and corn futures prices will be used. The regulatory data is from RegData, a regulatory data base (Al-Ubaydli et al., 2015).

Results

Results for the model that includes all banks are in Table 2. A 1 percent increase in the restriction index is correlated with a 0.15% decrease in the dollar amount of farm loans. This shows that the increase in regulation has decreased the overall amount of agricultural credit available. From 2010 to 2014, there has been a 325% increase in the regulation index, this is correlated with a 48.75% decrease in agricultural credit. This indicates that increasing regulation decreases the banks' ability to extend credit.

Land values were found to be correlated with an increase in agricultural credit. With land accounting for a major portion of a farmer's balance sheet, it is not surprising that increasing land values results in more credit being extended. An increase in land values results in more equity for the farmer to use as a down payment or for collateral. This decreases the capital risk the farmer poses to the lender and increases the amount the lender can offer the farmer in credit without increasing the risk of the lenders loan portfolio.

Corn price was found to not be statistically significant in the model. This means that the amount of credit farmers need is not correlated with the corn price at time of planting. It seems that prior liquidity conditions impact credit available than future expectations of profits.

A model was estimated for only those banks that are classified as an agricultural bank by the FDIC (Table 3). Results were similar to the model that was estimated with all banks. The restriction index is negatively correlated with agricultural credit and farmland value was positively correlated with agricultural credit. The corn price was, again, not statistically significant.

Conclusions

This study analyzed the impact of farmland values, price expectations, and bank regulations on the dollar amount of farm loans made. Results show that an increase in farmland values increases the amount of agricultural credit, an increase in bank regulation decreases the amount of agricultural credit, and the price expectation did not impact the amount of agricultural credit.

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Figure 1, Total Farm Loans Made

