

CREDIT UNIONS: WHO IS IN CONTROL?

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Credit unions are governed by members who are also the primary supplier of funds and demander of loans. Economists have long recognized the possibility that a group of members could control the credit union in such a way as to exploit the minority membership. This paper extends a theoretical model for deposit and loan rates given this possibility. Empirical evidence suggests that majority members set loan and deposit rates in such a way as to exploit minority members.

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How do financial institutions set loan and deposit rates? Standard economic theory implies that owner profits are maximized by choosing rates given constraints of the local and national credit and deposit markets. Yet credit unions face very different constraints than for-profit commercial banks and thrifts. Credit unions are self-governed institutions in which members receive equal say in their governance. Self-governance presents the potential of setting deposit and loan rates in favor of the majority members at the expense of the minority. Thus, credit unions dominated by depositors [borrowers] may choose deposit and loan rates to maximize their personal return at the expense of minority member borrowers [depositors].

While credit unions are legally controlled by their members, current law requires credit unions to be sponsored by a secondary entity. Typically these sponsors include employers although a number of credit unions sponsored by professional and religious organizations exist. Hansmann (1996) contends sponsors benefit from establishing credit unions by tying employees more tightly to their employers while simultaneously improving the employee's financial situation. If sponsors provide credit union access to maximize the welfare of their members, then the threat of withdrawing sponsorship might mitigate against majority members exploiting the minority.

Of course when setting deposit and loan rates it is important to note that credit unions do not operate in a vacuum. If the local loan and deposit markets are highly competitive, then choosing rates to benefit the majority members may drive minority members to competitor institutions. Therefore, in a competitive financial market, the composition of members should have little impact on credit union pricing.

This paper attempts to understand who controls credit unions. Specifically, this paper tests the question, do members, sponsors, or the market control loan and deposit rates set by

credit unions? This test is motivated by theoretical observations on the difference between loan and deposit rates under alternative modes of credit union control. I offer an extension of Emmons and Schmidt's (2001) model that allows credit union members to influence rates through the election of the credit union's leadership.¹ Since each credit union member receives some share of credit union profits through advantageous pricing of loans and/or deposits, members face a tradeoff between credit union profitability and personal gain. In a one-member one-vote method of governance, this model predicts credit unions with large numbers of depositors will act to maximize depositor surplus by setting loan rates to generate large profits and then redistributing these profits through paying higher rates to depositors. As borrowers join the credit union, the marginal value of a deposit increases resulting in credit unions paying higher deposit rates. Because of this, the model predicts that the loan-deposit rate spread decreases as the number of borrowers grows in a depositor controlled credit union.

Likewise, a credit union with a majority of borrowers generates borrower surplus by charging a low loan rate which is funded by paying a low deposit rate. Under borrower control, if more depositors join the credit union, the marginal benefit to the credit union of an additional loan falls leading to a lower loan rate. Again, this model predicts that that loan-deposit rate spread decreases as the number of depositors grows in a borrower controlled credit union. If credit unions act to maximize either borrower or depositor surplus, one should observe smaller loan-deposit spreads for credit unions with roughly equal numbers of borrowers and depositors.

In contrast to member-controlled credit unions, sponsors maximize the sum of borrower and depositor surplus. Absent credit union costs, sponsors set rates to equate deposit supply with

¹ Federally chartered credit unions require membership elections for the Board of Directors annually. The minimum role these directors may exert in credit union governance includes the appointment of an executive officer, a financial officer, a recording officer, and supervisory committees such as a budget or delinquent loan committee. Credit union bylaws may expand these roles; a common expansion includes granting the power to appoint loan officers and a credit committee to the Board of Directors.

loan demand. Credit unions with high numbers of borrowers attract additional deposits through increasing the deposit rate. To finance higher deposit rates, sponsors increase loan rates. Under sponsor control, as the ratio of borrowers to depositors rises, one would expect both higher loan and deposit rates and hence stable loan-deposit spreads.

If credit unions are constrained by market forces in setting their rates, then the composition of the membership should not influence either loan or deposit rates. For instance, in a competitive market, if a credit union responds to an increase in the number of borrowers by raising loan rates, existing borrowers will exit the credit union leaving the institution with no revenue source. Thus, under perfect competition, the borrower-lender ratio of an individual credit union would not impact the loan rate, the deposit rate, nor the spread between these two rates.

This research analyzes a cross-section of 446 credit unions located in the Pacific Northwest. The membership structure of each credit union is measured by the number of loans issued per member. This measure is compared with the spread between each credit union's loan and deposit rates. In the case of car loan rates and unsecured loan rates, a non-linear relationship between loan-deposit spread and membership constituency is found. This is evidence for the membership control hypothesis.

This paper proceeds by providing a view of the literature on credit union governance. Section II presents a theoretical model that links the three credit union control hypothesis with credit union constituencies. The third section offers a semi-parametric model that tests the three hypothesis. A fourth section investigates alternative explanations for the empirical findings and the final section concludes.

I. Literature Review

It has long been noted that traditional models of financial intermediation do not apply to credit unions because credit union members not only are the institution's shareholders but are also typically consumers of credit union output (loans), as well as suppliers of credit union input (deposits), and frequently managers of credit union operations. Because of these conflicts, Taylor (1971) was the first to observe that a credit union cannot simultaneously maximize its dividend rate for savers and minimize the loan rate for borrowers. Almost all subsequent theoretical work has recognized that member conflict affects credit union operations. Perhaps the most influential works are those of Smith, Cargill, and Meyer (1981) and Smith (1984). In these papers, the authors posit credit unions provide member benefits by offering advantageous loan and deposit rates. Indexing the level of institutional orientation towards borrowers or depositors, Smith, et. al. demonstrate that as the preference towards borrowers increases, credit unions reduce loan and deposit rates. Thus, if management favors borrowers because more borrowers than depositors vote for credit union leadership, then a result counterintuitive to standard microeconomic theory occurs: as the number of borrowers rises loan rates fall.

