Name (Last, First, Middle): Vancel, James Hugh

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INNOVATIVE FINANCE OR TOXIC CREDIT:
THE FEDERAL FARM LOAN ACT OF 1916 AND ITS ROLE IN
AGRICULTURAL DEBT ACCUMULATION
PRIOR TO THE GREAT DEPRESSION

By: James Hugh Vancel

A Thesis Submitted to the Honors College
In Partial Fulfillment of the Bachelors degree
With Honors in
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Approved by:

Dr. Price V. Fishback
Department of Economics
# Table of Contents

- List of Figures, Tables, and Equations: 3
- 1 Introduction: 4
  - 1.1 State of Agricultural Finance: 4
  - 1.2 Overhauling the Agricultural Financial System: 6
    - 1.2.1 Federal Land Bank System: 8
    - 1.2.2 Joint Stock Land Banks: 8
  - 1.3 Financing the Federal Farm Loan Act Institutions: 10
  - 1.4 Implementation: 12
- 2 Effects of the Federal Farm Loan Act: 13
- 3 Methodology: 20
  - 3.1 Time Frame: 20
    - 3.1.1 Total Lending Model: 20
    - 3.1.2 Farm Mortgage Debt Model: 21
  - 3.2 Econometric Model: 21
    - 3.2.1 Total Lending Model: 21
    - 3.2.2 Farm Mortgage Debt Model: 23
- 4 Results: 25
  - 4.1 Total Lending Model: 25
  - 4.2 Farm Mortgage Debt Model: 28
- 5 Interpretations: 29
- 6 Conclusions: 32
- References Cited: 37
List of Figures, Tables, and Equations

Tables

Table 1. Total mortgage loans outstanding and annual increase (in millions of dollars). 13
Table 2. Farm loan model variable definitions. 22
Table 3. Farm mortgage model variable definitions 24
Table 4. Summary statistics: Total lending model. 25
Table 5. Total lending model regression results. 26
Table 6. Summary statistics: Farm mortgage debt model. 28
Table 7. Farm mortgage debt model regression results. 28

Figures

Figure 1. United States crop prices, farm value, and gross farm production from 1911-1929 (Indexed 1913=100). ........................................................................................................................................ 15
Figure 2. Farm mortgage debt 1910-1935 ........................................................................................................ 17
Figure 3. Farm foreclosure rates (per 1000 farms). ......................................................................................... 18

Equations

Equation 1. Farm lending model: Federal Land Bank Loan lending estimation. .......................... 22
Equation 2. Farm lending model: Joint Stock Land Banks lending estimation ............................. 22
Equation 3. Farm mortgage debt model: Estimation equation......................................................... 23
1 Introduction

While industry and manufacturing were on the rise in the United States in the 1910s and 1920s, agriculture still constituted a significant portion of the American economy. The Westward expansion of the mid-19th century as well as the breaking up of large plantations in the South led to an unprecedented rise in the number of farms and farmland in the United States from 1850-1900 (U.S. Census Bureau 1920). By 1910, the rural population was still as high as 43% of total population and 56% of the rural population derived their income from on-farm activities (US Census Bureau 1920). Following demand from a booming population and price quotas in WWI, crop prices pinnacled in the 1910s. However, population growth had increased the demand from existing agricultural areas, which in turn caused more extensive farming systems to give way to more intensive use of land. In line with Esther Boserup’s framework, agricultural developments needed to rise to meet the needs of population growth (1965).

The ready supply of advanced inputs and implements were needed to meet this demand but could not yet be accessed due to limited credit mechanisms. Furthermore, land values were also on the rise, giving investors both a sense of confidence in land investments as well as calling for larger amounts of capital to be invested in the land (Thompson 1916). Based on all these conditions, policymakers were actively seeking out methods to improve access to farm credit.

1.1 State of Agricultural Finance

To supplement the changing state of American agriculture, vast amounts of farm credit were needed to supply added investment and provide capital for the new intensive systems. The National Banking Act of 1864 had significantly restricted availability of long-term financing by banks chartered under the national system, yielding the market to private investment groups. It
is more than apparent that these lending institutions had penetrated the agricultural industry. They held 28% of owned farms had mortgages in 1880 and 30% in 1910,(Carter 2010) however, due to the high risks and long terms involved in farm mortgage loans, interest rates and loan structures were perceived by many to be inadequate and under unjust conditions (Buckley 1917).

In order to remedy the pressing lack of credit in rural areas, farmers organized themselves as early as 1732 into the nation’s first cooperative credit system in New London Connecticut (Farm Credit Administration 2012). However, formal government intervention to address this growing need didn’t officially begin until well after the Homestead Act of 1862. As land out West was quickly seized under this legislation, property became increasingly scarce, driving land prices up, further providing an impetus for an effective agricultural credit system to be created. Up until the Federal Farm Loan Act, few lenders were providing long term loans to farmers at affordable interest rates. Private lenders neither had the means nor incentives to develop long terms lending methods, because the risk premiums they would have had to attach to interest rates in order to cover the additional risk made interest rates far too high for farmers to want to borrow (O’Hara 1983).

In a 1915 study commissioned by the House of Representatives in which data was collected from agricultural agents, country banks, representative farmers, and local crop correspondents, the prevailing interest rates for agricultural credit were discovered (Buckley 1917). Only in New York, New Jersey, and Pennsylvania where the average interest rates even remotely close to the 6% proposed under the Federal Farm Loan Act, with actual payouts being closer to 6.5% or 7% due to commission costs. The majority of farmers in Midwestern states such as Indiana, Illinois, Iowa, Wisconsin, Minnesota, Missouri, Michigan, and Ohio faced rates averaging between 6 and 8%, while in the major agricultural states of the Great Plains, West
Coast, and Southern Belt farmers faced interest rates from 8-10%. Furthermore, farmers in a handful of Plains and Southern states such as Texas, North Dakota, and Montana faced rates well above 10%, with Oklahoma averaging as high as 14.5% (Buckley 1917). Furthermore, while the interest rates were high for small-scale borrowers, there were also very few loans conducted on an amortization plan, largely due to the short life of loans and their risky nature from the perspective of borrowers (Buckley 1917). As such, most loans required the entire sum to be paid on completion, a sum which farmers found difficult to come up with when crop prices fell or bad weather crippled harvests.

