DIFFERENTIAL TAXATION IN AGRICULTURAL CREDIT MARKET

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Abstract

The farm credit system's profits on agricultural loans are exempted from state level corporate income tax. We use the variation in state level corporate income tax rate to identify its effect on the farm credit system's farm debt share and its consequences on borrowing costs for the farm loan. We find that a 10 percent rise in state level corporate income tax is associated with 2.1 percent increase in FCS total farm debt market share. For a 10 percent rise in the farm credit system's total farm debt market share leads to a 0.07 percent increase in the estimated interest rate of total farm debt. Moreover, the state level farm financial measures are also crucial in determining the change in market share of farm credit system and interest rate on the agricultural loan.

Key Words: Agricultural Credit, Farm Credit System, Corporate Income Tax, Market Share, Interest Rate

Introduction

Several lenders compete in the U.S. agricultural credit markets. The U.S. federal government has been directly involved in providing credit to farmers by issuing direct loans and guarantees as well as by establishing other rural lending institutions (Monke, 2016; Robbins, 2009). In particular, the Farm Service Agency (FSA) of the United States Department of Agriculture (USDA) makes direct loans to farmers and also issues guarantees on loans from commercial banks and the farm credit systems to those farmers who are not credit-worthy otherwise. There is also a direct government involvement in the existence of cooperatively owned Farm Credit System (FCS) and Farmer Mac, both of which are agricultural lending institutions that operate as the government-sponsored enterprises (GSEs).

The FCS was established by Federal Farm Loan Act 1916, which became fully borrower-owned cooperative lending institution in 1968. The government bailed out the FCS in 1985 due to loan default. Later, the Agricultural Act of 1987 established the Farm Credit System Insurance Corporation and Farmer Mac to support agricultural lending. As GSEs, these institutions have a competitive advantage due to implied backstop of the U.S. treasury. In addition, FCS profits on real estate loans are exempt from local, state and federal income taxes; whereas, profits from the non-real estate loans are exempt from local and state but not from the federal corporate income tax (CIT) (Ely, 2006). The total FCS tax advantage is estimated $850 million ($725 million in real estate lending and $125 in non-real estate lending) for 2005 and first half of 2006 (Ely, 2006). Among the remaining agricultural lenders, commercial banks and insurance companies do not receive this tax treatment though they

compete in the same market. [1] It is also worth noting that both FCS and commercial banks doesn't view FSA as a competitor because it operates in a different market (i.e.provides loan to the disadvantaged farmers or those that are unable to obtain commercial credits) (Monke, 2016).

Commercial banks argue the FCS tax advantage is *unfair* for them for market competition. In 2015, the President of American Bankers Association requested the Chairman of the Senate Committee on Agriculture to conduct annual oversight hearings on "growth and questionable practices" of FCS. In the letter [2], they mention, the "FCS' tax subsidy has outlived its usefulness, skewing markets in ways that waste government resources, raise safety and soundness concerns, and greatly harm the ability of local banks to help their communities grow and prosper." A recent study by Turvey (2017) provides the historical background on the establishment of FCS as well as the joint-stock land banks and also highlights the institution conflicts due to tax exemption for some organization. Turvey (2017) notes, "although the 1916 Act made every effort to foster competition and to allow flexibility to decide upon cooperative and joint-stock companies, the tax-free status became contentious". Despite the policy interest, there are few empirical research works on the impact of favorable tax treatment to FCS in the agricultural credit market in the empirical setting.

[1] According USDA, "The lender category of individuals and others as reported on the farm sector balance sheet would include: the Small Business Administration (SBA); State and county government lending agencies; implement dealers and financing corporations; input suppliers; co-operatives and other merchants; individuals from whom any land was bought under a mortgage or deed of trust; individuals from whom any land was bought under a land purchase contract; credit unions; any other individuals; any other lenders; credit cards; other debts and unpaid bills." Therefore, all most all of the lenders in the *individuals and other* category either do not have corporate income in their portfolio or are exempt from it.

[2] Please click here to access the letter.

This study provides empirical evidence on two areas of policy interest. First, it is determined whether or not the market share of agricultural lenders is affected by the change in corporate income tax. Given the fact that FCS receive favorable tax treatment, it is hypothesized that the tax rate might cause an increase in the agricultural market share of FCS. Second, the potential impact of an agricultural lender's market share on the farmers agricultural loan rate is examined. It is expected that an increase in the market share of FCS might reduce the farmer's cost of borrowing on agricultural loan.

Review of Literature

The standard public economics literature has explored how tax exemption affects the behavior of non-profits firms over for-profit firms as well as credit unions compared to the banks. A portion of this literature explains the role of tax exemption particularly to the change in market share and social welfare. Market share is a source of high profits irrespective of the firm's concentration level (Rhoades, 1985); therefore, whether or not there should be tax-exempt financing (that affects the capital flows) is an important question that needs to be addressed carefully (O'Hara, 1983). Using statewide samples of several for-profit and non-profit firms such as residential nursing homes, hospitals, post-secondary vocational schools as well as the primary and secondary schools, Hansmann (1987) concludes that corporate income tax exemption caused a significant increase in the market share of non-profit firms.

While tax exemption seems to favor some types of firms, there is a debate about the impact of tax exemption on overall social welfare. Harris and Strouse (1997) study four non-profit hospitals and finds that property tax exemptions are not justified because none

of those targeted hospitals have provided sufficient charity care. They estimate the excess tax break over the free care provided by these hospitals as $4 million. At the same time, they underscore that it is crucial to collect data on tax exemptions benefits and their charity expenses to provide examine the justification for tax exemption. Gentry and Penrod (2000) suggests that the benefits of tax arbitrage to the non-profit hospital happens when they maintain their endowments through tax-exempt borrowing to expand their facilities. In particular, they show that there are substantial arbitrage benefits as almost half of their outstanding tax-exempt debt is likely to offset by endowments. Using a computational general equilibrium model, Johnson (2003) finds that differential corporate income tax rates for for-profit and commercial non-profit firms cause a significant impact on welfare cost. In fact, Johnson (2003) argue that some level of average excess burden to the for-profit is necessary as complete elimination also leads to a overall reduction in the social welfare. Likewise, Grabowski and Hirth (2003) provides evidence that non-profits are a quality signal for some uniformed nursing home consumers. Thus, they mention that an increase in the market share of non-profit institutions in health care improves the quality of overall nursing home including the quality of for-profits. Byrne (2014) studies the impact of state and local tax exemption on wage differentials in the non-profit hospital industry. Byrne (2014) finds that the non-profit wage differential is not more noticeable due to its tax exemption status because the wage premium of workers declines for an increase in the state tax burden.

From the literature, it can be concluded that evidence exits on the impact of a corporate income tax exemption not only to the market share but also to overall social welfare. Rushton (2007) encourages researchers to explore the reasons behind the corporate income tax

exemptions before examining the special features of non-profits. Specially, Rushton (2007) argues that it is vital to identify the distortions of corporate income tax on the economy before changing the favorable tax treatment to the nonprofits. Sjoquist and Stoycheva (2010) emphasize that it is not only essential to explore the role of the corporate income tax exemption but also the impact of property tax exemptions to the quantity and quality of services produced by for-profits and nonprofit organizations. In particular, they indicate that policymakers need to be more aware of the distribution of the property tax exemption burden, the foregone revenues as well as their advantages and disadvantages. They argue that researchers need to offer both theoretical and empirical evidence on the impact of property tax exemptions on the behavior of non-profit organizations. Overall, irrespective of the type of tax-exemptions, most of the previous research concludes that it is crucial to identify both the market and welfare distortions of the tax-exemptions on for-profits firms.