The theoretical model presented in this paper extends the model of deposit rate setting proposed by Emmons and Schmid (2001). Emmons and Schmid model borrowers [depositors] control credit unions in such a way as to maximize consumer [producer] surplus. Focusing solely on deposit rates, the authors argue borrower controlled credit unions set deposit rates at the very minimum required to supply borrowers with deposits to finance their loans. As control changes from borrowers to depositors, a discontinuity in the deposit rate occurs. Upon taking control of the credit union, depositors raise the deposit rate in an attempt to capture rents from borrowers. Emmons and Schmid test their theory by examining the impact of increasing the

number of borrowers (and hence increasing the likelihood of borrower control) on a credit union's deposit rate. Rather than examining the deposit rate, the approach used in this paper is to extend Emmons and Schmid's model to derive both the deposit and loan rates and then examine the impact of credit union control on the spread between these rates.

Empirical studies of credit union control have been mixed; some find borrower control, others depositor control and at least one study finds neither. Flannery (1974) analyzes the residuals of three interest rate regressions to classify a sample of 951 federally chartered credit unions. Using this procedure 233 institutions were determined to be depositor controlled, 143 as borrower controlled while the remainder could not be classified. Smith (1986) sorted a sample of credit unions into borrower- and depositor-preference groups according to observed loan and dividend rates. Using regression analysis, Smith measured the impact on these rates of several exogenous shocks and compared the response to the prediction his earlier theoretical models provided. Neither borrower- nor depositor-preference behavior was found in any of the samples studied.

Patin and McNiel (1991) measure net monetary benefits received by credit union members. Net monetary benefits are the difference between a credit union's rate (either deposit or loan) and the locality's next best rate. Examining nearly 15,000 credit unions over two years (1984 and 1985), Patin and McNiel estimate that in 1985 the average credit union distributed \$62,600 more net monetary benefits to member depositors than to member borrowers. Recently Emmons and Schmid (2001) empirically investigated deposit rates set by credit unions. Emmons and Schmid found that as the membership of credit unions consists of a greater number of borrowers, deposit rates rise. This is consistent with the sponsor control hypothesis and not the member control nor the market control hypothesis.

II. Theoretical Model

The model that follows extends the theoretical work of Emmons and Schmid by determining not only the impact of credit union control on the deposit rate but also on the loan rate. Specifically, credit unions are assumed to generate consumer (borrower) and producer (depositor) surplus by presenting members with opportunities to interact with a financial intermediary in a risk-free environment. Each credit union faces an upward sloping supply of deposits schedule and a downward sloping demand for loans schedule. Although the household's decision is not modeled, these functions contain attributes one would expect; higher loan rates discourage household borrowing and higher deposit rates encourage household lending.

In this model all households are identical except that some are borrowers and others are depositors. For ease of computation, assume that households do not hold deposits and loans simultaneously. One way of considering this situation is that households with greater amounts of deposits relative to loans are net depositors and therefore contribute to the supply of deposits curve. Further, I follow Emmons and Schmid's work by assuming that the total quantity of credit union loans is proportional to the number of borrowers. Likewise, the total size of credit union deposits is assumed to be proportional to the number of depositors. The demand for a credit union's loans is given by the linear schedule:

$$(1) \quad R_L = a - cL$$

where R_L represents the loan rate, L represents the quantity of loans and $a > 0$ and $c > 0$ are parameters determined by borrower preferences. As the number of borrowers is assumed to be proportional to the demand for loans and because the credit union's demand for loans curve is the

horizontal summation of individual demand curves, an increase in the number of borrowers results in a smaller value of c without a change in the parameter a .

The credit union finances loans through deposit acquisition and borrowing/lending on the interbank market. Supply of credit union deposits are provided according to:

$$(2) \quad R_D = b + dD$$

Again $b > 0$ and $d > 0$ are parameters, D represents deposit supply and R_D the rate paid on deposits. Like the case of loan demand, an increase in the number of depositors results in a larger value of d without a change in the parameter b .

As credit unions are non-profit institutions, I assume that a zero profit condition applies. Since credit unions are run by members, assuming zero economic profits implies that profits are distributed to members through advantageous loan and/or deposit rates. In this model, credit unions are assumed to have no costs other than the deposit rate paid to depositors.² Finally, credit unions are assumed to borrow or lend in the interbank market at rate R . To guarantee the existence of credit unions, it is necessary that $a > R > b$.

Three possible governance scenarios are presented: (1) credit unions are controlled by a sponsor who maximizes the sum of depositor and borrower surplus; (2) credit unions are governed by an elected board of directors who maximize the benefits of the majority group; and (3) market forces in the lending and deposit markets are strong enough to preclude any rate setting behavior by credit union managers or sponsors. Under all three situations, I compare the impact on the credit union's loan-deposit rate spread given an increase in the borrower-member ratio.

² While this assumption is made primarily for simplicity, it is one that is commonly used in the credit union literature. See for instance Emmons and Schmid or Patin and McNeil. It is important to note that if non-interest costs vary systematically with measures of credit union control, then it would be likely to erroneously conclude that credit union control influences interest rates while in fact interest rates are influenced by credit union costs. While not modeled in the theoretical section, this possibility is addressed in the empirical section of this paper.

A. Control by Sponsor

Sponsors who maximize the welfare of members do so by maximizing the sum of depositor and borrower surplus. As shown in Figure 1, depositor surplus is the area beneath the deposit rate and above the deposit supply curve; the triangle R_{Deb} . Borrower surplus is triangle aR_{Le} ; the area beneath the loan demand curve and above the loan rate. As is readily apparent from welfare economics, sponsors maximize aggregate member surplus by equating the deposit and loan rates.

Under sponsor control, credit unions that have a smaller ratio of borrowers-to-members will maintain both lower deposit and loan rates. This is demonstrated in Figure 2. Figure 2 shows the sponsor's welfare maximizing loan and deposit rates in the presence of fewer borrowers represented by greater values of c . This analysis leads to a possible testable hypothesis: as the number of borrowers in a credit unions falls, both loan and deposit rates decline without a corresponding systematic change in the loan-deposit rate spread.