There is dispute as to the full explanation of interest rate differentials between Atlantic and Western states, as referenced in the debates of Barry Eichengreen and Kenneth Snowden. Snowden argues that in addition to the added risk of agricultural loans, there was a regional bias due to the transaction costs faced by Eastern lenders when estimating risk premiums for Western markets. This led to even higher interest rates than justified by the relative risk in Western states (Snowden 1987). Eichengreen contended that the variation was completely explainable via differences across states and that Snowden omitted several key variables in his analysis (Eichengreen 1987).

1.2 Overhauling the Agricultural Financial System
Restructuring the organization of agricultural credit was given great consideration in order to develop the best machinery for effectively transferring financial capital to farmers. Populist leaders had great political weight at this time, and adamantly called for the provision of loans through the national government, a broker they felt farmers could deal with on more equal terms than the current providers (Hicks 1931). Therefore, in preliminary proposals, the primary option proposed was developing a standard banking system under the supervision of the Federal
Government which would oversee the loaning of funds directly to individuals from the
government (FFLA 1916). However after careful consideration, this was deemed to be too
similar to the current system to promote any effective change or considerable agricultural
development without leading to undue risk being taken on the part of the Federal Government.
Congress was guided by advice from the American Commission to Europe which was
administered during the Southern Commercial Congress in 1912 to study the European system of
agricultural credit. During the discussion leading up to the passage of the Federal Farm Loan
Act, two major needs were identified as the centerpieces for the legislation. First, a large number
of farmers needed to improve their stock of collateral to back a loan in order to get access to
capital. On the other hand, a large group of farmers had ample collateral and security but were
unable to engage current private lenders due to the high rates associated with the risk in
investing. These individuals sought access to a system of financial institutions that could get
them long term loans at better terms than the private institutions but with fewer restrictions than
for those who needed more security to obtain capital (Thompson 1916).

These diverging demands of farmers led to a division of opinion between legislators on
how best to implement the system of agricultural finance. Two major mindsets dominated the
discourse underwriting the Farm Loan Act. One argued that cooperatively owned and
Government supported banks were the most effective, serving as the impetus for the Federal
Farm Loan Banks. Meanwhile, others argued that private institutions, also modestly overseen by
the government, would serve this need better. This split by the legislators led to the
establishment of two separate banking systems under the Federal Farm Loan Act: Federal Land
Banks and their National Farm Loan Associations as well as the Joint Stock Land Banks (Bennet
1938).
1.2.1 Federal Land Bank System

Federal Land Banks were commissioned to provide long-term loans in order to develop and expand farms. A majority of these loans were intended to be for a minimum of 20 years in order to account for and promote the long-term development of agricultural land, rather than quick marginal gains in yields to service shorter-term loans. The Federal Land Banks were supplied an initial stock of $750,000, which would be repaid over time by the mandate that 25% of further stock subscriptions generated be allocated to the retirement of the initial Federal investment (Wipurd 1921). Federal Land Banks issued loans at higher interest rates than the rates on standard Treasury Bills and all interest derived for the investor was then considered tax-free income. Bonds issued under the Federal Land Banks were backed by the Federal government, providing a much safer medium from the current private institutions engaged in farm-mortgage finance. The mood of the country at the time was extremely positive towards land investment, as land prices had been consistently rising since the beginning of the 20th century, and farm-mortgages were widely perceived as an underinvested asset that held great potential for investment (Thompson 1916). This speculative buying would later come to unfold once the Great Depression unraveled.

1.2.2 Joint Stock Land Banks

Joint Stock Land Banks, on the contrary, were originally implemented to satisfy the demand for credit by farmers who had already established a system of economic security, which they could demonstrate to lenders, but who would not pay the rates charged by private lenders or simply could not afford them (FFLA 1916). Initially, it was hoped that the joint stock banks could serve larger borrowers with greater established security but also serve as a backup for those who doubted the effectiveness of a cooperative loan administration.
Joint Stock Banks had a similar structure as Federal Land Banks in that they were to be formed by independent investors coming together in groups of no less than ten in order to engage in carrying out lending on farm mortgage security. They differed in that these principle investors supplied the entire capital stock for lending, contrary to the supplemental funding received by the Federal Land Banks. In the Federal Land Bank system, national farm loan associations were formed by borrowers and lenders in order to establish collective security and gain access to the Federal Land Banks.

Individuals could access Joint Stock Banks directly, while membership in a national farm loan association was a prerequisite to access Federal Land Bank financing. Furthermore, in order to receive an endorsement from a national farm loan association to obtain a loan from the Federal Land Bank, borrowers were required to subscribe for stock in the local farm loan association an amount equal to 5% of the face value of their loan application. This acted as an investment which would be paid back at the maturity of their loan, yielding dividends for the borrower as well as providing capital the association could use for loans. With this capital, the association then subscribed for an equal amount of stock in the Federal Land bank, yielding dividend returns for the organization (Thompson 1916).

Borrowers from Joint Stock Land Banks were not required to subscribe to the capital stock of the bank, leaving the entire stock of the corporation in the hands of the bondholders and principal investors. Originally, these were also constructed as a means to appease mortgage companies who were fearful of subsidized competition from the Federal Farm Loan Act. Legislators hoped that many of the Joint Stock Land Banks would be chartered out of existing mortgage loan firms, but this did not tend to be the case. A majority of Joint Stock Banks were
formed by wealthy landowners and major entrepreneurs in the area, but the stock of capital was conscripted by issuing bonds to the public, similar to the other private institutions.

Both Federal Land Banks and Joint Stock Banks helped to alleviate the uncertainty surrounding mortgage loans by putting local players in the position of evaluating loans and lending practices in order to minimize market information imperfections and ensure that these low risk loans were indeed low risk. Prior to the institution of the Federal Farm Loan Act, lenders were placing the added burden of risk and costs of moving funds between regions to the borrower, but with the institution of local and regional banks, that costs was eliminated (Snowden 1987). Under this structure, loans could be given to credible individuals without substantial experience with credit based on their reputation and dependability. Joint Stock Banks were able to do this to some extent because they were run by local elites. The members of farm loan associations under the Federal Land Bank system had each invested their own funds and so they had extra incentive to ensure that they only forwarded applications from individuals they trusted and believed would repay their principal loan to the Federal Land Banks. Arguably, this could have led to exclusion of certain farmers due to social biases such as race, gender, or various other factors who would otherwise qualify for loans. However the net benefit was viewed to be a necessary cost in a scheme structured to expand the credit system.