There has been some limited academic research on the welfare implications of tax exemption in the banking sector. Frame et al. (2003) investigate the pass-through of credit union federal corporate tax exemption along its members. They find that residential credit unions, in particular, misuse some portion of their income tax subsidy as they engage in expense preference behavior that is not beneficial to its members. Tatom (2005) examines the history of credit union federal tax exemptions and the impact on its competitors as well as to the members. According to Tatom (2005), the main justification behind the subsidy was that credit unions would use the tax advantage to serve low-income borrowers and depositors. However, considering the fact that there is no regulatory reason for credit unions to provide service to low and moderate income customer, they argue that the customers of credit unions

are no different than the banks. Thus, they conclude that the tax subsidy fails to provide the required financial services to low-income people. Because of the similar reason, commercial banks usually oppose policies to strengthen credit unions as these institutions face less regulation and more favorable taxation (Wheelock and Wilson, 2011). McKillop and Wilson (2011) emphasize that it is more reasonable to compare the tax exemptions to credit unions with other financial institutions only if they are in the same direct competition level. Most importantly, they argue that this debate cannot be resolved only by the theoretical arguments.

It is worth mentioning that there is no past literature that empirically identifies the impact of the corporate income tax exemption to Farm Credit System. As like to the non-profit firms and credit unions, this favorable tax treatment to FCS could have significant impacts on agricultural lending industry structure, the market share as well as the overall welfare. Therefore, a distinctive feature of this paper is that it provides the empirical evidence on the impact of corporate income tax on the market share of agricultural lending as well as outlines some of the welfare impacts in terms of change in cost of borrowing.

It is also worth noting that some of the major empirical studies related to FCS focus on credit risks. Featherstone et al. (2006) find that repayment capacity, owner equity, and working capital originations loans are important factors affecting the probability of default for loans in seventh FCS district portfolio. Jensen and Perry (2007) find that yield spreads are more responsive to default risk than liquidity risk. Nevertheless, these studies have briefly mentioned the issues of tax-exemption in the agricultural credit markets. Jensen (2000) indicates that the FCS was established as government-sponsored enterprise (GSE)

to provide loans at lower rates in response to perceived agricultural credit market failures. However, the same paper claims that the current competitive market structure is sufficient to meet the demand of the agricultural credit market; therefore, a valid justification is required for continuing FCS as GSE. Importantly, the author argues that government guaranteed interest rate subsidies due to GSE status causes a missallocation of resources resulting a rate of return less than the opportunity cost of alternative investments. Further, they argue that this distortion in relative interest rate due to subsidy causes allocative inefficiency and dead weight loss because excessive resources are allocated to one sector.

Data

This study examines the impact of favorable corporate income tax (CIT) treatment for the FCS in the U.S. and its spillover effect on interest rates across different types of the agricultural loans. For this purpose, first the state-year level CIT dataset (since 1980 to 2010) is obtained from Serrato and Zidar (2016). This state-year level CIT is the average effective tax rate paid by C-corporations[3]. Next, several datasets from the United States Department of Agriculture, Economic Research Service (USDA-ERS) [4] are used to obtain information on state-level farm financial variables. In particular, statistics on the number of farms, amount of different types of agricultural loan and market share of ag-lenders (since 1960 to 2003) are obtained from the state-level balance sheet. Also, farm financial ratios at the state level (since 1960 to 2003) are obtained. Furthermore, the interest expenses across different types of agricultural loans (since 1910 to 2017) are acquired at a state-level from

[3]Serrato and Zidar (2016) presents the details on how these average effective tax rates is actually due to statutory changes to top and bottom marginal rates for each state.

[4]Data Files: U.S. and State-Level Farm Income and Wealth Statistics

income-wealth statistics. Lastly, these datasets are merged together at the state-year level and ranges from 1980 to 2003 (1200 data points).

Table 1 presents descriptive statistics of the variables that are used in the study. Commercial banks and FCS together share more than 80% of total farm debt shares in recent years. The Figure 1 shows that the total farm debt shares since 2000 has been growing for FCS, relatively stable for commercial banks and life insurance companies, and decreasing for FSA, individuals and others (will be referred as "INOs"). The same conclusion holds for real estate loans, where FCS has a higher market share than commercial banks after 2000 (Figure 2). However, the market share of non-real estate agricultural loans has been dominated by the commercial banks in last two decades; but, the share of FCS has been growing in increasing rate in last decades (Figure 3).

Table 2 reports that the market share of real (non-real) estate farm debt for commercial banks, FCS, FSA, life insurance companies, Farmer Mac and INOs respectively, 37.92% (49.45%), 46.30% (32.63%), 2.69% (2.53%), 6.00% , 2.32% and 4.77% (15.38%) in 2015. On an average, the real estate interest expenses by farm households in U.S. is significantly more than the non-real estate interest expenses (Figure 4). Recently, the total real (non-real) estate interest expenses in farm debt is respectively 9.921 (6.490), 9.621 (6.929) and 11.434 (7.604) million dollars from 2015 to 2017 (Table 3). The state level CIT has varied from 0 to about 12 percent each year across different states (Figure 5).

Method

Corporate Income Tax and Agricultural Credit Market share

To find the impact of the state corporate income tax rate on the market share of tax-exempt sector, we use ordinary least square (OLS) estimation. Recall that commercial banks and the life insurance companies that lend to the agricultural sector do not receive the favorable tax treatment. The following OLS regression is estimated:

$$MS_{ist} = \alpha_i + \beta_i SCTR_{st} + \gamma_i X_{st} + T_t + \epsilon_{ist} \tag{1}$$

where the outcome variable MS_{ist} represents the market share of the tax-exempt agricultural lender on the agricultural loan type i for state s in year t. The regressions are estimated separately for three types of agricultural loans; total agricultural loans, real estate agricultural loans and non-real estate agricultural loans. The main regression specification consists of the market share of farm credit system (FCS) as the dependent variable. Nevertheless, two other regressions are presented as robustness check, in which one of them has the combined market share of FCS and FSA, while the other one has the total market share of FCS, FSA and INOs as the dependent variable. $SCTR_{st}$ represents the average effective corporate income tax rate in the state s in year t. Given the time fixed effect (T_t), β_i becomes the parameter of interest for agricultural loan type i for a continuous change in corporate income tax policy.

The variables X_{st} represent exogenous state level variables such as number of farms and farm financial ratios for state s at time t. Specifically, the debt service ratio (DSR) that

represents share of production to loan payments and times interest earned (TIE) that shows the farm's ability to meet its interest obligations are two liquidity measures used. Higher DSR indicate the farm is less liquid but the higher TIE implies the operations can generate adequate cash to meet interest obligations. Two-farm efficiency measures are used are asset turnover ratio (ATR) and net cash farm income to debt ratio (NFID). In general, higher ATR and higher NFID indicate the efficient use of assets and efficient generation of net farm income in the production process. The debt to asset ratio (DAR) and debt to equity ratio (DER) are the two solvency ratios used in regression estimations. A higher percentage of both of these ratios generally indicates more risk. Finally, the total rate of return of farm equity (ROE) and the rate of return on farm assets (ROA) are the two farms' profitability measures that are also used as the controls. ROA (ROE) measures the returns to farm sectors equity (assets) from current farm operations. In general, the increase in both of these ratios indicate the increase in profitability.

