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Deposit rate sensitivity of credit union shares

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Abstract This study examines the factors that are related to the growth of credit union liabilities. We use individual credit union data on deposit categories and their associated interest rates to measure the effect of interest rate changes on the growth rates of total shares and five of its subcomponents. After controlling for credit union size, previous growth, and market interest rates, we find that while total share growth is related to individual credit union regular share and money market rates, it is most affected by share certificate rates. With the exception of share drafts, the growth in other deposit categories is significantly affected by the interest rate a credit union offers for those particular accounts. Finally, we provide evidence that, in general, the growth rate of a deposit category is negatively related to interest rates offered on other types of accounts.

Keywords Credit Union · Savings · Share Deposits

JEL Classification G21

In 1909, a group of Franco-American Catholics in Manchester, New Hampshire, organized the first credit union in the USA (NCUA 2007). The same year, Massachusetts passed enabling legislation that formed the basis for subsequent state credit union laws and the Federal Credit Union Act. However, it was not until 1977,

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that credit unions were able to expand services available to members, including the sales of share certificates (CDs) and mortgage lending. With subsequent legislation that liberalized membership requirements, credit unions have shifted from making primarily small unsecured consumer loans to providing a full range of financial services in both saving and lending markets. Today's modern credit union offers numerous types of deposits (regular shares, share drafts, CDs, money market accounts, IRAs) and loans (first and secondary mortgage loans, used and new car loans, credit card lending, business loans).[1]

Legislative changes along with financial innovation have fueled substantial growth in credit union membership. Today there are 87.9 million members in the USA (CUNA 2006) and more than 8,500 credit unions. Despite this growth and an expanding menu of services, there has been little work examining individual deposit accounts of credit unions. In this study, we consider the growth rate of a credit union's total shares and then examine changes in five individual accounts: share drafts, regular shares, money market deposit accounts, share certificates and individual retirement accounts (IRAs).

The five accounts represent money in its different forms. In the USA, M1 includes share drafts and emphasizes money's role as a medium of exchange. It is the most liquid of all financial assets, as it need not be converted before being spent. Money as a financial asset also serves as a means of storing wealth. A broader definition of money, M2, adds household savings and includes credit union regular shares, money market accounts and share certificates.

In its various forms, money differs in its degree of liquidity and rate of return. In general, the more liquid the asset, the lower the rate of return. Share drafts are redeemable on demand and are the most liquid of the share accounts. Individuals mainly use share drafts for transaction purposes. Regular shares stress the savings function of money and typically carry higher returns than share drafts. However, regular shares are liquid as well and can be easily turned into cash by stopping at the credit union or ATM.[2] Bank regulations limit money market deposit account withdrawals to six per month, and therefore, they are less liquid than regular shares. Account restrictions and high minimum balances prompt money market rates that normally exceed returns to regular shares. Finally, share certificates are longer term time deposits. Whereas the other three deposit accounts enjoy varying degrees of liquidity, share certificates cannot be easily converted into cash. Stiff penalties for early withdrawal ensure that individuals will use share certificates mainly for savings purposes and also lead to the highest deposit account returns.

Credit unions differ from banks in at least two important ways. First, government regulators require that credit unions restrict their membership to a defined segment of the population. This "field of membership" or "common bond" may be based on criteria such as geographic region, place of work or a particular occupation or trade.[3]

[1] For a detailed review of the evolution of the modern day credit union, see Walter (2006).

[2] For a complete discussion of the effect of innovation on the demand for money, see Alvarez and Lippi (2007).

[3] The NCUA eased the strict common bond requirement in 1982 and allowed credit unions to draw members from multiple groups. Congress then passed the Credit Union Membership Access Act in 1998 to formally allow multiple group membership (Walter 2006).

Second, members are also the owners of the credit union. The unique institutional characteristics have given rise to a number of studies that focus on the determinants of credit union growth.[4] For example, Emmons and Schmid (2001) look at the relation between ownership structure and deposit rates, while Goddard et al. (2002) and Goddard and Wilson (2005) look principally at the effect of credit union size on asset and membership growth rates.

While the previous studies model the growth rate of credit unions measured either by total deposits or total assets, none consider the independent effects of deposit rates on credit union growth. Moreover, these studies do not disaggregate total deposits and explain the growth rates of the separate deposit accounts found at credit unions. In the next section, we describe the data and formally model the determinants of credit union share growth. For the first time, deposit rates are included as explanatory variables. After examining the growth rate for total deposits, we then estimate separate regressions for individual account growth rates. Thus, an additional contribution to the literature is that our analysis considers the substitution between different types of accounts and yields insight into members' demand for money.