1.3 Financing the Federal Farm Loan Act Institutions
Under this collective security, applicants were much more appealing and investors felt their investments were significantly more secure. As farmers were financially invested in the Farm Loan Associations, they had a significant interest in ensuring the success of their loans in order to secure their own capital stock, thus major investors felt this was a significant form of collateral that overcame any risk that might be perceived in distributing low-cost loans. This
proved to be absolutely vital in the expansion and private financing of the Federal Land Banks and Joint Stock Banks in the coming years, particularly when almost anyone could apply to be a member of a farm loan association. As worded in the Federal Farm Loan Act, the Federal Land Bank borrowers must be “engaged in the cultivation of the farm mortgaged,” opening up further financing opportunities for not just landowners but also tenant farmers. This was intended to target farmers who had a successful record but were unable to collect the necessary security for most banks to deem them eligible for mortgage loans (Thompson 1916).

As a result, capital was easily conscripted under these safeguards, both for the Joint Stock Banks and the Federal Land Banks. As mentioned earlier, Federal Land Banks were supplemented by the Federal Government which supplied $750,000 of initial capital stock to each of the 12 regional banks, from which they were able to issue further bonds and initiate their operations. They applied semiannual subscriptions to retire the initial capital stock and curb the level of direct government assistance to the Federal Farm Credit Program, as debates over political philosophy were volatile in the halls of Congress with fear of socialism and state superiority a major concern. From this capital base, Federal Land Banks could borrow twenty times the original capital stock by issuing public bonds. Interest rates for bonds were set by the Federal Farm Board, starting at 4.5%, half a percent below the rate set by the Joint Stock Land Banks for a period of one year until the Federal Land Banks saw 4.5% as unsellable in the present market climate.

Capital for Joint Stock Banks was acquired in a similar fashion to the Federal Land banks, in the auction of publicly traded bonds, however there was no initial capital subscription from the Federal Reserve System. However the Joint Stock Banks had an added advantage in that they were allowed to set their interest rates, both for loans and bonds based on the prevailing
market rate and not the government decreed standard. There were limits because the difference between the loan and bond rate could be no greater than 1% with bond rates never exceeding 6% (Wipurd 1921). While certain regulations were set from inception, joint stock land banks were much more flexible than Federal Land Bank loans. Unlike their counterpart, Joint Stock Land Bank money was not required to be used specifically for on-farm purposes. The borrower was not required to justify the expense for agricultural purposes, granting much more liberty and leeway in terms of entrepreneurial ability as well as accountability dangers for the banks (Thompson 1916). However, loans still could not be given to corporations, and there was a cap on the total amount that could be loaned to a borrower. Joint Stock Land Banks were not permitted to loan to any single borrower in excess of 15% of their total capital stock or $50,000, whichever amount was lower. This was an extremely high cap compared to the Federal Land Bank restrictions of $10,000 per loan.

1.4 Implementation

The Federal Farm Loan Act quickly expanded agricultural credit upon inception in 1916, and steadily rose outside of 1920-21 when Federal Farm Loan entities were held up in the Supreme Court under questions of constitutionality, for which it received a favorable ruling in 1921 (FFLB 1921). While Federal Land Banks initially provided the majority of loans, the demand for credit was eventually split with Joint Stock Land Banks, with different demographics of farmers finding either the Federal or Joint Stock Land Banks preferential. As was initially expected, large landholders tended to prefer the Joint Stock Banks, while tenant farmers and smaller landholders flocked towards Federal Land Banks. Lending from the beginning of the program to 1929 reflected this, with average loan size of $6,044 for Joint Stock Banks and $2,925 for Federal Land Banks (Bennett 1938). Total loans under both the Federal Land Banks
and the Joint Stock Land Banks rose extremely fast in the mid-1920s, with as many as $200 million in new loans under the Federal banks and $173 million under the Joint Stock banks in a single year (Table 1).

<table>
<thead>
<tr>
<th>Year</th>
<th>Joint Stock Land Banks</th>
<th>Federal Land Banks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total Loans Outstanding</td>
<td>Change</td>
</tr>
<tr>
<td>1918</td>
<td>$156.2</td>
<td>8.4</td>
</tr>
<tr>
<td>1919</td>
<td>293.6</td>
<td>137.3</td>
</tr>
<tr>
<td>1920</td>
<td>349.6</td>
<td>56</td>
</tr>
<tr>
<td>1921</td>
<td>432.5</td>
<td>82.8</td>
</tr>
<tr>
<td>1922</td>
<td>639.5</td>
<td>206.9</td>
</tr>
<tr>
<td>1923</td>
<td>799.7</td>
<td>160.1</td>
</tr>
<tr>
<td>1924</td>
<td>927.5</td>
<td>127.9</td>
</tr>
<tr>
<td>1925</td>
<td>1005.7</td>
<td>78.1</td>
</tr>
<tr>
<td>1926</td>
<td>1077.8</td>
<td>72.1</td>
</tr>
<tr>
<td>1927</td>
<td>1155.6</td>
<td>77.8</td>
</tr>
<tr>
<td>1928</td>
<td>1194.4</td>
<td>38.8</td>
</tr>
<tr>
<td>1929</td>
<td>1197.9</td>
<td>3.4</td>
</tr>
</tbody>
</table>

Source: (Persons 1930)