B. Control by Members

Because credit unions are member-controlled institutions, it is possible that one subgroup of members can control the credit union at the expense of the minority members.³ This section presents a simple theoretical model of deposit and loan rates based upon two possible situations: depositor control and borrower control of the credit union. In each case, I follow

³ Little investigation has followed actual credit union voting procedures and outcomes. Rasmussen (1988) reviews a handful of older articles that deal with mutual banks, mutual insurance, and credit unions. One study of mutual savings banks cited by Rasmussen finds a range of .02 to 2.5 percent of the membership voted in leadership elections at eleven major savings banks. While this is certainly a small percent of the membership, Rasmussen points out that this level of participation is typical for a non-controversial vote in a stock company. Nor does small size of votes negate the member controlled hypothesis which is dependent upon the ability of members to influence the credit union pricing decisions. Presumably the few voters that do vote have a larger stake in the credit union election; thus these individuals determine the type of member control.

Emmons and Schmid's suggestion that the controlling members are interested in maximizing their surplus (consumer or producer).

1. Depositor Control

Credit unions controlled by depositors choose loan and deposit rates to maximize depositor surplus without regard to borrower surplus. In Figure 3, this amounts to choosing a deposit rate to maximize the triangle $R_D gb$. Of course, depositors cannot simply set the deposit rate infinitely high. For instance, depositors are constrained to choose a deposit rate that guarantee non-negative profits for the credit union. Depositor welfare is maximized by solving the following problem:

$$(3a) \quad \text{Max}_{R_D, R_L} \frac{1}{2} (R_D - b) \times D$$

subject to:

$$(3b) \quad R_L \times L - R_D \times D - R(L - D) = 0$$

$$(3c) \quad R_L \geq R_D$$

The rates that solve the maximization problem are:

$$(4a) \quad R_L = \frac{a + R}{2}$$

$$(4b) \quad R_D = \frac{1}{2} \left(b + R + \sqrt{\frac{d}{c} (a - R)^2 + (b - R)^2} \right) > R.$$

To understand the properties of the solution to the depositor's maximization problem, consider a credit union that accepts deposits at rate R and lends these in the interbank market also at rate R . It is clear that this credit union earns zero profits and, in the absence of lending to borrowers, generates a depositor surplus equal to the area above the depositor supply curve and below the interbank rate R . In this case, this credit union is acting solely as an intermediary

between depositors and the interbank market. In order to further increase depositor surplus, this credit union must generate earnings that may be redistributed to depositors through higher deposit rates. The credit union generates earnings by further borrowing on the interbank market at marginal cost R and lending to its members. The loan rate given in 4a maximizes revenues generated from members by setting the marginal cost of funds (R) equal to the marginal revenue of an additional loan. The deposit rate given in 4b is simply the rate required to eliminate credit union profits.⁴

The comparative statics of loan and deposit rates are straightforward. The depositor-controlled credit union raises the loan rate given a greater demand for loans (a rises) and a higher marginal cost of funds (R).⁵ As long as depositors remain in control, the deposit rate rises as the supply of deposits shrinks (b or d rises). The deposit rate also rises as demand for loans increases (a rises or c falls).

2. Borrower Control

When the membership of the credit union is dominated by borrowers, a different pattern of loan and deposit rates occur. As above, borrower controlled credit unions are assumed to maximize borrower surplus which, in Figure 3 is the triangle afR_L . The credit union's maximization problem is:

$$(5a) \quad \text{Max}_{R_D, R_L} \frac{1}{2} (a - R_L) \times L$$

subject to:

$$(5b) \quad R_L \times L - R_D \times D - R(L - D) = 0$$

⁴ In fact, the solution to the depositor controlled problem of 3a is equivalent to a monopolists problem which first sets the marginal revenue of loans curve equal to the marginal cost curve of R and then uses the resulting profits to choose a deposit rate that generates zero profits.

⁵ That the resulting loan rate of $R_L = \frac{a + R}{2}$ does not depend on the slope of the loan demand curve is a general result of monopoly theory applied to a linear demand curve with constant marginal costs.

$$(5c) \quad R_L \geq R_D$$

The optimal loan and deposit rates are:

$$(6a) \quad R_L = \frac{1}{2} \left(a + R - \sqrt{(a - R)^2 + \frac{c}{d} (b - R)^2} \right) < 0$$

$$(6b) \quad R_D = \frac{b + R}{2}.$$

The solution to this problem is comparable to the depositor controlled credit union.

Without accepting deposits, a credit union could borrow on the interbank market at rate R and lend at rate R . In this case, borrower surplus would be the area beneath the loan demand curve and above the interbank rate. This credit union could further increase borrower surplus by paying depositors a low deposit rate and then lending the resulting funds to borrowers at a rate below the interbank rate. Thus, the borrower controlled credit union will choose the monopsony deposit rate and charge a loan rate that generates zero profits.⁶

Similar comparative statics as the depositor-control situation arise in the borrower-control situation. Loan rates increase when borrower demand rises (a rises or c falls) and fall with greater deposit supply (lower b or d). Deposit rates fall with greater deposit supply (b falls) and a lower interbank loan rate.

Combining the comparative statics results from both the depositor- and borrower-control models yields a testable hypothesis. To understand this, I focus on the number of borrowers in a credit union as proxied by the variable c , the slope of the loan demand curve. Recall, the variable c is determined by a horizontal summation of individual demand curves. Under depositor control, an increase in the number of borrowers (a decline in c), results in an increase

⁶ As in the case of depositor control, an equivalent problem to maximizing borrower surplus involves a borrower controlled credit union choosing a monopsony-level deposit rate by setting the marginal cost of funds equal to R and then picking a loan rate to eliminate profits.

in the deposit rate without a change in the loan rate. Thus, as long as depositors remain in control, the loan-deposit rate spread declines as borrowers increase. On the other hand, if borrowers control the credit union, then a further increase in the number of borrowers raises the loan rate while keeping the deposit rate unchanged. Thus the loan-deposit rate spread rises in a borrower-controlled credit union as more borrowers become members. Figure 4 demonstrates the impact of a change in the number of borrowers (as measured by the variable c) on loan and deposit rates under both borrower and depositor control.

Figure 4 demonstrates some notable findings. First, as one would suspect, deposit rates are always lower under borrower control than under depositor control. Likewise, loan rates are always higher under depositor control than borrower control. Of course both results are derived from one group of members exploiting the other group. For this paper though, the most important implication presented in Figure 4 is that the loan-deposit spread is minimized for moderate levels of borrowers and grows for extremely high or low levels of borrowers.