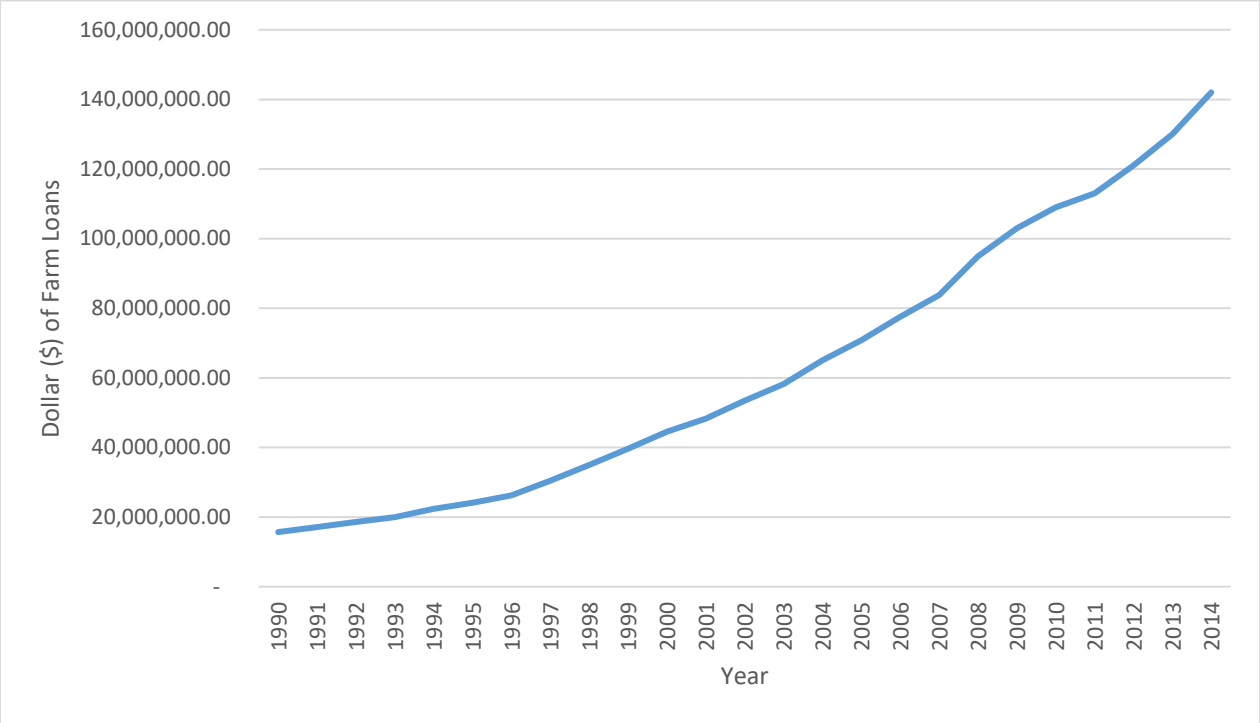

Figure 2, Number of Bank Restrictions, 1970-2014

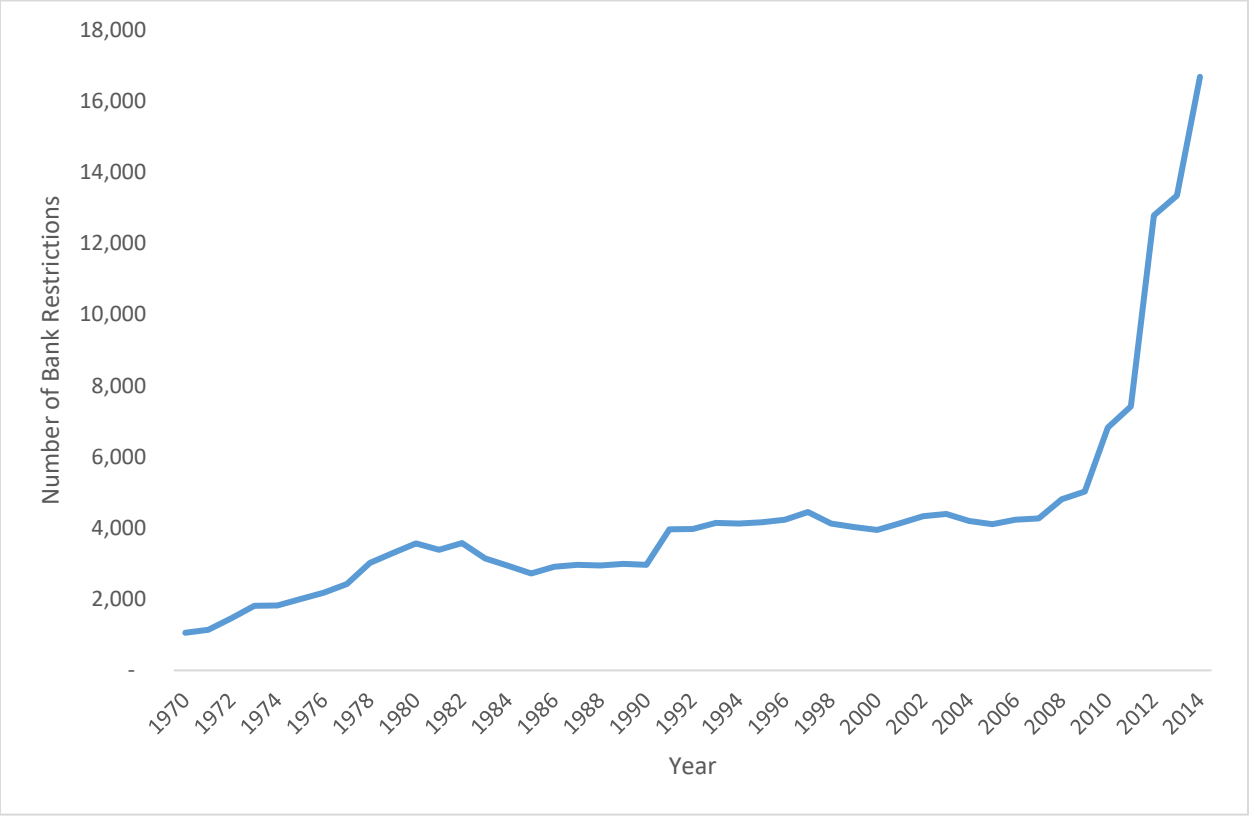

Figure 3, Probability-Weighted Index of Title 12 Regulatory Restrictions, 1970-2014