2 Effects of the Federal Farm Loan Act

Few will contest that the federal government’s methods for extending credit to rural farmers was a novel approach to promote agricultural development in the rural United States. However, there were perceived risks which were anticipated even during the early stages of implementation of the bill. It was feared that land values would increase with active speculation, particularly from the Joint Stock Land Bank loans (Thompson 1916). Unfortunately, this and various other risks would become realities during the late 1910’s and 1920’s, leading to heavy farmer indebtedness which arguably contributed to the farm mortgage crisis in the Great Depression.
Crop prices fell rapidly in 1921 in response to record harvests from staple crops such as corn and cotton “due to the encouraging spirit driving American agriculture.” (Bean 1930). This harvest did not come without a cost. Farmers made significant investments from loans taken out in previous years to buy expensive inputs such as fertilizer, farm equipment and high wages for employees (Link 1946). Secretary of Agriculture Henry C. Wallace stated in response to the farmer practices: “Farmers had been told over and over again that overseas there was a hungry world waiting to be fed and that there would be a strong demand for all they could produce.”(Link 1946). Farmers began to borrow more to service impending debt payments, to hold their crops until prices had recovered, and to invest in more intensive farming practices to produce more to overcome the drop in value of their produce (Link 1946). The drop, as predictable as it is in hindsight, was largely unanticipated by lenders and farmers alike. At the inception of the Federal Farm Loan Act, land prices had been continually on the rise since World War I had started in Europe in 1914, leading most farmers and investors to believe that even though fluctuations were bound to occur, they would now occur at a significantly higher level of prices than in previous time periods.
The new influx of long term capital was coupled by a period of overestimated returns on agricultural produce in 1921, 1922, and 1923, with prices only recovering right before the start of the Great Depression in 1929. Prices on major commodities such as cotton, wheat, and corn as well as livestock were high and rising due to speculation increasing demand from Europe and the potential American shortages. These price rises led many farmers to overplant and overinvest in crop development on already depleted soils. In major agricultural states such as Iowa, farm gate prices in 1920 were over double what they had been just a decade before, after accounting for inflation (Alston et al. 1994). When the Great War came to a close, the government could not afford to guarantee agricultural prices and the markets responded accordingly, but this was after four years of debt accumulation spurred on by the Federal Farm Loan Act.
The Federal Farm Loan Act, as outlined earlier, was a response to the high interest rates for agricultural credit. Farmers, who felt assured of rising high prices by the government guarantees under World War I quickly invested in improving their farms. As seen in Tables 1 and 2, total loan volume increased rapidly, but was quickly followed by decreasing returns to on-farm income based on low prices. Therefore, in the midst of the Great Depression, scholars such as Alston, Grove, and Wheelock have argued that this bill actually furthered the excessive credit speculation and expansion which contributed to the greatest economic recession in the history of the United States. Due to the wide breadth of the Federal Farm Loan Act of 1916, there are various aspects of the bill which can be attributed to this widespread expansion.

Tax exemptions were applied at the municipal, state, and federal level for interest paid to bondholders investing in the capital stock of both Federal Land Banks and Joint Stock Land Backs. From this point on, Joint Stock Land Banks continued to expand until they reached their peak in 1923 with over 70 separate banks operating and lending well over $130 million per year.

By 1928, Federal Land Banks held $1.16 billion of loans outstanding or 12.2% of the total farm mortgage debt in the US while the Joint Stock Land Banks held $670 million or 7.1% (Engberg 1931). In aggregate this represented 19.3% of the total farm mortgage debt in the United States at the end of the 1920’s. However, many of the Joint Stock Land Banks and Federal Land Bank’s loans were used to refinance existing mortgages from previous arrangements under their more ideal terms. From 1920-1928, the Joint Stock Land Banks and Federal Land Banks’ added $2.1 billion in loans of which $1.53 billion or 72% was used for refunding previously existing mortgages (Engberg 1931). As a result, farm mortgage debt clearly rose, as described in Figure 2 below.

Vancel 16
As lending continued however, problems began to arise within the structure of both types of institutions. Bennett claims that Joint Stock Land Banks were pushed to lend more to make up the margin of profit lost by the moratorium on lending during the litigations in the Supreme Court, the agricultural depression of 1921, and the limited margin of interest imposed by the Federal Farm Loan Act. Promoters were brought in to encourage the sale of bonds and eventually encourage lending, but these officials were minimally versed in sound mortgage practice, leading to risky and speculative lending (Bennett 1938). In 1927, three Joint Stock
Land Banks were on the verge of default and placed into receivership under the Federal Government, effectively undermining confidence in the institutions and precipitating the Emergency Farm Mortgage Act of 1933, which is discussed below (Bennett 1938). Federal Land Banks faced similar troubles, but enjoyed the benefit of full federal backing of the issued bonds, so were entitled to receive assistance from the Federal Government.

Farm foreclosure rates corresponded with the relative increase in debt as can be seen in Figure 2 below. By 1928, 3 of the 52 Joint Stock Banks had been placed into receivership, and demand for loans from farm loan associations was declining sharply. With the decrease in loans, these individual associations were no longer receiving significant dividend yields from their investments, limiting their income level and oftentimes forcing them to stop compensating their secretary-treasurers, compromising their future ability to effectively conduct business (Engberg 1931).

Figure 3. Farm foreclosure rates (per 1000 farms).
An effort was made to rebrand both the Joint Stock Land Banks and the Federal Land Banks by improving their appraisal corps and tightening their lending procedures, but this didn’t prove too successful and eventually, well into the Great Depression, finances and new capital were almost impossible to secure, making liquidation an extremely appealing option for investors. Under the Emergency Farm Mortgage Act of May 1933 Joint Stock Banks were given an orderly process for liquidating all assets and phasing out of existence, an option which resulted in over 80% of loans held by the Joint Stock Land Banks being liquidated (Bennett 1938).

While no one disputes the mortgage debt crisis which ensued leading up to the Great Depression, there is room to argue what role the Federal Farm Loan Act played in delaying or exacerbating the level of farm-mortgage credit, and more specifically whether, Joint Stock Land Banks, or the Federal Land Banks, played a larger role in contributing to the level of “toxic” debt.

I take the position that the Federal Farm Loan Act institutions were the source of vast amounts of credit expansion and speculative investing. I pose that these institutions created significant incentive for investors to invest and farmers borrow at a time when agriculture was facing substantial challenges. All bonds purchased from either the Federal Land Banks or Joint Stock Land Banks were considered an instrumentality of the government and as such, the interest paid on the bonds was exempt from national, state and local taxes, making an enticing investment all the more appealing to wealthy investors eager to avoid the excessive and constraining taxes of the era. This status was abused by the investors of the Joint Stock Land Banks and further exacerbated the amount of credit available in the form of farm mortgage debt which accrued during this period. While it is difficult to test the extent to which Joint Stock
Banks or Federal Land Banks contributed to the Great Depression, in our model we will attempt to distill the effect both banking institutions had on total farm mortgage debt, and hopefully infer which had a greater effect on the total level of debt.

3 Methodology
In this study, we will explore two forms of econometric models to attempt to distill the relationships between several variables. The first empirical model will focus on the effects of crop prices, farm mortgage debt, gross farm income, commercial interest rates, farm real estate taxes and total farm value on the total amount of federal loans being issued to infer if our hypothesis that increasing indebtedness, low crop prices, and dropping farm values contributed to the overall increase in farm loans. I include commercial interest rates and farm real estate taxes in order to control for changes that could have impacted lending policy but also to explore if our hypothesis that high commercial rates drove farmers to land banks is founded in empirical evidence. The second empirical model explores the role of both the Joint Stock Land Banks and Federal Land Banks institutions and their collective role in debt accumulation and the eventual farm-mortgage crisis which developed prior to the Great Depression of the 1930’s.