Agricultural Credit Market Share and Interest Rate

Next, the impact of agricultural lenders' market share on the cost of borrowing on agricultural loans is estimated. Where the interest rate paid by farm households for loan type i is regressed on agricultural lenders' market share (for example, FCS market share for loan type i in the main specification) and the previous years' farm sector financial ratios (which are specified in previous section) as well as the number of farms from last year. Specifically, following regression is estimated to obtain the change in the estimated interest rate due to

the exogenous variation of the market share of different agricultural lenders:

$$IR_{ist} = \alpha_i + \varphi_i MS_{ist} + \gamma_i X_{st-1} + T_t + \epsilon_{ist} \tag{2}$$

where X_{st-1} and T_t represents the same information as in the equation (1). However, since the interest rate faced by the farmers and the farm sectors financial ratios are jointly determined, the above preferred OLS regression uses lagged farm financial ratios. MS_{ist} is the market share of agricultural lenders (particularly, market share of FCS in the main specification) associated with agricultural loan type i for state s in year t.

The interest rate for loan type i for state s in year t (IR_{ist}) is obtained by dividing the total interest expenses by the total loan amount for the corresponding loan type. This interest expenses to farm debt ratio is a proxy for the actual interest rate on the agricultural loans. The increase in this ratio usually indicates that the farm are paying a higher interest rate for the given amount of farm debt. Thus, the interest rate used in this study is the cost of borrowing on agricultural loans faced by farm households. This estimate provides some implications on the interest rate of agricultural loans when agricultural lenders' market share changes. The key parameter of interest φ_i represents the response of interest rate to exogenous changes in FCS market share. Like the previous section, some robustness checks are performed by estimating two other regression using different market shares; where one uses the total market share of FCS and FSA, and another one uses the total market shares of FCS, FSA and INOs.

Results

The impact of CIT on total, real estate and non-real estate farm debt market share are respectively presented in the Table 4, 5, and 6. In all three tables, the dependent variables in the regressions results in columns (1) to (5) are the market share of FCS, columns (6) to (10) are the market share of both FCS and FSA, and columns (11) to (15) are the market share of FCS, FSA and INOs. Furthermore, the regressions in the columns (1), (6) and (11) consists SCTR as the only explanatory variable, columns (2), (7) and (12) has SCTR as the only independent variables with year fixed effect; columns (3), (8) and (12) includes additional state-year level controls (such as ROE, ROA and number of farms) but no year fixed effects, columns (4), (9) and (13) include year fixed effects and columns (5), (10) and (14) further extends these regression by adding FCTR as an additional control. The following section, presents the result from the fourth set of regression estimates.

Market Share Implications

Among the regression estimations in Table 4, the coefficient on the key variable *SCTR* is positive and statistically significant in column (4) indicating that the state level CIT has a positive and significant impact on the total agricultural credit market share of FCS. The estimate implies that 10 percent increase in corporate income tax rate at the state level causes the total farm debt share of FCS to rise by 2.1 percent. Across agricultural loan types, raising the state level corporate income tax rate is associated with a significant reduction in the market share for the real estate loans (Table 5), but has positive effect on non-real estate loans (Table 6). A 10 percent rise in state level CIT reduces the FCS market share for

real estate loans by 1.9 percent, and boosts the FCS market share for non-real estate loan by 4.4 percent. These findings suggests that a rise in the state level CIT encourages FCS to move lending from real estate to non-real estate loan, which leads to an increase in its total agricultural credit market share.

Column (4) of Tables 4, 5 and 6 presents the effect of farm financial measures on the total, real estate, and non-real estate market shares of FCS. The coefficient estimates suggest that an additional ten thousand farms leads to statistically significant decrease in the FCS market share to the total, real estate and non-real estate loans by 0.06 percent, 0.03 percent and 0.01 percent. The same estimations show that an increase in DS ratio by 0.1-point leads to a decrease in FCS' total, real estate and non-real estate farm debt shares by 5.43%, 4.79% and 6.46% percent respectively. In contrary, an additional points in TIE ratio results in increase of market share of FCS by 2.0%, 1.6% and 2.4 %. Combining these findings, suggest that FCS flourishes in the states that have lower number of farms but with higher liquidity and greater ability to make debt payments.

The estimates in the same column (4) in the Tables 4, 5 and 6 also indicate that for a one percent increase in ATR leads to a rise in total, real estate and non-real estate farm debt respectively by 0.4%, 0.2% and 0.6%. However, an additional percentage decrease in the NFID leads to decrease in total and real estate farm debt respectively by 0.4% and 0.1 %. Similarly, results suggest that additional percent increase in DAR (DER) respectively caused an increase (decrease) of FCS total and non-real estate market share by 4.6% (3.0%) and 8.8% (5.8%). Therefore, the two efficiency ratios and two solvency ratios impact FCS total agricultural credit market share in exact opposite directions. It supports the view that

an increase in efficiency in the production process (due to the increase in either of these two efficiency ratios) or the rise in credit risks (from the the increase in either of these two solvency ratios) doesn't necessarily improve the FCS total farm debt market share, but rather, it depends on the magnitude of the change in these ratios. Unlike other farm financial ratios, there is no statistically significant relationship between farm profitability ratios and FCS' total, real estate and non-real estate market shares.

Interest Rate Implications

Table 7 shows the interest rate implications of agricultural lenders' market share. Recall that the farm households' interest expenses to debt ratio is used as an estimate for the actual interest in the agricultural loans. Columns (1), (4) and (8) present the results respectively for total, real estate and non-real estate estimated interest rates incurred by the farm households. The key variables of interest *MS_FCS1* for column (1) is positive and statistically significant, *RealMS_FCS1* for column (4) is positive and statistically significant and *NonRealMS_FCS1* for column (4) is non-negative and statistically insignificant, indicating that for a 10 percent rise in the total (real estate) market share of FCS in previous year leads to an increase (decrease) in the interest rate of total (real estate) farm debt by 0.07% (0.11%) in the current year. The findings suggest that increased competition in total farm debt lending can result in an increased in cost of borrowing of overall agricultural loans for farm households.

The same estimation columns of Table 7 also illustrate the effect of farm financial performance to the interest rate on agricultural loans. Specifically, the rise in the number of farms in previous year leads to an increase in contemporaneous interest rate associated with both

real estate and and non-real estate farm loans. Similarly, the rise in the debt-servicing ratio and fall in time interest earned ratio leads to an increase in the both real estate and non-real estate interest rated in the following year. Thus, lower liquidity (i.e. rise in DSR) and lesser ability to generate adequate cash to meet interest obligations (i.e. fall in TIE ratio) leads to an increase in the interest rate in total farm debt in the following year.

Across the efficiency measures, an increase in the asset turn over ratio and net cash farm income to debt ratio in previous year causes an increase interest rates for both real estate and non-real estate farm loans. Interestingly, this in turn leads to the conclusion that efficient use of assets (i.e. higher ATR) and efficient generation of net farm income (i.e. higher NFID) in the production process causes an increase in interest rate in the farm debt in the following year.

Furthermore, we find that we find that the reduction in debt to assets but the rise in debt to equity ratio leads to an increase in the next year's non-real estate interest paid by farm households. Therefore, interest rates change for an increase in the farm households' credit risk in last year is not necessarily positive, but rather the its direction depends on the magnitude of increase in DAR or DER or both. As in case of market share, the previous years' profitability ratios doesn't have a statistically significant impact on this year's interest rate on FCS total farm debt.