C. Market Control

It is possible that neither members nor sponsors control rates set by credit unions. If local or national markets are competitive for deposits or loans, one would expect neither of the above outcomes. Under perfect competition, a credit union that favored one group over the other would alienate the minority group who would leave the credit union. Given the threat of exit, no entity would be able to alter interest rates which implies that credit union constituency would not impact loan rates, deposit rates, and the spread between these rates.

III. Empirical Evidence

This paper analyzes a cross section of 446 of the 453 credit unions located in Idaho, Oregon, Washington, Alaska, and Hawaii.⁷ Data were gathered from the National Credit Union Administration (NCUA) call reports for June, 2002. These 446 credit unions serve slightly over 4,999,000 members with combined assets over \$36 billion. Credit unions in the Pacific Northwest average 2,800 more members and \$25 million more assets per institution than the national average. Descriptive statistics of credit unions in the sample appear in Table 1.

Credit union call reports list a large variety of loan and deposit rates. The deposit rate used in the following empirical work is the average interest rate paid on share drafts, regular shares, time deposits, and IRA deposits weighted by its fraction of total deposits in each credit union.⁸ Credit unions report quarterly to the NCUA interest rates charged on new car loans, used car loans, credit cards, first mortgages, and non-credit card unsecured loans. These five loan categories consist of 74.3% of all credit union lending in the Pacific Northwest.⁹ Because of the importance of these five loan categories, this paper constructs loan-deposit rate spreads based on these categories. Specifically, the simple difference between each credit union's loan rate and deposit rate was computed and transformed into five loan-deposit spreads. These spreads will serve as the dependent variables in the following empirical work.

A number of methods could be constructed to measure the level of borrowers relative to members in each credit union. I employ the variable LOANPERMEM which is defined as the number of loans issued by a credit union divided by the number of credit union members. According to this measure, a credit union equally divided between depositors and borrowers would have a value of LOANPERMEM equal to .5. Of course, if borrowers receive more than

⁷ Seven credit unions were eliminated due to missing information.

⁸ All interest rates in this paper are those reported as being in effect on June 30, 2002.

⁹ New car loans consist of approximately 18% of all credit union lending, used car loans 22%, first mortgages 24%, credit cards 7%, and unsecured loans 5%.

one loan, than a credit union divided equally between voting borrowers and depositors would have a value of LOANPERMEM greater than .5. In my sample, LOANPERMEM ranges from 2 loans per 100 members to nearly 7 loans per 10 members.

If members control credit unions and loans-per-member proxies for loan demand, then as LOANPERMEM increases, one should observe situations analogous to moving from right to left in Figure 4. Specifically, one should observe a minimum loan-deposit spread when the number of borrowers equals the number of depositors and spreads that grow as the loan-to-member ratio becomes imbalanced. If, on the other hand, market forces or sponsors control credit unions, then no relationship between loan-deposit spreads and LOANPERMEM should be found.

This paper employs a semi-parametric kernel regression to estimate the relationship between LOANPERMEM and the various loan-deposit spreads.¹⁰ The benefit of employing this estimator is flexibility; *a priori* no structural relationship between LOANPERMEM and rate spreads are assumed. A semi-parametric approach allows the data to determine the shape of the regression function rather than the researcher employing limiting conditions that predetermine the functional form of the regression. Thus if the member control hypothesis is correct, a parabolic relation between rate differences and LOANPERMEM will be found while if it is not correct, the semi-parametric kernel regression will not erroneously lead to the conclusion that it is correct.

A kernel regression is an example of a non-parametric “local” regression. Local regressions employ all observations of an independent variable within a given distance (the bandwidth) of a chosen value and regresses these against the dependent variable. Values of the independent and dependent variables that are further from the chosen point are weighted less

¹⁰ Härdle (1990) details the exact procedure of Kernel regressions. For a good, broad overview of Kernel regressions, see DiNardo and Thomas (2001).

than points nearer. The weighting procedure is typically done with a “kernel” function; in this paper’s case weights are computed using the normal distribution. After estimating the local regression, a new value of the independent variable is chosen and the process is repeated. The resulting kernel regression combines all local regressions to yield point estimates of the dependent variable throughout the values of the independent variable.

A number of complications arise when employing kernel regressions, the most important of which is that more things than loans-per-member influence loan-deposit spreads. For instance, credit unions in different states operate under a wide range of legal structures. Likewise, loan and deposit rates are influenced by the level of competition each credit union faces as well as credit union costs. Credit unions also have different chartering options; most are chartered at the federal level but some are chartered by individual states; the difference in chartering presents to credit unions various structures that likely influence pricing decisions. Credit unions may choose to be a member of a corporate credit union, have access to the Federal Reserve discount window, and the Federal Home Loan Bank System. Potentially, membership in these organizations generates either a lower cost of funds or an expanded role for lending.

Standard non-parametric kernel regressions cannot account for multiple independent variables so a semi-parametric approach is employed. Specifically, the equation estimated is:

$$(7) \quad y_i = z_i\beta + m(\text{LOANPERMEM}_i) + \varepsilon_i$$

where y represents one of the five loan-deposit spreads, z is the matrix of independent variables, β is a vector of slope estimates, and ε is an error term. The function m represents the potentially nonlinear relationship between LOANPERMEM and the deposit-loan rate spread that will be estimated using the kernel regression approach.

The matrix z consists of state dummy variables, dummy variables indicating if the credit union has a federal charter, if it serves a low income constituency¹¹, and if it maintains membership privileges with the Federal Reserve Discount Window, the Federal Home Loan Bank Corporation, and with a corporate credit union.¹² The matrix z also includes three measures of operating costs (wages per member, loan servicing fees per member and office expenses per member), size (total assets and total assets squared), age, and a county-level Herfindahl index that measures competition for deposits among credit unions and commercial banks.¹³

A semi-parametric kernel regression is a multiple-step process. First one must estimate the β 's in equation 7 and then use a kernel regression to estimate $m(\bullet)$. As described by DiNardo and Tobias (2001), the β 's are estimated in a preliminary regression and then the dependent variable is purged of the impact of the z 's by computing $y - \hat{\beta}z$.¹⁴ Finally, the kernel regression process described earlier is performed with the purged dependent variable and the independent variable LOANPERMEM.