1 Data

We examine all credit unions that have filed a 5300 Call Report in each quarter from Q2:1994 through Q1:2006.[5] We also require that a credit union offer a full range of deposit accounts (have non-zero amounts in each of the five categories: regular shares, share drafts, money market deposits, share certificates, and IRA/Keogh accounts), which leaves us with an initial sample of 531 credit unions. To avoid estimation biases caused by credit unions that merged during the sample period (Q2:1994–Q1:2006), we apply a filter to drop all credit unions that experienced higher than a 25%-growth in their total shares from one quarter to the next. This leaves us with a *final sample* of 490 credit unions with 47 quarterly observations for each.[6]

Table 1 presents descriptive statistics for the 490 credit unions. Panel A reports statistics for the first period in our sample, Q2:1994. The mean size of a credit union measured by its total shares was $165.02 million, with the smallest credit union having $46.16 million and the largest, $3,395.98 million in total shares. In terms of individual accounts, share drafts had the smallest mean ($20.92 million), while regular shares had the largest ($67.92 million). Money market accounts were the second largest with a mean of $27.87 million, followed by share certificates ($24.77 million) and IRA deposits ($21.18 million).

[4] Another strand of literature considers the competition between credit unions and commercial banks and examines the effect of this competition on bank behavior. See Rahman et al. (1995), Emmons and Schmid (2000), and Tokle and Tokle (2000).

[5] This data can be found on the National Credit Union Administration's (NCUA) web page at: http://www.ncua.gov/data/FOIA/foia.html

[6] This equals 5.6% of all credit unions at the end of 2006, but represents a significantly larger 36% of all total shares. These full service credit unions are also substantially larger, as our sample's median size (total shares) equals $240.4 million compared to only $8.9 million for the out of sample credit unions.

Table 1 Total shares and individual accounts: descriptive statistics, Q2:1994–Q1:2006

Statistics	Total shares	Share drafts	Regular shares	Money market accts	Share certificates	IRA/Keogh accounts
Q2:1994, *N*=490						
Mean	165.02	20.92	67.92	27.87	24.77	21.18
Median	108.27	12.74	44.62	15.82	14.92	12.32
Standard deviation	216.87	28.14	74.35	61.12	37.37	34.30
Skewness	8.11	6.11	4.12	13.11	6.24	8.17
Minimum	46.16	0.24	6.72	0.0004	0.41	0.000001
Maximum	3,395.98	379.80	815.10	1,142.68	486.00	530.46
Range	3,350.00	379.56	808.37	1,143.00	485.60	530.46
Q1:2006, *N*=490						
Mean	445.01	62.46	112.35	96.76	131.51	38.58
Median	248.73	36.42	68.86	45.57	68.56	18.54
Standard deviation	775.80	102.25	147.54	248.98	245.76	81.46
Skewness	9.14	8.30	4.45	14.32	7.17	10.36
Minimum	39.35	3.35	5.34	0.004	0.03	0.02
Maximum	12,339.67	1,546.86	1,342.88	4,797.20	3,169.01	1,357.49
Range	12,300	1,544	1,338	4,797	3,169	1,357
Q2:1994–Q1:2006, *N*=23,520						
Mean	278.48	38.47	77.94	57.74	73.50	28.21
Median	161.32	21.89	49.71	26.95	39.27	15.07
Standard deviation	472.61	63.56	98.78	152.45	137.87	54.33
Skewness	10.92	8.99	5.59	17.77	8.86	10.79
Minimum	39.35	0.16	2.14	0.0004	0.03	0.000001
Maximum	12,339.67	1,546.86	1,585.60	4,797.20	3,169.01	1,357.49
Range	12,300	1,547	1,583	4,797	3,169	1,357

By the end of the sample, Panel B shows that mean total shares almost tripled to an average of $445.01 million, although individual deposit categories did not advance at a uniform rate. Share certificates showed the fastest growth, increasing 431% between 1994 and 2006, and were followed by money market accounts, which rose 3.47 times during the same period. Share drafts also grew rapidly, increasing almost 200%. Regular shares and IRA/Keogh accounts rose at more moderate rates (1.65 and 1.82 times, respectively), both increasing at a slower pace than the growth rate of total shares. Despite a dramatic increase in size, the average credit union in our sample was small compared to the typical commercial bank. In 2006, total assets of an average commercial bank were $1.23 billion (Schenk 2006), nearly three times the size of our average credit union.[7]

The various deposit account growth rates reflect, in part, relative interest rate dynamics. Table 2 presents descriptive statistics for credit union deposit rates and market rates of interest. Again, Panels A and B describe Q2:1994 and Q1:2006 data, while Panel C is for the entire sample period. There are four facts of note in Table 2. First, the average rate paid by credit unions on share drafts dropped dramatically between 1994 and 2006. The mean rate paid on share drafts declined from 187.50

[7] This understates the size difference between credit unions and banks. According to Schenk (2006), the average size credit union was only $79 million in 2006. Our analysis concentrates on full service credit unions, and thus, the representative credit union in the sample is larger than the average size of all US credit unions.