3.1 Time Frame
3.1.1 Total Lending Model
The analysis of the first model is focused on the period from 1919 to 1932 in order to capture the full effect of the various effects on farm loans after the Federal Farm Loan Act leading up to the Great Depression. While lending really started taking place immediately after passage of the act in 1916, our data was limited to the period 1919 through 1932.
3.1.2 Farm Mortgage Debt Model

The second model focuses the lens on the levels of lending and their effects from 1921 through 1929. Our choice in this time period is important because it follows the flow of capital from both types of institutions following the Supreme Court case declaring their constitutionality under U.S. legal precedence. Joint Stock Bank operations were stifled when the legality of Joint Stock Land Banks and even the entirety of the Federal Farm Loan Act was put into question under the Supreme Court case of Smith vs. Kansas City Title and Trust Company, et al ((Smith v Kansas City Title and Trust Co et al. 1921)). Under this case, the investment of a trust company in bonds of Federal Land Banks and Joint Stock Land Banks was called into question upon the claim that the creation of such banks under the Federal Farm Loan Act was unconstitutional.

Following legal precedence established in McCulloch v. Maryland, the Supreme Court ruled that Congress was within its constitutional authority to create this banking system and provide for the tax exemption on its interest payments (Smith v Kansas City Title and Trust Co et al. 1921). Resolved in 1921, the case ruled that tax exemption of both Federal Land Bank bonds and Joint Stock Land Bank bonds was constitutional permitting both institutions to continue their operations unabated.

3.2 Econometric Model

3.2.1 Total Lending Model

The model incorporates five main variables that may have contributed to the level of federal farm lending. The model aims to examine the differential between the effects of lagged crop value, livestock value, real estate taxes and present commercial interest rates on the lending practices of the Joint Stock Land Banks and the Federal Land Banks (Equation 1 and 2). We thus construct two equations, with the same explanatory variables but altering the dependent variable to reflect both lending institutions. The estimating equations becomes:
Equation 1. Farm lending model: Federal Land Bank Loan lending estimation.

\[ Federal \ Land \ Bank \ Loans_{it} = \beta_0 + \beta_1 Value \ of \ Crops_{it-1} + \beta_2 Value \ of \ Livestock_{it-1} + \beta_3 Farm \ Real \ Estate \ Tax_{it-1} + \beta_4 Commercial \ Interest \ Rate_{it} + \Delta + \theta + \varepsilon \]

Equation 2. Farm lending model: Joint Stock Land Banks lending estimation.

\[ Joint \ Stock \ Land \ Bank \ Loans_{it} = \beta_0 + \beta_1 Value \ of \ Crops_{it-1} + \beta_2 Value \ of \ Livestock_{it-1} + \beta_3 Farm \ Real \ Estate \ Tax_{it-1} + \beta_4 Commercial \ Interest \ Rate_{it} + \Delta + \theta + \varepsilon \]

Where the variables are defined as follows:

<table>
<thead>
<tr>
<th>Table 2. Farm loan model variable definitions.</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable Label</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Federal Land Bank Loans_{it}</td>
<td>Federal Land Bank Loans for state ( i ) in year ( t ) in 1967 $ per capita</td>
</tr>
<tr>
<td>Joint Stock Land Bank Loans_{it}</td>
<td>Joint Stock Land Bank Loans for state ( i ) in year ( t ) in 1967 $ per capita</td>
</tr>
<tr>
<td>Value of Crops_{it-1}</td>
<td>Lagged Total Value of Crops for state ( i ) in year ( t-1 ) in 1967 $ per capita</td>
</tr>
<tr>
<td>Value of Livestock_{it-1}</td>
<td>Lagged Total Value of Livestock for state ( i ) in year ( t-1 ) in 1967 $ per capita</td>
</tr>
<tr>
<td>Farm Real Estate Tax_{it-1}</td>
<td>Lagged Total Value of Farm Real Estate Tax for state ( i ) in year ( t-1 ) in 1967 $ per capita</td>
</tr>
<tr>
<td>Commercial Interest Rate_{it}</td>
<td>Average loan interest rate for commercial banks for year ( i ) in year ( t ) in percentage points</td>
</tr>
<tr>
<td>( \Delta )</td>
<td>Vector of State Dummy Variables</td>
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</tbody>
</table>
We will examine both empirical estimations both with and without fixed effects in order to control for factors such as climate and soil quality that did not vary over time but varied within states as well as national shocks that did not vary over states. We will examine our model for differential estimates between the two lending institutions as well as statistical significance of estimates to propose how varying outcomes effected lending for both institutions. The time frame was limited to 1923 to 1932 due to the lack of available data for Joint Stock lending prior to 1923.

3.2.2 Farm Mortgage Debt Model

In order to test the theory that Joint Stock Land Banks contributed more to the expansion of farm mortgage debt, we needed to test a model to explore the full effects of both banking systems on mortgage debt. The model includes both the loans by Joint Stock Land Banks and by Federal Land Banks. The empirical estimation aims to examine to what extent Joint Stock Land Bank and Federal Land Bank loans impacted total Farm Mortgage Debt. If we assume that they will be crowding out the loan market, we would expect a coefficient value less than one, but alternatively if either institution is not crowding out the market but actually stimulating the lending market and encouraging more lending. The hypothesis presented in this study expects to find a coefficient of Federal Land Bank Loans value less than one, and a coefficient of Joint Stock Land Bank Loans value greater than one.

**Equation 3. Farm mortgage debt model: Estimation equation.**

\[ Farm \text{ Mortgage Debt}_{it} = \beta_0 + \beta_1 Total \text{ Federal Land Bank Loans Outstanding}_{it} + \beta_2 Total \text{ Joint Stock Land Bank Loans Outstanding}_{it} + \Delta + \theta + \epsilon \]
In doing so, we were also working with limited data in regards to total farm debt and lending totals for both Joint Stock Land Banks and Federal Land Banks, so we were forced to drop observations in regards to several of the states and all years with the exception of 1920, 1925, 1928, and 1930. The variables are described in Table 3 below:

<table>
<thead>
<tr>
<th>Variable Label</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>( Farm \text{ Mortgage Debt}_{it} )</td>
<td>Total farm mortgage debt (1967$ per capita) for a given state, ( i ) in year ( t )</td>
</tr>
<tr>
<td>( Federal Land Bank Loans_{it} )</td>
<td>Total Federal Land Bank Loans Outstanding (1967$ per capita) for a given state, ( i ) in year ( t )</td>
</tr>
<tr>
<td>( Joint Stock Land Bank Loans_{it} )</td>
<td>Total Joint Stock Land Bank Loans Outstanding (1967$ per capita) for a given state, ( i ) in year ( t )</td>
</tr>
<tr>
<td>( \Delta )</td>
<td>Vector of State Dummy Variables</td>
</tr>
<tr>
<td>( \theta )</td>
<td>Vector of Year Dummy Variables</td>
</tr>
</tbody>
</table>

Lastly, \( \Delta \) was a vector of state indicator variables to control for factors such as climate, soil quality that did not change over time but varied amongst states. \( \theta \) was a vector of time indicator variables to control for national shocks that occurred across all states. The time frame is the same for the Farm Lending Model, although the years are limited to only 1920, 1925, 1928, and 1930 instead of all years in the time frame 1920-1932 due to restricted availability on farm mortgage debt.
4 Results

4.1 Total Lending Model

The summary statistics of the variables utilized in this estimation are presented in Table 4.