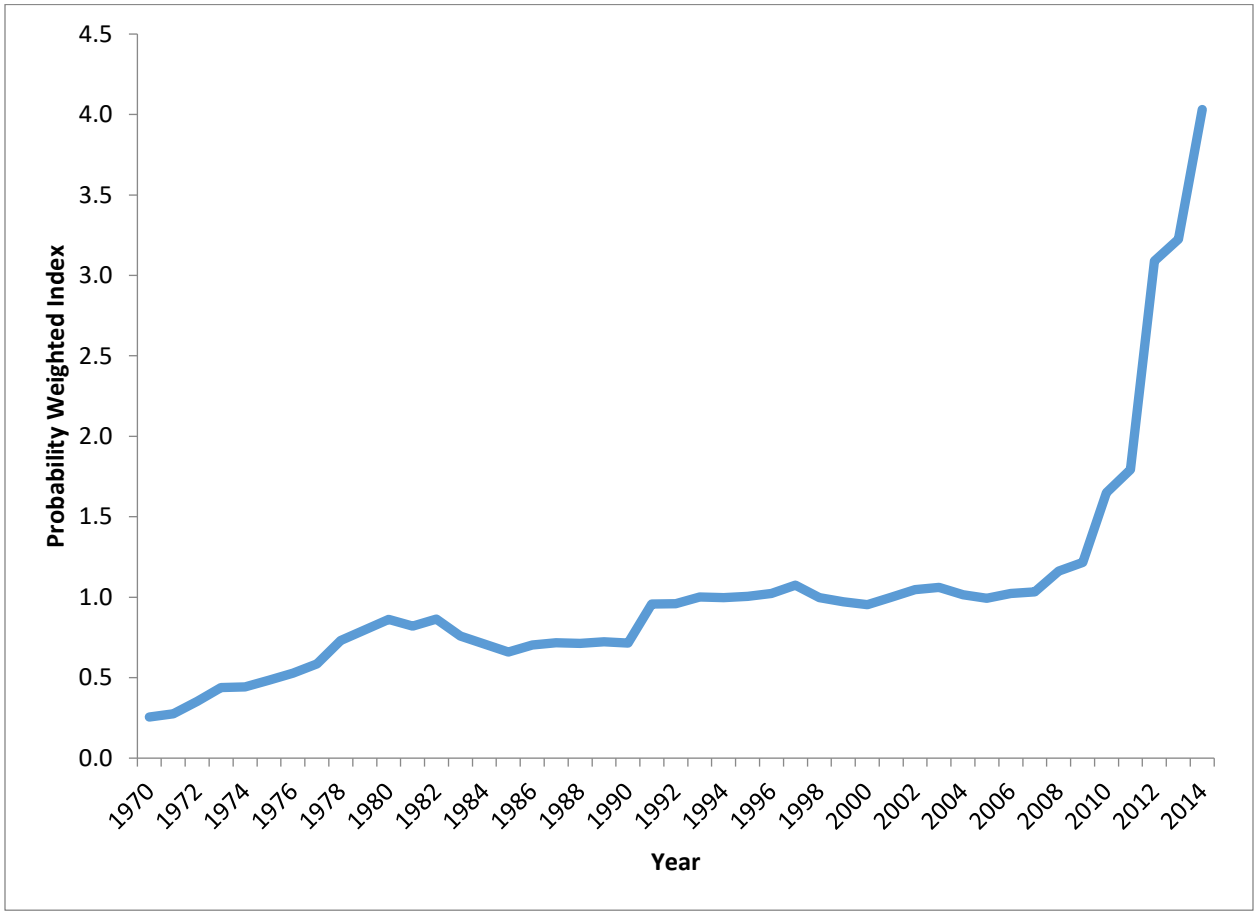

Table 1. Summary Statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Farm Loans	58,000,000	167,000,000	0	4,990,000,000
Total Assets	922,756	20,200,000	1,329	2,070,000,000
Asset Growth (%)	8.95	24.69	(99.67)	959.44
Total Deposits	654,033	13,300,000	1	1,440,000,000
Net Charge Offs	0.37	0.87	(30.26)	45.20
Salary to Assets	1.72	1.88	0	457.09
Leverage	10.92	9.60	(3.00)	925.53
Restriction Index	1.41	0.85	0.72	4.03
Farmland Value	2,339.65	855.63	1,270.00	4,100.00
Corn Price	320.09	144.00	193.25	756.25

Table 2, All Banks Model Results

Variable	Coefficient	Test Statistic	P Value
Year	0.0672*	14.0300	0.0000
Total Assets	0.0000	-1.3200	0.1860
Asset Growth (%)	0.0016*	4.2700	0.0000
Total Deposits	0.0000*	2.0100	0.0450
Net Charge Offs	-0.0796*	-4.6600	0.0000
Salary to Assets	-0.3406*	-8.3800	0.0000
Leverage	-0.0690*	-11.7500	0.0000
Restriction Index	-0.1530*	-8.1100	0.0000
Farmland Value	0.1639**	2.5000	0.0120
Corn Price	0.0171	1.2500	0.2130
Constant	-117.7267*	-12.8300	0.0000

R-Squared of 0.09. N=76,334.*,**,*** indicates statistical significance at the 99%, 95%, and 90% levels respectively.

Table 3, Small Bank Model Results

Variable	Coefficient	Test Statistic	P Value
Year	0.0512*	9.6200	0.0000
Total Assets	0.0000*	4.2100	0.0000
Asset Growth (%)	-0.0016*	-3.6500	0.0000
Total Deposits	0.0000*	-2.7400	0.0060
Net Charge Offs	-0.1566*	-9.1200	0.0000
Salary to Assets	-0.3808*	-9.0400	0.0000
Leverage	-0.0444*	-7.2400	0.0000
Restriction Index	-0.1440*	-5.8700	0.0000
Farmland Value	0.0348	0.4700	0.6370
Corn Price	0.0200	1.2800	0.2020
Constant	-85.2003*	-8.3700	0.0000

R-Squared of 0.09. N=58,227.*,**,*** indicates statistical significance at the 99%, 95%, and 90% levels respectively.