Table 2 Interest rates: descriptive statistics, Q2:1994–Q1:2006

Statistics	Credit union deposit rates					Market interest rates	
	Share drafts	Regular shares	Money market	Share certificates	IRA/Keogh accounts	5-Year note	Slope of the yield curve
Q2:1994, *N*=490							
Mean	187.50	293.03	315.05	409.89	390.40	670.00	256.00
Median	200.00	300.00	310.00	409.00	393.00	670.00	256.00
Standard deviation	90.29	35.61	43.49	45.42	77.27	0.00	0.00
Skewness	−0.99	−0.10	1.02	0.24	−0.44	0.00	0.00
Minimum	0.00	150.00	200.00	275.00	0.00	670.00	256.00
Maximum	350.00	400.00	600.00	572.00	609.00	670.00	256.00
Range	350.00	250.00	400.00	297.00	609.00	0.00	0.00
Interquartile range	95.00	40.00	45.00	60.00	100.00	–	–
Q1:2006, *N*=490							
Mean	31.24	88.47	208.80	404.76	275.57	472.00	21.00
Median	25.00	80.00	200.00	414.00	273.50	472.00	21.00
Standard deviation	35.27	42.49	80.08	54.50	139.98	0.00	0.00
Skewness	2.82	1.55	0.33	−1.56	0.11	0.00	0.00
Minimum	0.00	8.00	50.00	124.00	45.00	472.00	21.00
Maximum	296.00	375.00	425.00	510.00	800.00	472.00	21.00
Range	296.00	367.00	375.00	386.00	755.00	0.00	0.00
Interquartile range	50.00	50.00	112.00	61.00	251.00	–	–
Q2:1994–Q1:2006, *N*=23,520							
Mean	107.95	218.62	289.64	422.45	366.35	504.83	123.00
Median	100.00	250.00	314.00	480.00	375.00	515.50	127.50
Standard deviation	95.29	102.98	122.79	154.17	159.27	134.30	814.12
Skewness	0.79	–0.19	–0.12	–0.47	–0.16	–0.18	0.17
Minimum	0.00	1.00	10.00	10.00	0.00	227.00	–0.60
Maximum	1,750.00	1,700.00	1,500.00	725.00	800.00	778.00	295.00
Range	1,750.00	1,699.00	1,490.00	715.00	800.00	551.00	355.00
Interquartile range	185.00	181.00	210.00	273.00	253.00	202.50	108.00

All interest rates are in basis points.

basis points in Q2:1994 to 31.24 basis points in Q1:2006; nevertheless, share draft deposits increased substantially over the same period of time. This result is consistent with share drafts being used mainly for transaction purposes and suggests that interest paid is not a very important determinant of share draft deposits.

Regular shares grew as well; however, their growth rate was the lowest among all five types of accounts (1.65 times between Q2:1994 and Q1:2006). In part, a significant decrease in rates paid on this type of deposit may be the cause of slow growth. Again, this is a testable hypothesis.

Third, rates paid on saving-type deposits also decreased from Q2:1994 to Q1:2006, although money market accounts and share certificates did not change nearly as much as rates on regular shares. Correspondingly, a reallocation of saving deposits saw money market accounts and share certificates grow at much faster rates than regular shares. Finally, with respect to market rates of interest, the yield curve has become significantly flatter over time, with its slope decreasing from 256 basis points in Q2:1994 to 21 basis points in Q1:2006. This decreasing gap between short- and long-term interest rates may further affect the allocation of funds between different credit union accounts with different maturities.

Figure 1 illustrates the changes in deposit rates over the sample period. Rates were relatively high throughout the mid to late 1990s. Share drafts and regular shares began to decline in the latter half of the 1990s, whereas the other three deposit categories peaked in 2001. With the onset of a recession and the economic fallout of September 11th, the Federal Open Market Committee cut interest rates thirteen times, and all rates fell to their lowest levels in 2004. With the economic recovery, market rates began to increase in 2004, although the rise in the mean rates for regular shares and share drafts were small. Given the large variation in interest rates and reallocation of credit union deposits suggest that it is important to include both deposit rates and market rates of interest in the subsequent modeling of credit union growth.