Conclusions

Using the variation in the state level corporate income tax rate, we find that the rise in state level CIT improves the market competitiveness of CIT favored FCS in the U.S. agricultural

credit market. A 10 percent rise in state level CIT increases the total farm debt market share of FCS by 2.1 percent. Moreover, the respective negative and positive effect of increase in state level CIT to the FCS market share on real estate and non-real estate agricultural loan.

As a welfare implications of tax exemption, we analyze the models that identify the causal effect of FCS market share to the estimated interest rate on agricultural loan. We find that the cost of borrowing on total farm debt rises by 0.07 percent for a 10 percent rise in the FCS total farm debt market share. Though the results are loan specific, meaning that higher market share of FCS leads to an increase in interest rate of real estate farm loan but not to the non-real estate farm loan, the overall impact on total farm debt is particularly interesting.

We also find that change in both FCS market share and the interest rate incurred by the farm households can also be explained by state level farm financial conditions such as change in number of farms, the size of liquidity, ability to pay debt obligations, change in efficiency on use of assets as well as on the net farm income generation.

A clear implication of this paper is that the favorable tax treatment to FCS might have affected the market competitiveness of other agricultural lenders, mainly commercial banks in the U.S. agricultural credit market. At the same time, given the increase in the interest rate on total farm debt in response to increase in market share of FCS, this tax exemption might impose an indirect burden to farm households through higher interest rates.

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Table 1: Summary statistics

Variable	N	Mean	Std. Dev.	Min.	Max.
Market share of total farm loans for farm credit system (ratio)	1200	0.32	0.113	0.031	0.715
Market share of real estate loans for farm credit system (ratio)	1200	0.381	0.111	0.059	0.764
Market share of non-real estate loans for farm credit system (ratio)	1200	0.252	0.147	0	0.771
Market share of farm loans for farm service agency (ratio)	1200	0.119	0.082	0.009	0.519
Market share of real estate loans for farm service agency (ratio)	1200	0.104	0.075	0.008	0.568
Market share of non-real estate loans for farm service agency (ratio)	1200	0.141	0.111	0.004	0.63
Market share of farm loans for individuals and others (ratio)	1200	0.228	0.058	0.092	0.656
Market share farm loans for individuals and others (ratio)	1200	0.221	0.092	0.04	0.792
Market share of non-real estate loans for individuals and others (ratio)	1200	0.237	0.075	0.091	0.751
State corporate tax rate (ratio)	1200	0.068	0.029	0	0.12
Federal corporate tax rate (ratio)	1200	0.382	0.051	0.34	0.46
Real interest expenses including operator dwellings (thousand dollars)	1200	152043	155977	568	885997
Real estate loan (thousand dollars)	1200	1669763	1739686	5535	12287253
Non-real estate loan (thousand dollars)	1200	1520607	1545343	2562	7970990
Interest rate for farm loan (ratio)	1200	0.092	0.017	0.055	0.186
Interest rate for real estate loan (ratio)	1200	0.092	0.017	0.041	0.213
Interest rate for non-real estate loan (ratio)	1200	0.093	0.024	0.026	0.352
Number of farms (ten thousands)	1200	4.453	3.935	0.045	22.9
Debt servicing (ratio)	1200	0.178	0.073	0.06	0.48
Times interest earned (ratio)	1200	4.95	2.876	0.34	26.32
Asset turnover ratio (percent)	1200	20.122	7.297	6.7	52.95
Net cash farm income to debt (percent)	1200	47.258	22.005	7.68	208.14
Debt to assets (percent)	1200	15.341	5.018	1.98	31.64
Debt to equity (percent)	1200	18.542	7.142	2.02	46.29
Total rates of return on equity (percent)	1200	0.946	8.743	-54.14	87.86
Total rates of return on assets (percent)	1200	1.701	7.417	-47.9	82.13

Table 2: Market Shares in 2015

Farm Debt Lender	Total Farm Debt	Real Estate Farm Debt	Non-Real Estate Farm Debt
Commerical banks	43.69%	37.92%	49.45%
Farm Credit System	39.47%	46.30%	32.63%
Farm Service Agency	2.61%	2.69%	2.53%
Life insurance companies	3.00%	6.00%	
Farmer Mac	1.16%	2.32%	
Individuals and others	10.08%	4.77%	15.38%

Table 3: Interest Expenses in Million Dollars from 2015 to 2017

Year	All	Non-Real Estate	Real Estate
2017	19.038	7.604	11.434
2016	16.550	6.929	9.621
2015	16.411	6.490	9.921

Table 4: Impact of Corporate Income Tax Rate on Total Farm Debt Market Share

	(1) FCS	(2) FCS	(3) FCS	(4) FCS	(5) FCS	(6) FCS_FSA	(7) FCS_FSA	(8) FCS_FSA	(9) FCS_FSA	(10) FCS_FSA	(11) FCS_FSA_INO	(12) FCS_FSA_INO	(13) FCS_FSA_INO	(14) FCS_FSA_INO	(15) FCS_FSA_INO
SCTR	0.455***	0.473***	0.238**	0.214**	0.214**	0.463***	0.493***	0.104	0.139	0.139	0.494***	0.548***	0.099	0.125	0.125
	(0.110)	(0.110)	(0.104)	(0.098)	(0.098)	(0.128)	(0.125)	(0.124)	(0.119)	(0.119)	(0.133)	(0.128)	(0.128)	(0.117)	(0.117)
Farms			-0.007***	-0.006***	-0.006***			-0.013***	-0.011***	-0.011***			-0.014***	-0.011***	-0.011***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
LQRatio_DS			-0.220***	-0.543***	-0.543***			-0.170*	-0.595***	-0.595***			-0.059	-0.766***	-0.766***
			(0.083)	(0.086)	(0.086)			(0.088)	(0.093)	(0.093)			(0.091)	(0.092)	(0.092)
LQRatio_TIE			0.013***	0.020***	0.020***			-0.002	0.018***	0.018***			-0.006*	0.019***	0.019***
			(0.003)	(0.004)	(0.004)			(0.004)	(0.005)	(0.005)			(0.003)	(0.004)	(0.004)
EFPercent_ATR			-0.004***	-0.004***	-0.004***			-0.008***	-0.007***	-0.007***			-0.005***	-0.004***	-0.004***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
EFPercent_NFID			0.000	-0.001	-0.001			0.003***	0.000	0.000			0.003***	-0.001**	-0.001**
			(0.000)	(0.001)	(0.001)			(0.000)	(0.001)	(0.001)			(0.000)	(0.001)	(0.001)
SLRatio_DA			0.040***	0.046***	0.046***			0.032***	0.035***	0.035***			-0.003	0.004	0.004
			(0.010)	(0.010)	(0.010)			(0.012)	(0.011)	(0.011)			(0.010)	(0.009)	(0.009)
SLRatio_DE			-0.025***	-0.030***	-0.030***			-0.014*	-0.018**	-0.018**			0.007	-0.000	-0.000
			(0.006)	(0.007)	(0.007)			(0.008)	(0.008)	(0.008)			(0.006)	(0.006)	(0.006)
ROE_Total			0.000	-0.004	-0.004			0.003	-0.002	-0.002			0.008**	-0.001	-0.001
			(0.002)	(0.002)	(0.002)			(0.003)	(0.002)	(0.002)			(0.004)	(0.002)	(0.002)
ROA_Total			-0.004*	0.001	0.001			-0.009**	-0.002	-0.002			-0.015***	-0.004	-0.004
			(0.002)	(0.003)	(0.003)			(0.004)	(0.002)	(0.002)			(0.004)	(0.002)	(0.002)
FCTR					0.391*					0.959***					1.827***
					(0.222)					(0.240)					(0.220)
Year Fixed Effects	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Observations	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
R^2	0.014	0.051	0.216	0.294	0.294	0.010	0.122	0.288	0.356	0.356	0.011	0.164	0.313	0.456	0.456