The estimated impact of loans-per-member on the five loan-deposit rate spreads appear in Figure 5. Each diagram displays, in basis points, the impact on loan-deposit rate spreads of different levels of loans-per-member. In the case of the two car rate spreads and the unsecured spread, the effect of increased numbers of borrowers follow a pattern consistent with the member

¹¹ The National Credit Union Administration determines if a credit union serves a low-income constituency. These credit unions serve primarily distressed and financially underserved areas. The NCUA manages a loan fund that provides technical assistance to these credit unions.

¹² Corporate credit unions serve as credit unions for credit unions. They typically provide payment services for member credit unions as well as investment opportunities.

¹³ This Herfindahl index measures competition for deposits between individual commercial banks and credit unions at the county level. An index of 1 indicates that only one bank or credit union accepts deposits within a county. An index of 0 would indicate perfect competition for deposits.

¹⁴ DiNardo and Tobias suggest estimating the β 's by ordering the data from lowest to highest LOANPERMEM, calculating the first differences of the y 's and z 's, and then estimating the β 's using OLS on these differences.

control theory. For instance, in the case of new cars, the spread is high for extreme levels of loans-per-member but dips nearly 50 basis points for credit unions between .5 and .6 loans per member. The unsecured-deposit rate spread follows a similar pattern but falls nearly 100 basis points at its minimum.

Whereas the new car, used car, and unsecured spreads fit the member control hypothesis, the credit card and first mortgage spreads fit the member control hypothesis less well. For levels of loans-per-member below one-third, both credit card and mortgage spreads are strictly increasing; a finding consistent with the sponsor control theory. For levels of loans-per-member above one-third, the credit card and mortgage spreads follow a pattern consistent with the member control hypothesis; each spread falls and then rises achieving a local minimum in the area of .6 loans per member. While there are clear differences between the credit card/mortgage findings and the other three spreads, this is perhaps not surprising given the national scope of the credit card and mortgage markets relative to the more local markets for unsecured loans and automobiles.

Remarkably, all five spreads achieve a minimum at a ratio of loans-per-member between .5 and .6. The member control theory predicts spreads to be minimized when members are evenly split between borrowers and depositors. If each borrower receives only one loan, then an even split occurs when a ratio of loans per member equals .5. If some borrowers receive multiple loans, then an even voting split occurs at a ratio greater than .5. The fact that all spreads achieve a minimum at a level of loans-per-member slightly above .5 provides evidence that credit unions make pricing decisions in response to their member constituencies.

Results of the preliminary regressions to the semi-parametric results appear in Table 2. For the most part, the results are consistent with prior expectations. Credit unions that face high

office expenses, low levels of local market competition (as measured by the Herfindahl index), and those that serve riskier low income communities generally provide larger loan-deposit rate spreads. Credit union size, as measured by total assets, appears to influence rate spreads in a declining, then increasing manner as assets grow. This finding suggests a U-shaped average cost curve and is consistent with much other research examining the commercial bank and credit union markets. Finally, credit union location appears to matter significantly; on average Idaho credit unions charge larger spreads than do other states in the Northwest.

IV. Other Explanations

The results of new car-, used car-, and unsecured-deposit spreads presented in Figure 5 support the member control hypothesis. The results of the mortgage and credit card spreads are more difficult to interpret but, by achieving a minimum near an equal ratio borrowers to members, suggests that member composition influences these rates as well. Yet, the member control hypothesis need not be the only explanation. In this section, I investigate the possibility that an endogenous relationship exists between member composition and interest rate spreads.

The member control hypothesis suggests that the composition of members influence rate spreads. But, it is certainly likely that rate spreads influence the composition of members. For instance, a credit union that offered a minimum difference between loan and deposit rates would attract a very different membership than one with a large rate spread. If this simultaneity exists, then the estimated impact of member composition on the rate spread will be biased.

To test for the possibility of endogeneity, I employ a Hausman test as described in Gujarati (2003). The null hypothesis of this test is that loans per member is an exogenous

variable.¹⁵ Results of this Hausman test and associated probabilities are presented in the last row of Table 2. For the two car spreads and the unsecured loan spread, the hypothesis that loans-per-member is exogenous is not rejected. Thus, for these three outcomes, loans per member may be considered an exogenous variable suggesting that the finding of member control is legitimate for these outcomes. For the mortgage and credit card regressions, the Hausman test rejects exogeneity suggesting the mortgage and credit card results suffer from an endogeneity problem and should not to be trusted.

IV. Conclusion

This paper seeks to distinguish between three hypotheses of credit union control: member control, sponsor control, and market control. Using a modified version Emmons and Schmid's model of credit union governance, the loan-deposit rate spread is hypothesized to be a non-linear function of the number of borrowers in a credit union. This is contrasted to the case under which sponsors or the market controls the credit union; in either of these cases the number of borrowers in a credit union should have no impact on the loan-deposit rate spread.

To test how credit unions are controlled, this paper employs a semi-parametric regression that allows for a wide variety of functional forms to exist between loan-deposit spreads and the number of borrowers in a credit union. Using data from mid-2002 in the Pacific Northwest, this paper presents evidence consistent with the member control hypothesis. In markets for new car loans, used car loans, and unsecured loans, loan-deposit spreads matched the predictions of the member control model. The markets that did not follow this pattern were the mortgage and credit card market, markets that are more national in scope and possibly more influenced by endogenous competitive influences not accounted for in this work. Taken as a whole, the

¹⁵ No specific version of a test for exogeneity in semiparametric models exists. I therefore proceed by assuming that loans per member quadratically impact the rate spread and apply the Hausman test as described by Gujarati (2003), p. 756.

findings of this paper are consistent with those of Patin and McNeil who determined that credit union pricing decisions is influenced by credit union membership constituencies.