Table 4. Summary statistics: Total lending model.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Std. Dev</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Joint Stock Bank Loans (per capita)</td>
<td>480</td>
<td>1.648066</td>
<td>4.615383</td>
<td>0</td>
<td>58.69368</td>
</tr>
<tr>
<td>Federal Land Bank Loans (per capita)</td>
<td>480</td>
<td>2.483827</td>
<td>3.127516</td>
<td>0</td>
<td>24.093</td>
</tr>
<tr>
<td>Value of Crops (per capita)</td>
<td>480</td>
<td>12962.02</td>
<td>12099.1</td>
<td>467.2729</td>
<td>93693.99</td>
</tr>
<tr>
<td>Value of Livestock (per capita)</td>
<td>480</td>
<td>309.4119</td>
<td>114.5323</td>
<td>95.66578</td>
<td>728.2</td>
</tr>
<tr>
<td>Farm Real Estate Tax (per capita per acre)</td>
<td>480</td>
<td>1.06E-06</td>
<td>1.15E-06</td>
<td>6.99E-08</td>
<td>6.42E-06</td>
</tr>
<tr>
<td>Commercial Interest Rate</td>
<td>480</td>
<td>6.668027</td>
<td>1.043156</td>
<td>1.205</td>
<td>9.899</td>
</tr>
</tbody>
</table>

As we see in the Table 5 above, the Joint Stock Bank Loans were significantly more variable than Federal Land Bank Loans, with higher standard deviations and a higher range. This can largely be attributed to their extended flexibility under the Federal Farm Loan Act and discussed earlier in this paper. Furthermore, we see that Crop Value was significantly higher than Livestock Value at this time, reflecting the dominance of crops in agricultural livelihoods over farm animal activities during this time period. The measure for Farm Real Estate Taxes may appear very low, however taking into account that this variable is denotes in dollars per capita per acre, the magnitude has more meaning. Nevertheless, the level of variation is quite significant, with the standard deviation being higher than the mean value, indicating a great deal of variation from state to state. This could reflect the level to which the government in each state was encouraging land ownership and long term investments in the land. Lastly, we note that the
Commercial interest rate fluctuated a fair amount over this time period, which will likely play into the interest or desire to invest in Federal Land Bank or Joint Stock Land Bank loans as they held fixed interest rates.

Using STATA to carry out multiple linear regressions, we received the following results from our lending models (Equation 1) and (Equation 2) listed in Table 5.

<table>
<thead>
<tr>
<th>Variables</th>
<th>(Eq2) Joint Stock Land Banks</th>
<th>(Eq1) Federal Land Banks</th>
<th>With State and Year Fixed Effects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Value of Crops_{it-1}</td>
<td>0.000115***</td>
<td>0.000132***</td>
<td>4.11e-05</td>
</tr>
<tr>
<td></td>
<td>(1.83e-05)</td>
<td>(1.03e-05)</td>
<td>(1.95e-05)</td>
</tr>
<tr>
<td>Value of Livestock_{it-1}</td>
<td>-0.00397*</td>
<td>-0.00379***</td>
<td>0.00634*</td>
</tr>
<tr>
<td></td>
<td>(0.00203)</td>
<td>(0.00115)</td>
<td>(0.00195)</td>
</tr>
<tr>
<td>Farm Real Estate Tax_{it-1}</td>
<td>-109,358</td>
<td>338,775***</td>
<td>2,407</td>
</tr>
<tr>
<td></td>
<td>(186,756)</td>
<td>(105,485)</td>
<td>(147,588)</td>
</tr>
<tr>
<td>Commercial Interest Rate_{it}</td>
<td>-0.343</td>
<td>0.322**</td>
<td>0.308</td>
</tr>
<tr>
<td></td>
<td>(0.223)</td>
<td>(0.126)</td>
<td>(0.161)</td>
</tr>
<tr>
<td>Constant</td>
<td>3.792**</td>
<td>-0.565</td>
<td>-3.869</td>
</tr>
<tr>
<td></td>
<td>(1.732)</td>
<td>(0.978)</td>
<td>(1.422)</td>
</tr>
<tr>
<td>Observations</td>
<td>480</td>
<td>480</td>
<td>480</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.100</td>
<td>0.374</td>
<td>0.443</td>
</tr>
<tr>
<td>Standard errors in parentheses</td>
<td>*** p&lt;0.01, ** p&lt;0.05, * p&lt;0.1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In the estimates without state and year fixed effects, we see almost no difference in the effect of Crop Value and Livestock value on either lending institution. However, once we account for national shocks and state differences with the fixed effect model we see a divergence between the two institutions. Crop Value had a slightly smaller effect on the total amount of
Joint Stock Land Bank Loans than Federal Land Banks loans, but the effect of Crop Value on Joint Stock Bank lending was not statistically significant, so we cannot infer with confidence that there was an effect. However, based on our estimate with and without the fixed effects, we can conclude that crop value had a statistically significant positive relationship with both lending by Federal Land Banks and Joint Stock Land Banks.

The sign for the coefficient of Value of Livestock flipped when we took into account state and year fixed effects, implying that time-invariant features of the states influenced the relationship between the stock of animals and lending. Some states tended to specialize in rangeland management practices, absorbing the majority of the market contribution. After controlling for the fixed effects, the value of livestock had a statistically significant and positive relationship with both lending institutions, but the effect was almost twice as strong for Joint Stock Land Banks as for Federal Land Banks.