2 Estimation technique and methodology

We first consider the total shares of a credit union and then focus on the five types of deposits: share drafts, regular shares, money market accounts, share certificates, and retirement (IRA/Keogh) accounts. The analysis estimates separate regressions for the growth rate of total shares, g_{st}, and the growth rates of each account, g_{it}, where $i=1$, 2, 3, 4, or 5 ("1" for share drafts, "2" for regular shares, "3" for money market accounts, "4" for share certificates, and "5" for IRA/Keogh accounts) and t denotes a specific quarter. For the individual deposit growth rate estimations, we exclude all credit unions that experienced an increase or decrease in the deposit account of more than 50% in at least one period during the sample. This requirement is mainly to adjust for sample outliers exhibiting large percentage increases due to small base month deposit values.

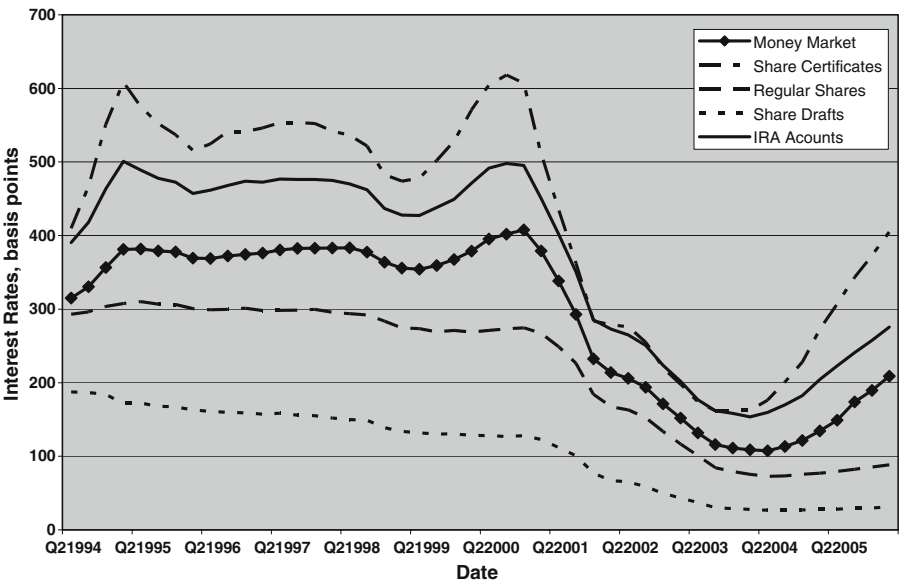

Fig. 1 Mean interest rates

The independent regressors used to explain credit union share growth can be divided into three categories: (1) size variables, (2) credit union specific variables, and (3) market specific variables. Inclusion of the first group of regressors replicates Goddard et al. (2002) and Goddard and Wilson (2005) who test for the law of proportionate effect (LPE). This theory states that the growth of a firm is a random process and is therefore unrelated to a firm's size. Following the earlier work, we include total shares and total shares squared, the latter to adjust for possible non-linearities in the size-growth relationship. Similar to the earlier empirical studies, the regressions also include a lagged growth rate term to allow for any persistence in quarterly growth.[8] As the LPE is a theory of the overall organization, we are mainly interested in the size effect on credit union total shares; however, for consistency, we include these regressors when estimating the individual deposit growth rate equations.

The credit union specific regressors test whether factors that a credit union has a direct control over affect the growth rates of the credit union's shares. Specifically, to explain share growth rates for credit union n, we use interest rate deviations from the industry's average on the same type of deposit, $(r_{int} - \overline{r}_{it})$ where i=1, …,5, n=1, 2, …, 490, t=1, …,47, and $\overline{r}_{it} = \frac{1}{N}\sum_{n=1}^{N} r_{int}$. By doing so, we are able to estimate the effects of intra-industry competition on the growth rate of credit union shares.

Finally, we include the market specific variables in the regressions to test whether overall market conditions affect growth of credit union shares. While the credit union deposit rates are relative to industry averages, the market rates directly test whether high versus low interest rates affect saving growth rates. We use the 5-year Treasury note rate, $(\text{r\_5YrNote})_t$, and the slope of the yield curve, $(\text{SlopeYldCurve})_t$, rather than separate rates on short and long-term bonds. This mitigates any multicollinearity problem, as there is little correlation between the 5-year Treasury rate and the slope of the yield curve (ρ=−0.1874).