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Figure 1: Borrower Demand and Depositor Supply

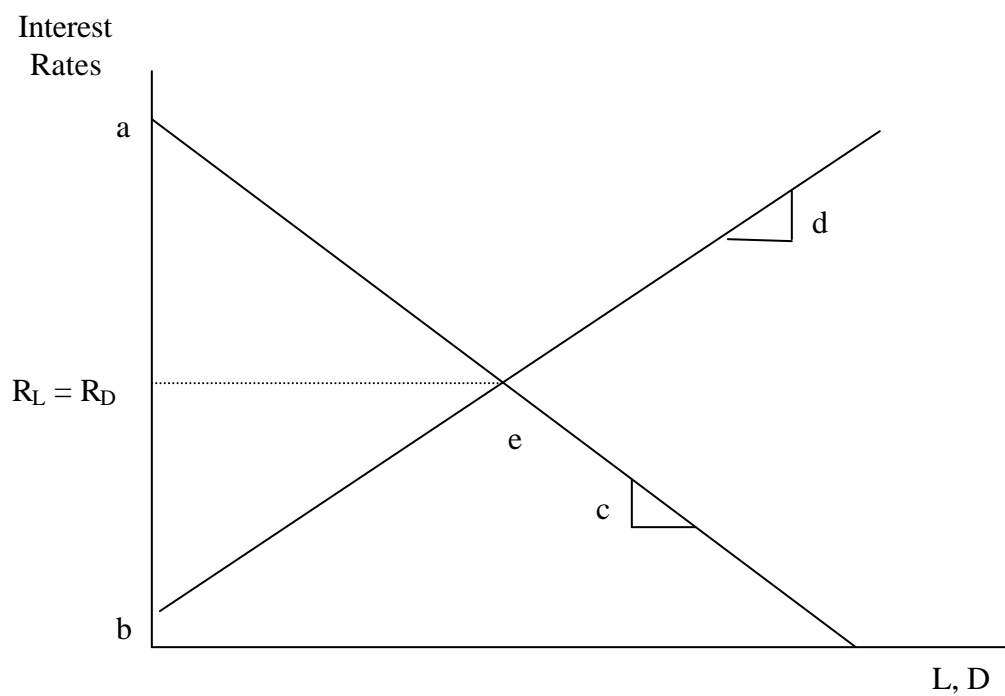


Figure 2: Effect of a Decrease in Borrowers on Interest Rates Under Sponsor Control