The effect of Farm Real Estate Taxes was inconclusive as only the coefficient for Federal Land Banks without state and year fixed effects was statistically significant, leaving little confidence in the hypothesis that Farm Real Estate Taxes had any effect on lending from either institution. Commercial interest rates had strong positive and statistically significant correlation with total Federal Land Bank loans issued; loans by Joint Stock Land Banks did not.

The $R^2$ values suggest that the combination of correlates and fixed effects explained about 44 and 64 percent of the variation in the loans by Joint Stock Banks and Federal Land Banks. These values can be attributed to the high variability between lending practices over such a short time frame.
4.2 Farm Mortgage Debt Model

The Summary statistics for the variables analyzed in the Farm Mortgage Debt Model are displayed in Table 6.

**Table 6. Summary statistics: Farm mortgage debt model.**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Observations</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Farm Mortgage Debt (per capita)</td>
<td>192</td>
<td>204.184</td>
<td>232.1044</td>
<td>6.480288</td>
<td>1113.056</td>
</tr>
<tr>
<td>Joint Stock Bank Loans Outstanding (per capita)</td>
<td>192</td>
<td>10.48209</td>
<td>16.64288</td>
<td>0</td>
<td>104.2723</td>
</tr>
<tr>
<td>Federal Land Bank Loans Outstanding (per capita)</td>
<td>192</td>
<td>25.59583</td>
<td>27.03427</td>
<td>0.265472</td>
<td>123.9108</td>
</tr>
</tbody>
</table>

Farm Mortgage Debt per capita was extremely variable over the time period and across states, ranging from 6.48 to 1113.056 and having a standard deviation well above the mean. Joint Stock Bank Loans outstanding had a similar range to the Federal Land Bank loans; however the outstanding total tended to be smaller on average.

The coefficients were estimated using STATA and are displayed below in Table 7.

**Table 7. Farm mortgage debt model regression results.**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Total Farm Mortgage Debt</th>
<th>Total Farm Mortgage Debt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>With State and Year</td>
<td>Fixed Effects</td>
</tr>
<tr>
<td></td>
<td>Observations</td>
<td>192</td>
</tr>
<tr>
<td>Joint Stock Land Bank Loans&lt;sub&gt;it&lt;/sub&gt;</td>
<td>6.259***</td>
<td>2.996***</td>
</tr>
<tr>
<td></td>
<td>(0.811)</td>
<td>(0.377)</td>
</tr>
<tr>
<td>Federal Land Bank Loans&lt;sub&gt;it&lt;/sub&gt;</td>
<td>3.510***</td>
<td>-0.0861</td>
</tr>
<tr>
<td></td>
<td>(0.499)</td>
<td>(0.297)</td>
</tr>
<tr>
<td>Constant</td>
<td>48.73***</td>
<td>778.4***</td>
</tr>
<tr>
<td></td>
<td>(14.96)</td>
<td>(26.43)</td>
</tr>
</tbody>
</table>

Observations | 192 | 192 |
R-squared     | 0.586 | 0.983 |

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1
Our estimates demonstrated that the coefficient of Joint Stock Land Bank Loans is statistically significant and demonstrated a strongly positive relationship with total farm mortgage debt. Our estimates for the coefficient of Federal Land Bank Loans were not as clear, while strongly positive and statistically significant without fixed effects, once state and year fixed effects were included, the coefficient was not statistically significant and the sign had flipped, implying that Federal Land Bank Loans did little to increase total Farm Mortgage Debt.

The $R^2$ value on our estimates implies that our model explains a great deal of the variation in estimates, with values of 0.586 for the model without fixed effects and 0.983 for the model with fixed effects.

5 Interpretations

The results for our Total Lending Model neither fully confirm nor deny our initial hypotheses that these lending institutions were largely used to service shortfalls in previous mortgage payments rather than significant agricultural investments. It is clear that the total value of crops was positively related with lending at either institution, implying that farmers were taking out more loans more often after strong harvests rather than due to shortfalls in previous debt payments. This is significant and contrary to the descriptions in the literature. A great deal of the language used in that period implied that lending at these institutions, with particular emphasis on the Joint Stock Land Banks, was used to prop up farmers following bad harvests and depreciating crop prices. Our results find the opposite claim tended to be true, that farmers were borrowing more from both institutions following expansions in farm revenues.
The variance in the effect of the livestock value is unclear, but potentially demonstrates a slight preference of livestock holders towards joint stock land bank institutions. This could be due to their increased flexibility in lending practices or increased access in more remote areas, both important factors in ranching culture.

The model also demonstrated that Farm Real Estate Taxes had almost no discernible effect on the total loans issued from other banking group. The small magnitude of the Farm Real Estate Taxes per capita could explain the lack of impact, as the total dollar value per capita was almost negligible relative to farm income.

Lastly, and of particular interest, commercial interest rates had a significantly larger impact on Federal Land Banks than Joint Stock Land Banks, implying that Federal Land Bank were seen as stronger substitutes to commercial lending institutions than Joint Stock Land Banks, and that there perhaps was a larger group of farmers who simply switched their loans over to Federal Land Banks from commercial ventures than obtained their first loan from these institutions. This implication is extremely important in that it contradicts a great deal of the political rhetoric which was espoused prior to the implementation of the Federal Farm Loan Act, indicating that Federal Land Banks would be used to target farmers who previously did not have access to credit, rather than simply provide cheaper credit for farmers who already have access, which is more of what we were seeing. The substitution between Joint Stock Land Banks and commercial institutions is less visible, and implies that these institutions potentially gave more farmers access to credit.

The results from the second econometric model discussing farm mortgage debt leads us to believe that Joint Stock Land Banks were not crowding out existing lending institutions and were
in fact stimulating new forms of credit access for farmers. However, with a coefficient of 2.996, this implies that for each dollar loaned out in Joint Stock Land Banks, 2.99 dollars was added to the outstanding total Farm Mortgage Debt. The other 1.996 dollars could be derived from interest payments on the Joint Stock Bank loans or complementary loans by commercial lending institutions, however this division cannot be sufficiently explored with the data we have concerning the lending climate at the time. The same result cannot be said for the Federal Land Bank loans as our coefficient is neither positive nor statistically significant, suggesting that the Federal Land Banks loans did not crowd out private credit.