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 5: Impact of Corporate Income Tax Rate on Real Estate Farm Debt Market Share

	(1) FCS	(2) FCS	(3) FCS	(4) FCS	(5) FCS	(6) FCS_FSA	(7) FCS_FSA	(8) FCS_FSA	(9) FCS_FSA	(10) FCS_FSA	(11) FCS_FSA_INO	(12) FCS_FSA_INO	(13) FCS_FSA_INO	(14) FCS_FSA_INO	(15) FCS_FSA_INO
SCTR	-0.035	-0.016	-0.185*	-0.192**	-0.192**	0.146	0.174	-0.193*	-0.148	-0.148	-0.094	-0.032	-0.259**	-0.189*	-0.189*
	(0.097)	(0.097)	(0.100)	(0.096)	(0.096)	(0.116)	(0.114)	(0.116)	(0.115)	(0.115)	(0.117)	(0.109)	(0.116)	(0.114)	(0.114)
Farms			-0.005***	-0.003***	-0.003***			-0.011***	-0.009***	-0.009***			-0.011***	-0.009***	-0.009***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
LQRatio_DS			-0.126	-0.479***	-0.479***			-0.140	-0.659***	-0.659***			0.362***	-0.383***	-0.383***
			(0.089)	(0.093)	(0.093)			(0.094)	(0.095)	(0.095)			(0.083)	(0.079)	(0.079)
LQRatio_TIE			0.007**	0.016***	0.016***			-0.003	0.019***	0.019***			-0.008**	0.023***	0.023***
			(0.003)	(0.004)	(0.004)			(0.004)	(0.004)	(0.004)			(0.003)	(0.004)	(0.004)
EFPercent_ATR			-0.003***	-0.002**	-0.002**			-0.006***	-0.005***	-0.005***			-0.005***	-0.004***	-0.004***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
EFPercent_NFID			0.000	-0.001**	-0.001**			0.003***	-0.001	-0.001			0.003***	-0.002***	-0.002***
			(0.000)	(0.001)	(0.001)			(0.000)	(0.001)	(0.001)			(0.000)	(0.001)	(0.001)
SLRatio_DA			0.005	0.010	0.010			0.014	0.017*	0.017*			-0.028***	-0.023***	-0.023***
			(0.010)	(0.010)	(0.010)			(0.011)	(0.010)	(0.010)			(0.009)	(0.008)	(0.008)
SLRatio_DE			0.001	-0.005	-0.005			-0.001	-0.006	-0.006			0.025***	0.019***	0.019***
			(0.007)	(0.007)	(0.007)			(0.007)	(0.007)	(0.007)			(0.006)	(0.006)	(0.006)
ROE_Total			-0.001	-0.004	-0.004			0.002	-0.003**	-0.003**			0.008**	0.000	0.000
			(0.002)	(0.003)	(0.003)			(0.002)	(0.001)	(0.001)			(0.003)	(0.002)	(0.002)
ROA_Total			-0.002	0.002	0.002			-0.006**	0.001	0.001			-0.013***	-0.002	-0.002
			(0.003)	(0.003)	(0.003)			(0.003)	(0.002)	(0.002)			(0.004)	(0.002)	(0.002)
FCTR					0.234					1.075***					2.144***
					(0.235)					(0.243)					(0.243)
Year Fixed Effects	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Observations	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
R^2	0.000	0.072	0.075	0.156	0.156	0.001	0.152	0.218	0.319	0.319	0.000	0.283	0.266	0.422	0.422

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 6: Impact of Corporate Income Tax Rate on Non-Real Estate Farm Debt Market Share

	(1) FCS	(2) FCS	(3) FCS	(4) FCS	(5) FCS	(6) FCS_FSA	(7) FCS_FSA	(8) FCS_FSA	(9) FCS_FSA	(10) FCS_FSA	(11) FCS_FSA_INO	(12) FCS_FSA_INO	(13) FCS_FSA_INO	(14) FCS_FSA_INO	(15) FCS_FSA_INO
SCTR	0.777***	0.796***	0.492***	0.439***	0.439***	0.624***	0.661***	0.246	0.262*	0.262*	0.934***	0.985***	0.293	0.263	0.263
	(0.152)	(0.152)	(0.132)	(0.128)	(0.128)	(0.171)	(0.167)	(0.160)	(0.156)	(0.156)	(0.195)	(0.194)	(0.186)	(0.175)	(0.175)
Farms			-0.011***	-0.010***	-0.010***			-0.015***	-0.014***	-0.014***			-0.017***	-0.015***	-0.015***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
LQRatio_DS			-0.392***	-0.646***	-0.646***			-0.251**	-0.574***	-0.574***			-0.671***	-1.343***	-1.343***
			(0.101)	(0.102)	(0.102)			(0.113)	(0.120)	(0.120)			(0.139)	(0.139)	(0.139)
LQRatio_TIE			0.022***	0.024***	0.024***			0.001	0.017***	0.017***			-0.006	0.012**	0.012**
			(0.004)	(0.005)	(0.005)			(0.004)	(0.006)	(0.006)			(0.004)	(0.005)	(0.005)
EFPercent_ATR			-0.007***	-0.006***	-0.006***			-0.011***	-0.011***	-0.011***			-0.008***	-0.006***	-0.006***
			(0.001)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)			(0.002)	(0.002)	(0.002)
EFPercent_NFID			0.000	0.000	0.000			0.004***	0.002**	0.002**			0.004***	0.001	0.001
			(0.000)	(0.001)	(0.001)			(0.000)	(0.001)	(0.001)			(0.001)	(0.001)	(0.001)
SLRatio_DA			0.083***	0.088***	0.088***			0.062***	0.063***	0.063***			0.032**	0.038***	0.038***
			(0.011)	(0.012)	(0.012)			(0.014)	(0.014)	(0.014)			(0.015)	(0.014)	(0.014)
SLRatio_DE			-0.055***	-0.058***	-0.058***			-0.032***	-0.034***	-0.034***			-0.015	-0.022**	-0.022**
			(0.007)	(0.008)	(0.008)			(0.010)	(0.010)	(0.010)			(0.010)	(0.010)	(0.010)
ROE_Total			0.002	-0.003	-0.003			0.005	-0.001	-0.001			0.011**	-0.000	-0.000
			(0.003)	(0.003)	(0.003)			(0.005)	(0.004)	(0.004)			(0.005)	(0.003)	(0.003)
ROA_Total			-0.007*	-0.001	-0.001			-0.012*	-0.005	-0.005			-0.020***	-0.007*	-0.007*
			(0.004)	(0.003)	(0.003)			(0.006)	(0.004)	(0.004)			(0.006)	(0.004)	(0.004)
FCTR					0.558**					0.985***					1.603***
					(0.275)					(0.299)					(0.304)
Year Fixed Effects	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes
Observations	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
R^2	0.024	0.060	0.316	0.372	0.372	0.011	0.071	0.286	0.319	0.319	0.021	0.057	0.304	0.395	0.395