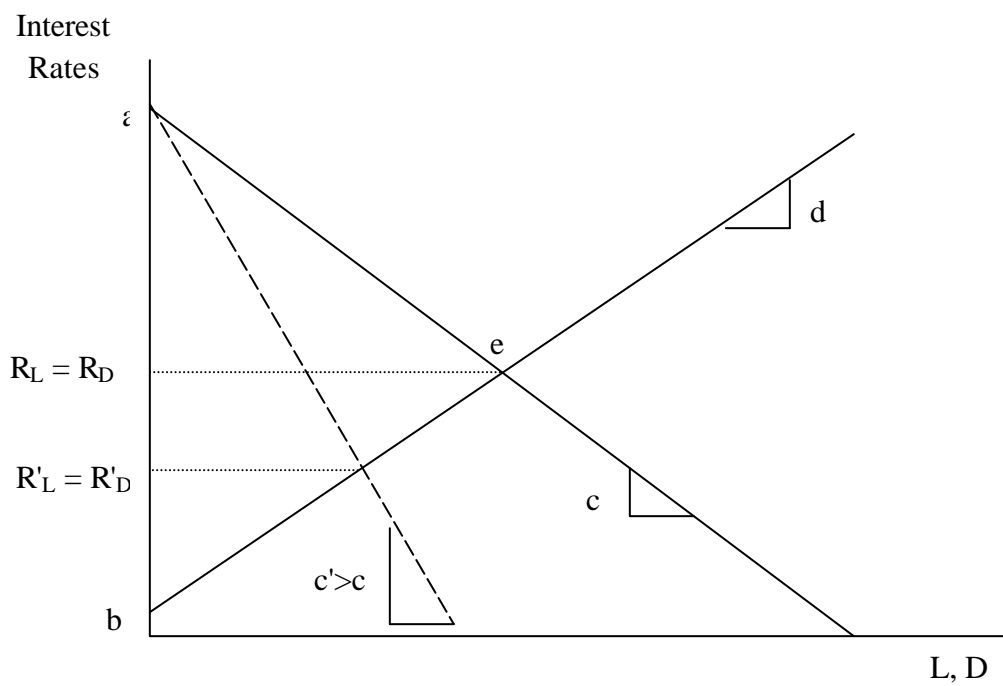


Figure 3: Borrower and Depositor Surplus Under Member Control

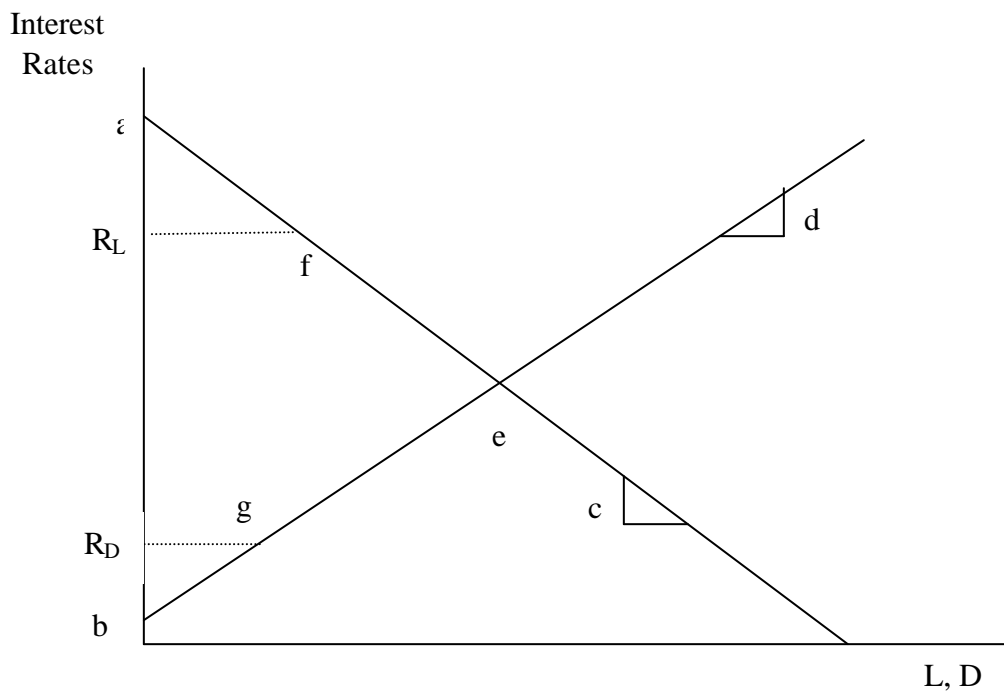


Figure 4: Loan, Deposit Rates and Membership Control of Credit Unions

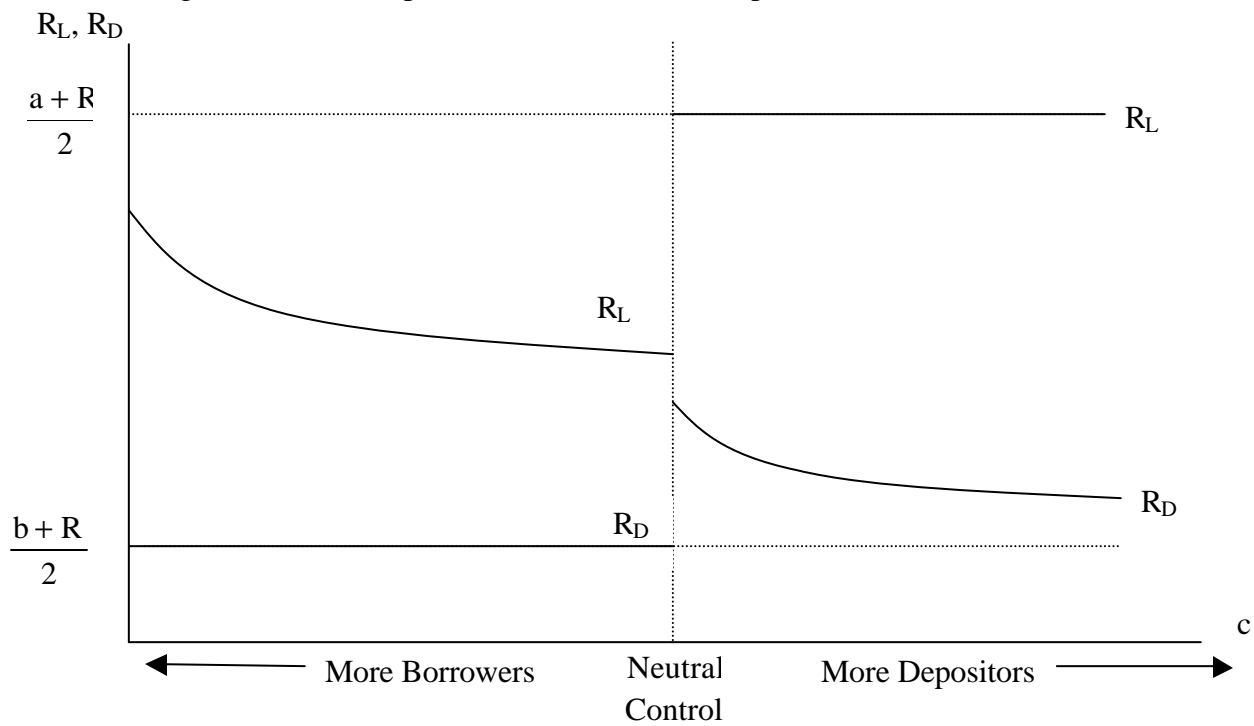
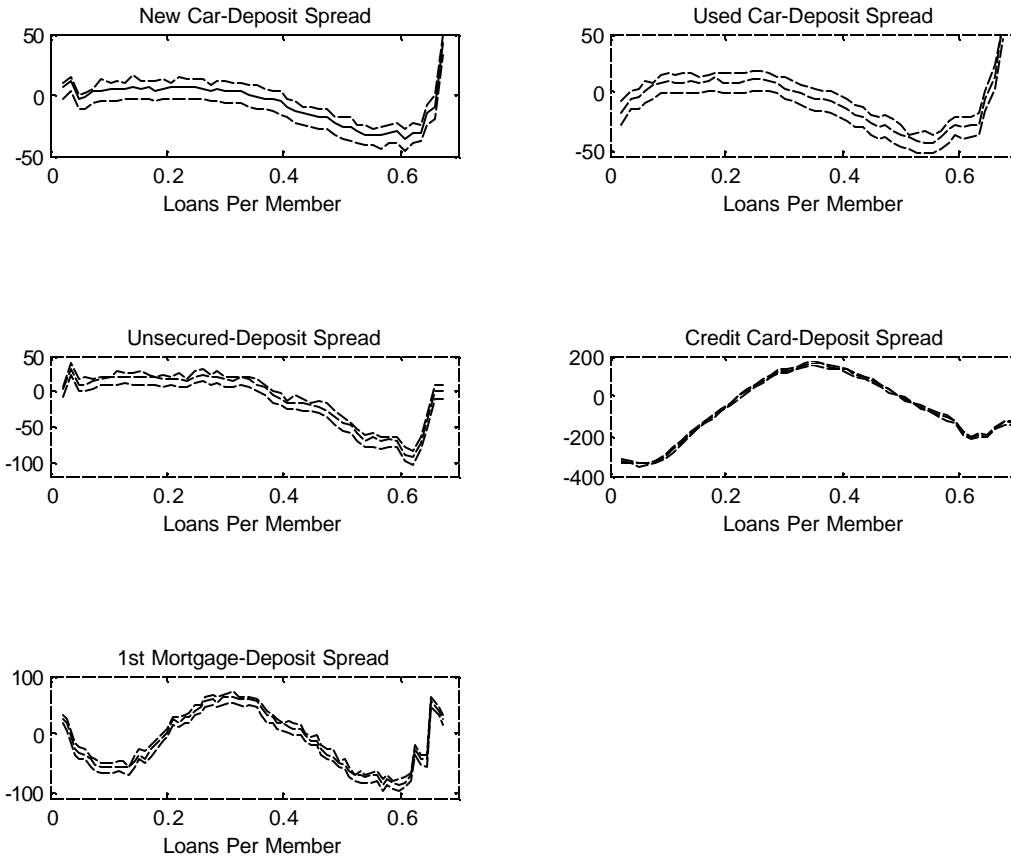


Figure 5: Impact of Loans Per Member on Loan-Deposit Rate Spread



All spreads measured in basis points. Dashed lines represent bootstrapped 90% confidence intervals.