Combining results from the model we see that both Joint Stock Bank lending and Federal Land Bank lending can be seen to correlate strongly with improvements in farm productivity. Furthermore, it follows that Federal Land Bank loans proved to be more of a substitute for commercial bank loans than Joint Stock Bank Loans, which actually stimulated further overall lending. It is unclear the proportion of lending which was attributable to servicing current farm debt, a result which clearly needs further research to be fully explained.
6 Conclusions

Initial aspirations for the Federal Land Bank Institutions was that they would be composed of knowledgeable local officials to help guide lending policy and ensure that the low interest rates established by the federal government accurately reflected the amount of risk in the loans. By providing extra collateral and financial security in the form of collective ownership and local oversight, the Federal Farm Loan Act aimed to extend agricultural credit to millions of new farmers and help promote increased agricultural productivity and technology.

Following the institution of the Federal Farm Loan Act in 1916, lending from both the Joint Stock Land Banks and Federal Land Banks progressively climbed until the Great Depression. However, contrary to its original intent, many of these later loans were made to service and refinance prior debt which existed as a result of the Federal Farm Loan Act institutions. Furthermore, the Joint Stock Land Banks were responsible for a significantly larger portion of this debt burden, with each dollar lent from a Joint Stock Land Bank more than quintupling into debt.

It is abundantly clear that while low interest rates on farm loans were conceived as an innovative way to promote agricultural growth without further indebting the farmers of the United States, there were several issues which arose and prevented this from happening. First, as compared to State, Municipal, and Federal bonds, the prices on bond issuances did not vary with risk. The interest rates were set at the national level by the Federal Farm Loan Board, with zero fluctuation between Federal Land Banks and Farmer Loan Associations. Joint Stock Banks were given more freedom in setting prices, but were still limited to a one percent range below their loan prices, which had to remain competitive with the Federal Land Banks, in effect fixing their prices as well (Galbraith 1937). Without varying prices, information concerning loans was less
reliable, and bondholders could not make sound or secure investments based on the information prices provide. The most volatile bonds were priced at 5% while the most secure were also priced at 5%, making investors extremely skeptical after the initial capital surge.

These interest levels set by the Federal Farm Loan Board were also artificially low for the time period. The private market had dictated that interest rates were high for farm mortgage loans because they were risky assets. Subsidized farm loans were not going to change the essential composition of a loan applicant’s assets. Farm loan associations and the hopeful local context of the joint stock leadership could potentially offset excessive lending in these areas, but it could not change the volatility of the agriculture industry, particularly immediately following a war period. As such, Alston Grove and Wheelock argue that these institutions promoted a sense of excessive competition that forced regularly competitive banks to choose between leaving the market or engaging in riskier practices, many of which took the latter path (1994). With the resulting riskier lending practices farm debt rose, and likely the share of toxic credit as well.

However, particularly with the Joint Stock Land Banks, local officials were not as influential as was originally designed. The Joint Stock Banks boards of directors tended to be composed of very few experienced members in agricultural credit expansion, leading to poor management and policies in a great deal of the banks. Investors collected by the promoters these banks hired, were the sole controllers of a bank’s policies for JSLBs thus policy was dictated purely by quick return (Bennett 1938).

Meanwhile the Federal Land Banks not only had more diverse board but also all of their borrowers acted as acting shareholders. This further incentivized loan consumers to manage their finances well. Each shareholder received dividend yields from the Federal Land Bank, but
these dividends only accrued when the Federal Land Bank was profitable, or reliant on higher quality loans, which gave members an incentive to manage their finances well and ensure that their loan applicants were qualified and had the ability to pay.

Interest rate restrictions coupled with the increasing overall debt levels of farmers eventually precipitated the Emergency Farm Mortgage Act of 1933. In this act, over 80% of the loans of Joint Stock Land Banks were liquidated into either the Federal Land Banks or the Land Commissioners fund, a Federal Government initiative designed to swallow up some of the extra assets. Joint Stock Land Banks were originally more profitable, but when it was more than apparent that these discounted loan prices were not as secure as the 6% interest rate indicated on the bonds issued, investors quickly migrated to the government backed securities that the Federal Land Banks possessed. Furthermore, profit margins continued to drop due to commission prices as well as the agricultural recession of the early 1920’s, causing the Federal Farm Loan Board to drop the price of Federal Land Bank loans to 4.5%. In order to maintain similar operating costs, banks had to start lending on riskier terms to less qualified individuals, which led to toxic assets and eventual liquidation.

Throughout the period of the 1920’s, several scathing cases were distributed by the Mortgages Bankers Association of America claiming that both Federal land banks and Joint Stock Land banks were benefiting the wealthy investors and not the farmers who were borrowing (MBAA 1920). After several instances when loans were taken in excess of the legal limit with limited supervision in 1918-1920, a scathing report which helped block an amendment to the Federal Farm Loan Act to increase loan limits by the Federal Land banks from $10,000 to $25,000 (Preston 1921). This failure to raise the limit funneled major investors to the Joint Stock
Land Banks, allowing individuals who were not the ideal target of the Federal Farm Loan Act to receive extensive lines of credit and capital for potentially non-farm expenditures (Preston 1921).

Furthermore, with both bonds for JSLBs and Federal Land Banks holding tax exempt status, the government was indirectly creating a tax haven for the wealthiest investors to accrue tax-free profits during a period where federal income tax was as high as 77% for the highest tax bracket immediately following World War I, a massive incentive for creative investments to avoid this burdensome tax (US Department of Treasury 1929).

Thus, the Federal Farm Loan Act was designed to expand agricultural credit. Stakeholders were strongly encouraged to participate in the process and helped formulate a more comprehensive program for addressing this challenge. However, the poor timing associated with the artificially high crop prices following World War I as well as the anticipation for increased demand from Europe led to expansion in lending the inception of the Federal Farm Loan Act’s program. This initial surge of credit was followed by a contraction of crop prices and the according loss of farm income which coupled with poor lending oversight and unrealistic interest rates led to problems when the low interest rates on the loans did not reflect the actual risk on the loans, which in turn lowered the attractiveness of the bonds issued by the banks. Joint Stock Land Banks were particularly notable for this, and their management style led to greater problems that ended with the bailout in 1933.

In closing, we have seen that the Federal Farm Loan Act did not achieve its outlined goals through the lending institutions implemented. Federal Land Banks tended to refinance existing credit without expanding total farm debt. Joint Stock Land Banks contributed to significant expansion of agricultural credit, however a great deal of this credit would eventually
lead to widespread speculation and an overwhelming debt burden due to poor lending practices and improper incentive systems within their structures. Several interesting parallels can be drawn between this case and the housing crisis of 2008, and we would recommend a comparative analysis be drawn for future research and hopefully appropriate measures to prevent either scenario from ever occurring again.
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*Smith v Kansas City Title and Trust Company, et al,* 41 U.S. 80 (1921).