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

Table 7: Impact of Farm Debt Market Share on Interest Rate

	(1) IntRate	(2) IntRate	(3) IntRate	(4) RealIntRate	(5) RealIntRate	(6) RealIntRate	(7) NonRealIntRate	(8) NonRealIntRate	(9) NonRealIntRate
MS_FCS1	0.007**								
	(0.003)								
MS_FCS_FSA1		0.001							
		(0.003)							
MS_FCS_FSA_INO1			-0.002						
			(0.003)						
RealMS_FCS1				0.011***					
				(0.002)					
RealMS_FCS_FSA1					0.003				
					(0.003)				
RealMS_FCS_FSA_INO1						-0.009***			
						(0.002)			
NonRealMS_FCS1							0.000		
							(0.004)		
NonRealMS_FCS_FSA1								-0.008*	
								(0.004)	
NonRealMS_FCS_FSA_INO1									-0.010***
									(0.004)
farms1	0.000***	0.000***	0.000***	0.000***	0.000***	0.000*	0.000***	0.000***	0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lqratio_ds1	0.082***	0.078***	0.076***	0.014	0.010	0.005	0.181***	0.176***	0.167***
	(0.015)	(0.015)	(0.015)	(0.011)	(0.012)	(0.012)	(0.038)	(0.038)	(0.036)
lqratio_tie1	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.002**	-0.002**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)
efpercent_atr1	0.001***	0.000***	0.000***	0.000***	0.000***	0.000**	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
efpercent_nfid1	0.000***	0.000***	0.000***	0.000**	0.000**	0.000	0.000*	0.000*	0.000*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
slratio_da1	-0.003***	-0.002**	-0.002**	-0.001	-0.001	-0.001	-0.005**	-0.005**	-0.005*
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)
slratio_de1	0.001**	0.001*	0.001*	0.000	0.000	0.000	0.003*	0.002*	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
roe_total1	-0.000*	-0.000**	-0.000**	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
roa_total1	0.000*	0.000*	0.000*	0.000	0.000	0.000	0.001	0.001	0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1199	1199	1199	1199	1199	1199	1199	1199	1199
R^2	0.833	0.832	0.832	0.780	0.776	0.778	0.644	0.647	0.649