Table 1: Descriptive Statistics		
Variable Name	Description	Mean and Std. Deviation
LOANPERMEM	Loans Per Member	.283 (.146)
ALASKA	Dummy Variable Representing Location	.029 (.168)
HAWAII	Dummy Variable Representing Location	.224 (.417)
IDAHO	Dummy Variable Representing Location	.156 (.364)
OREGON	Dummy Variable Representing Location	.242 (.428)
WASHINGTON	Dummy Variable Representing Location	.348 (.476)
HERFINDAHL	Herfindahl Index for Local Deposit Market	.177 (.066)
FEDERAL	Dummy Variable Equal to 1 if Credit Union is chartered by the Federal Government	.632 (.482)
AGE	Age of Credit Union measured in Years	45.782 (17.61)
LOWINCOME	Dummy Variable Equal to 1 if Credit Union is Classified as a Low Income Credit Union	.123 (.329)
CORPORATE	Dummy Variable Equal to 1 if Credit Union is Member of a Corporate Credit Union	.968 (.174)
FHLB	Dummy Variable Equal to 1 if Credit Union is Member of FHLB	.125 (.331)
DISCWINDOW	Dummy Variable Equal to 1 if Credit Union is Member of the Discount Window	.091 (.289)
WAGES	Total Wages Paid to Credit Union Employees Per Member	49.036 (19.31)
OFFICE	Office Occupancy and Operations Expense Per Member	24.575 (11.822)
LOANSERVICE	Loan Servicing Expense Per Member	.0034 (.0038)
ASSETS	Total Credit Union Assets, Thousands of \$	80,045.67 (252,324)
DEPOSIT RATE	Weighted Average of Time, Checking, Savings, and IRA Deposit Rates Measured in Basis Points	203.940 (69.482)
NEW CAR RATE	Interest Rate Charged on New Car Loans Measured in Basis Points	698.002 (117.236)
USED CAR RATE	Interest Rate Charged on Used Car Loans Measured in Basis Points	785.621 (155.493)
CREDIT CARD RATE	Interest Rate Charged on Credit Card Measured in Basis Points	774.574 (593.285)
UNSECURED RATE	Interest Rate Charged on Unsecured Loans Measured in Basis Points	1190.204 (278.110)
N	Number of Observations	446

Table 2: Results of Regressions Preliminary to the Kernel Regression

	New Car Spread	Used Car Spread	Unsecured Spread	Credit Card Spread	First Mortgage Spread
Idaho	-7.257 (23.56)	58.387** (28.06)	246.053*** (50.71)	312.07*** (94.59)	-8.072 (58.88)
Oregon	-18.400 (19.24)	46.358** (22.91)	161.250*** (41.41)	160.369** (77.25)	-45.558 (48.09)
Washington	-1.913 (20.54)	18.297 (24.46)	155.476*** (44.21)	204.675** (82.47)	55.891 (51.34)
Alaska	8.498 (41.57)	-.032 (49.50)	58.102 (89.46)	-110.724 (166.89)	10.209 (103.89)
Federal Charter	7.366 (15.98)	-21.194 (19.03)	-35.375 (34.40)	-96.950 (64.17)	-34.282 (39.95)
Age	-.378 (.38)	-.595 (.45)	-.574 (.83)	2.022 (1.54)	2.170** (.96)
Herfindahl Index	123.564* (72.64)	177.64* (101.09)	386.260* (215.22)	634.968* (368.49)	64.907 (249.63)
Corporate Credit Union Member	73.476** (35.98)	-102.962** (42.84)	-102.708 (77.43)	367.610** (144.44)	177.683** (89.91)
FHLB Member	40.531* (24.64)	20.785 (29.35)	-34.823 (53.04)	-99.373 (98.95)	-42.080 (61.60)
Discount Window Member	11.610 (26.61)	9.633 (31.68)	91.419 (57.26)	-51.562 (106.82)	51.144 (66.49)
Low Income Credit Union	65.259*** (19.85)	80.307*** (23.63)	-21.738 (42.71)	-72.349 (79.68)	102.984** (49.60)
Assets	-2.20e-4*** (6.85e-5)	-3.16e-4*** (8.15e-5)	-2.64e-4* (1.47e-4)	1.32e-4 (2.74e-4)	8.17e-5 (1.71e-4)
Assets Squared	4.43e-11** (1.76e-11)	6.95e-11*** (2.1e-11)	5.10e-11 (3.79e-11)	-8.21e-11 (7.07e-11)	-5.00e-11 (4.40e-11)
Wages per Member	.419 (.49)	.084 (.58)	1.288 (1.05)	-1.606 (1.97)	.289 (1.22)
Loan Service Fees per Member	-1536.93 (1925)	-1282.487 (2292)	6125.78 (4143.27)	52,995*** (7728)	12,504*** (4811)
Office Expenses per Member	2.050*** (.78)	1.011 (.937)	2.875* (1.69)	16.465*** (3.16)	11.878*** (1.96)
Constant	354.833*** (48.85)	646.941*** (58.11)	793.475*** (105.13)	-573.465*** (196.11)	-355.992*** (122.08)
N	446	446	446	446	446
R ²	.097	.111	.156	.335	.269
F (prob.)	2.89 (.000)	3.33 (.000)	4.94 (.000)	13.47 (.000)	9.84 (.000)
Hausman (prob.)	.02 (.895)	.38 (.536)	2.04 (.154)	16.76 (.000)	4.08 (.044)

*** (**) [*] represent one-tailed statistical significance at the 99 (95) [90] percent level.
Standard errors are in parenthesis.