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

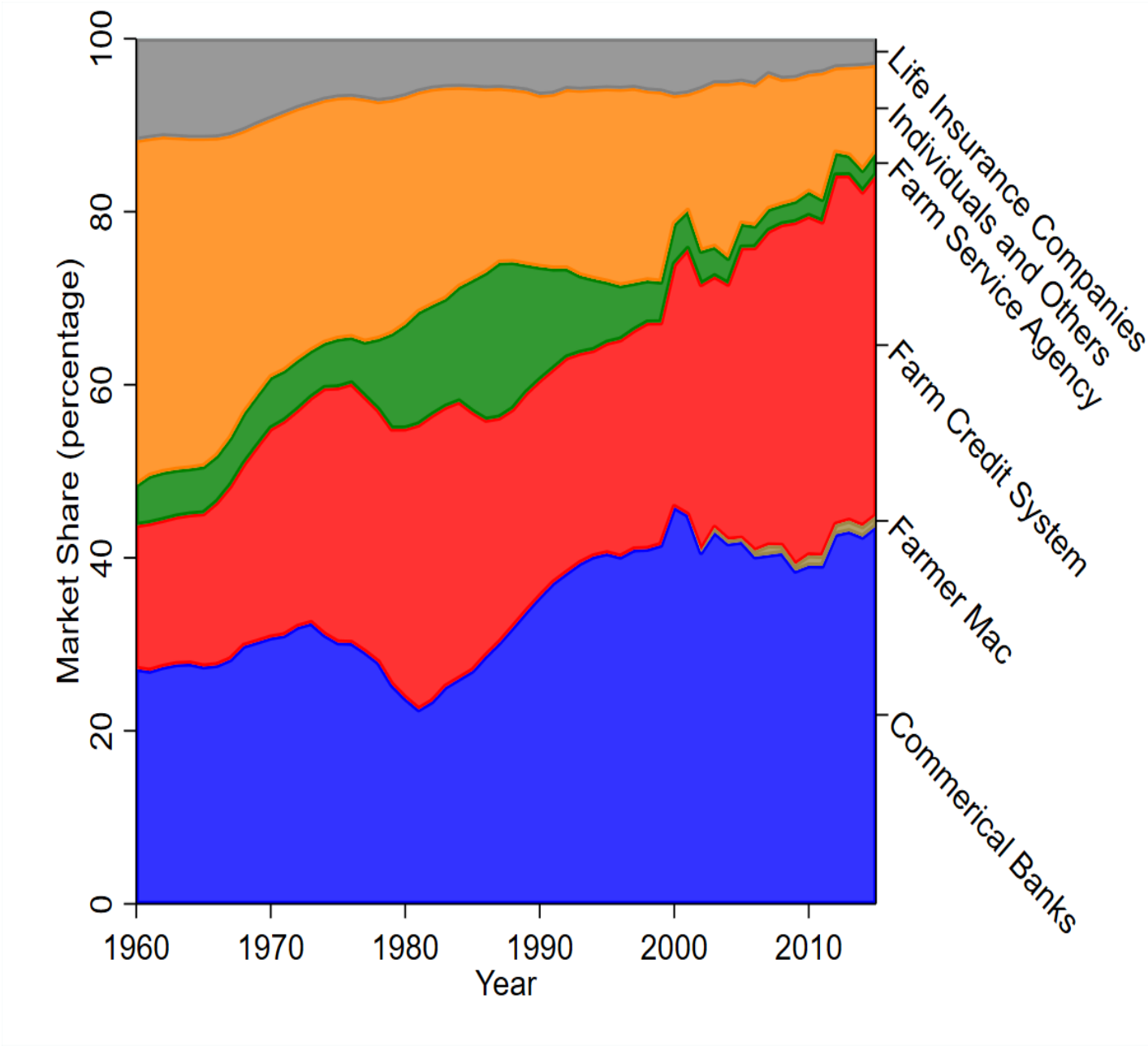

Figure 1: Market Shares of Total Farm Debt
Data Source: USDA ERS

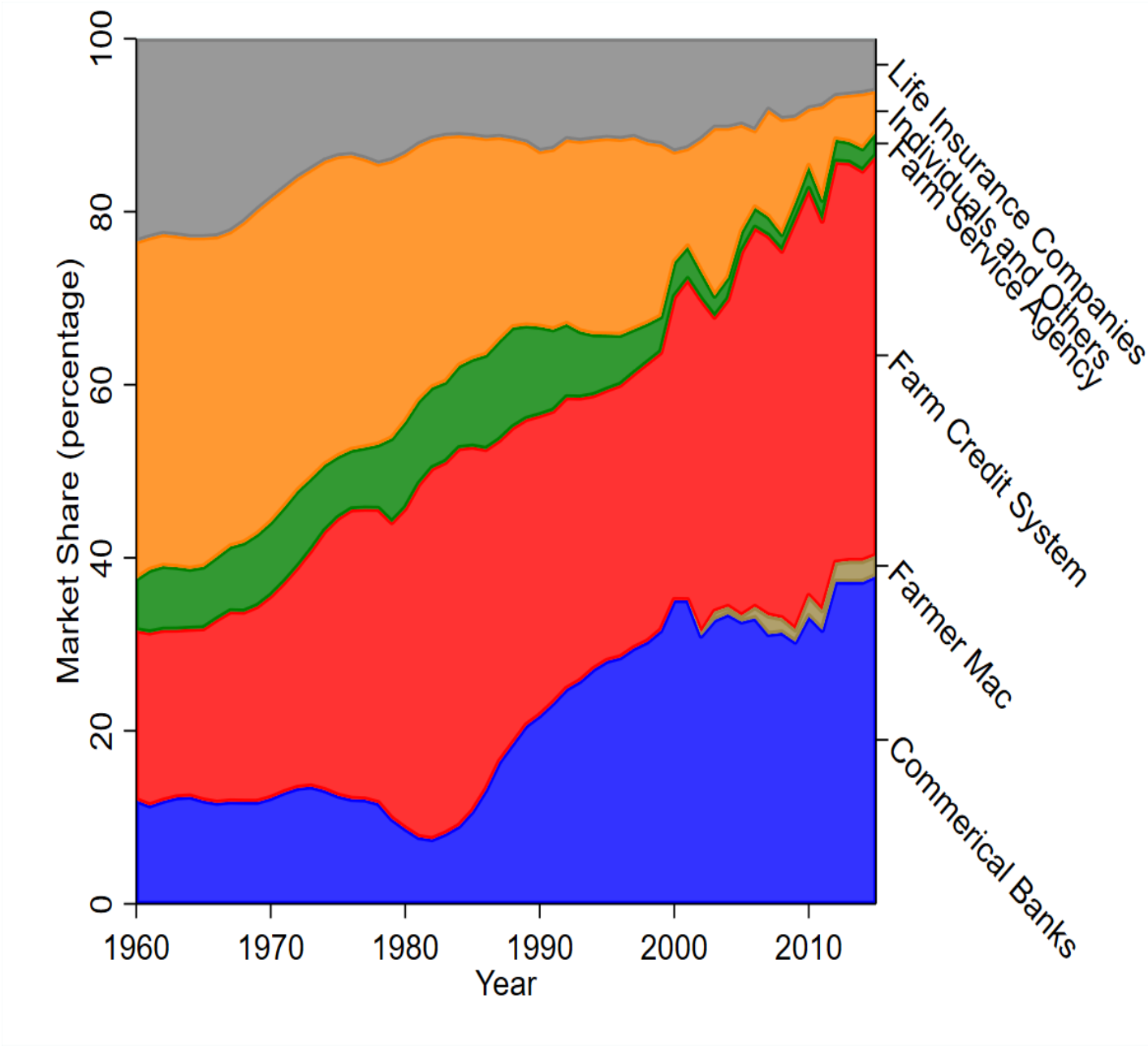

Figure 2: Market Shares of Real Estate Farm Debt
Data Source: USDA ERS

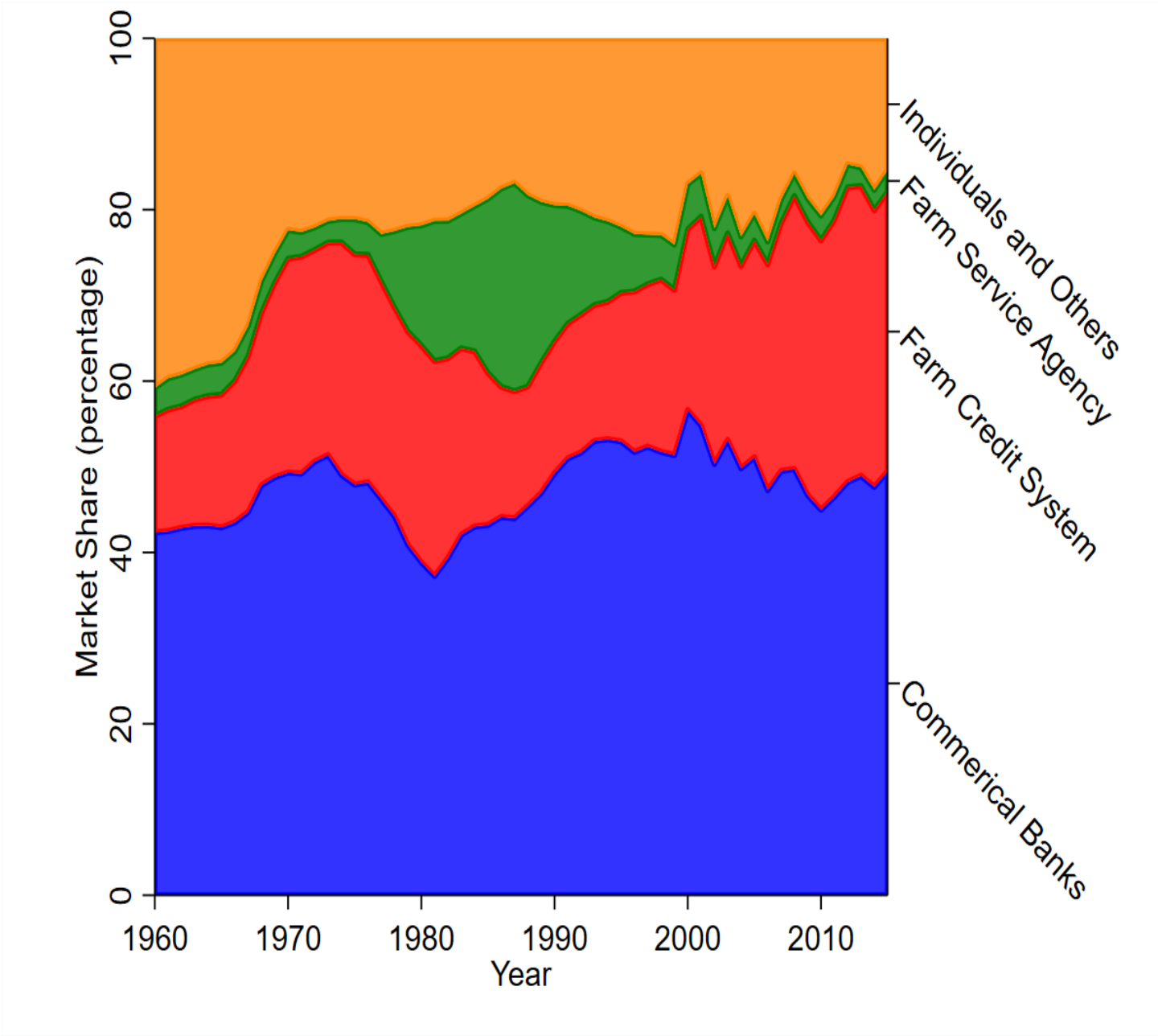

Figure 3: Market Shares of Non-Real Estate Farm Debt
Data Source: USDA ERS

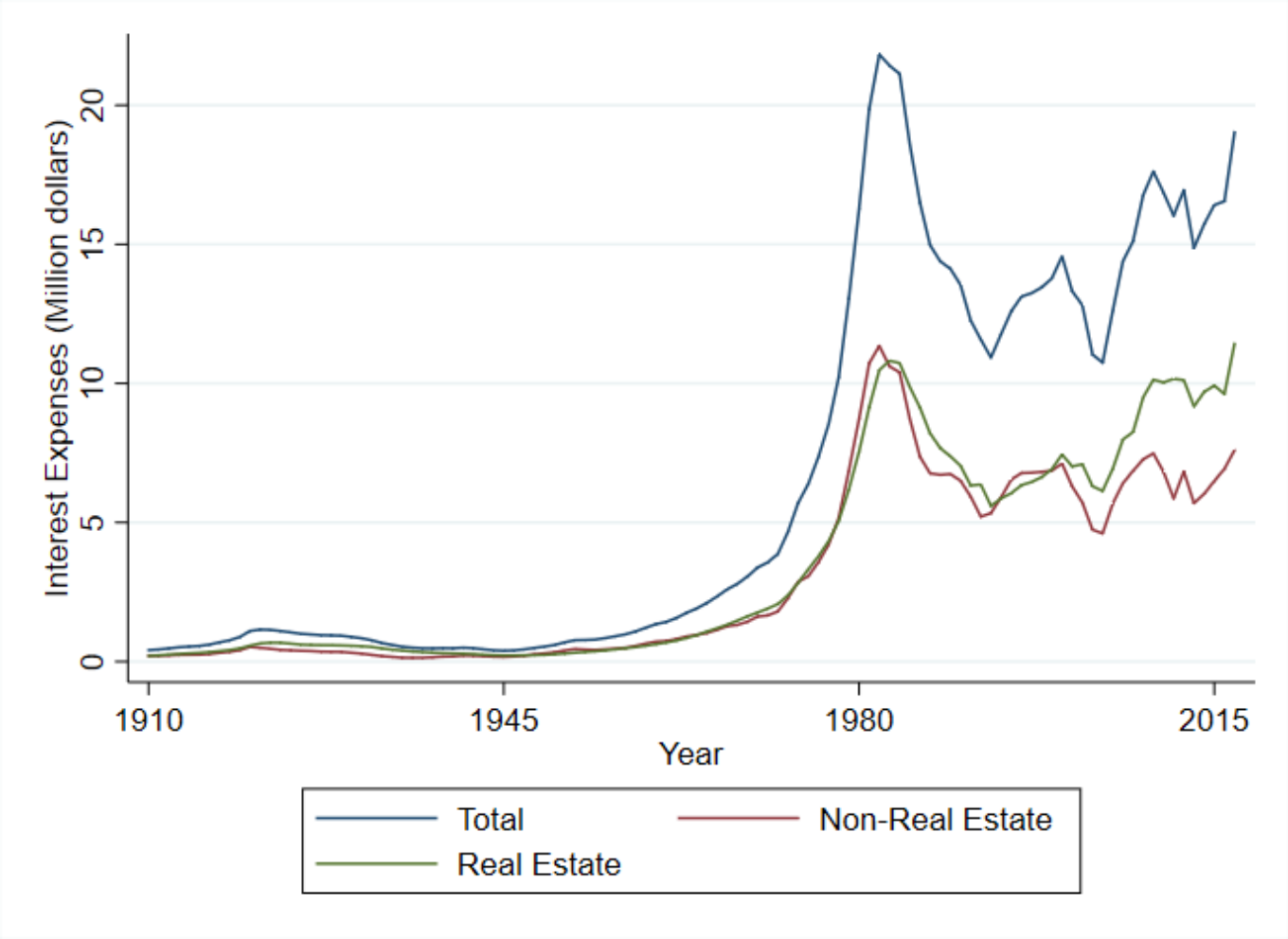

Figure 4: Interest Expenses
Data Source: USDA ERS

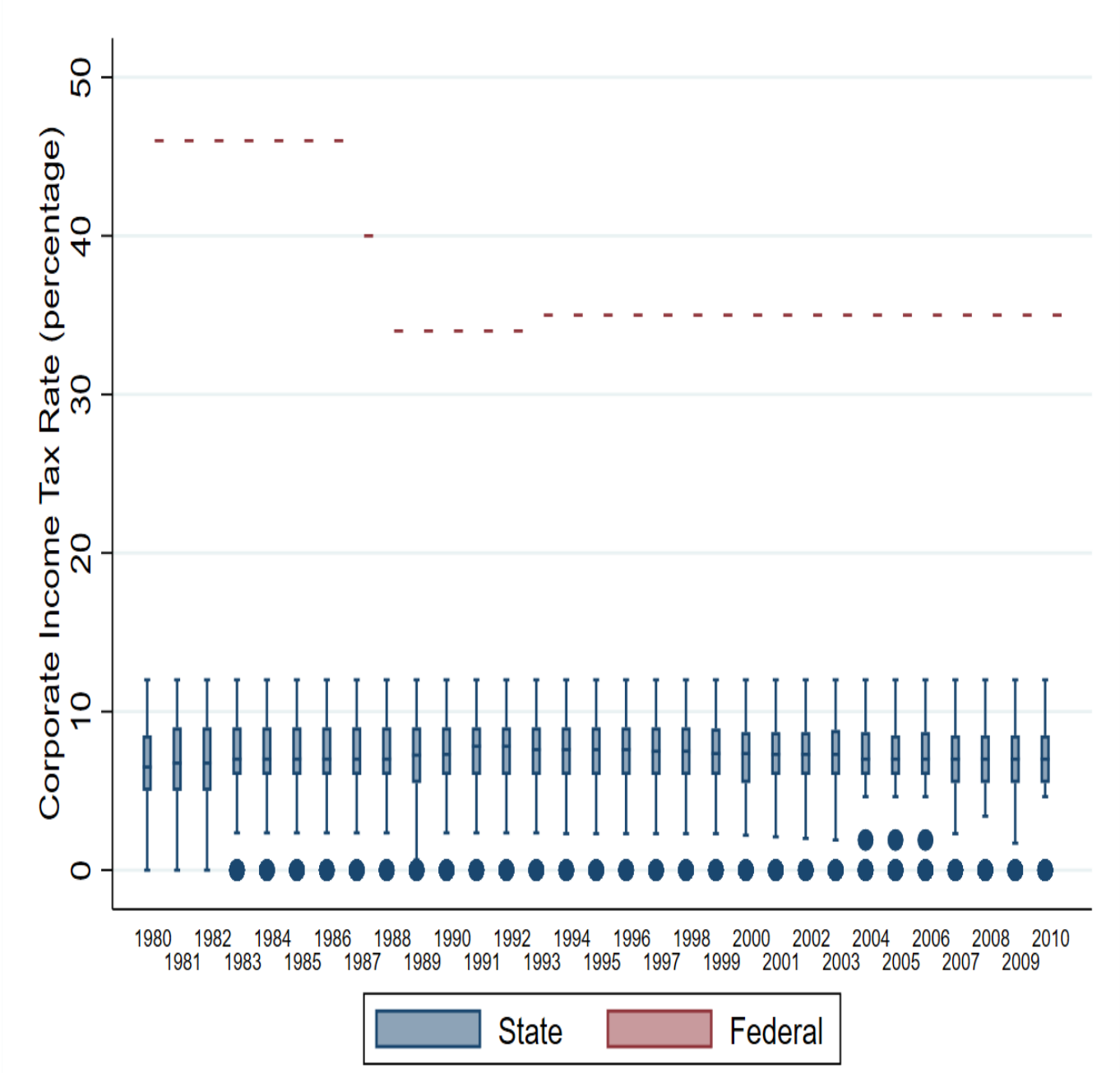

Figure 5: Corporate Income Tax Rate
Data Source: Serrato and Zidar (2016)