Whereas Treasury notes are risk-free assets, an alternative specification of market rates considers instruments that embody similar risk to that of the credit union accounts. We substitute the 5-year certificate of deposit rate for the 5-year Treasury note and then calculate the slope of the yield curve using the 5-year and 3 month CD rates.[9] By including both credit union deposit rates and bank CD rates in the regression, the alternative specification also tests for inter-industry competition hypothesized by Rahman et al. (1995), Tokle and Tokle (2000), and Emmons and Schmid (2000). They argue that credit unions compete directly with commercial banks in consumer loan and deposit markets.[10]

[8] Goddard et al. (2002) also model the residuals as a function of the size variables to accommodate heteroscedasticity and to test whether variability of the growth rates depends on a size of the credit union. We estimate our model using the fixed effects specification and insert different intercepts for each credit union to accommodate possible heteroscedasticity.

[9] We obtained 5 year CD rates from Bankrate.com. The rates represent the average CD rate from 100 large banks. Data for the short term CD rates appear in the Federal Reserve historic statistics.

[10] Earlier studies, principally Rhoades (1987), Berger and Hannan (1989), and Hannan and Liang (1995) find little or no effect of credit union competition on commercial banks' behavior, implying that these two types of financial institutions operate in different market niches. However, the full service credit unions in our sample along with the liberalization of credit union membership regulations almost certainly argue for *inter*-industry competition between credit unions and banks.

For a related study that looks at the competition between banks and thrifts, see Adams et al. (2007).

For each credit union n in our sample of 490 credit unions, we estimate the total shares growth rates, g_{snt}, as a function of ten variables:

$$g_{snt} = \alpha_n + \beta_1 s_{nt} + \beta_2 s_{nt}^2 + \beta_3 g_{snt-1} + \sum_{i=1}^{5} \gamma_i (r_{int} - \bar{r}_{it}) + \lambda_1 (r\_5YrNote)_t + \lambda_2 (SlopeYldCurve)_t + \varepsilon_{snt}, \quad (1)$$

$$\forall i = 1, ..., 5, n = 1, 2, ..., 490, \text{and } t = 1, ..., 47,$$

where g_{snt} equals total shares of credit union n at time t and s_{nt}^2 is total shares squared, g_{snt-1} is a one-period lagged growth rate of total shares, $r_{int} - \bar{r}_{it}$) is the interest rate that credit union n pays on account of type i less the industry's average on the same type of account at time t, $(\text{r\_5YrNote})_t$ is the interest rate on a 5-year Treasury note at time t; and $(\text{SlopeYldCurve})_t$ is the slope of the yield curve at time t.

Specification (1) is a fixed-effect model and allows for cross-sectional effects that are measured by the intercept term, a_n, different for each credit union $n = 1, \ldots, 490$.[11] The β coefficients provide a direct test of the LPE theory with the null hypothesis being that the growth rate is independent of size (β_1 and $\beta_2 = 0$) and not persistent from one period to the next ($\beta_3 = 0$). The γ coefficients illustrate the effect of credit union specific deposit rates on total share growth. Estimates of γ_i imply whether increases in deposit rate i (relative to the industry average) have an independent effect on credit union size. Finally, the λ coefficients measure how market conditions influence credit union total shares.

In addition to total share growth rates, we estimate a set of regressions for the five types of deposits. Again we specify a fixed-effect model similar to Eq. 1 of the form:

$$g_{int} = \alpha_n + \beta_1 s_{nt} + \beta_2 s_{nt}^2 + \beta_3 g_{int-1} + \sum_{i=1}^{5} \gamma_i (r_{int} - \bar{r}_{it}) + \lambda_1 (r\_5YrNote)_t + \lambda_2 (SlopeYldCurve)_t + \varepsilon_{int}, \quad (2)$$

$$\forall i = 1, ..., 5, n = 1, 2, ..., 490, \text{and } t = 1, ..., 47,$$

where g_{int} equals the growth rate of deposit i for credit union n in period t. In these regressions, we focus on the γ coefficients and examine the effect of rate changes on own account shares as well as the extent of substitution between the different type saving accounts.

3 Results

Table 3 presents the regression results for the growth rate of credit union total shares. The β coefficients test for the Law of Proportionate Effect. In the first regression, the

[11] While specification (1) allows for different intercepts, a_n, for each credit union $n = 1, \ldots, 490$, we assume that the slope coefficients, β_1, β_2, β_3, γ_1, γ_2, γ_3, γ_4, γ_5, λ_1, and λ_2 are time-invariant and also invariant across credit unions.

[12] Reported regressions use the credit union's *average* deposit rate for the quarter minus the industry average for the quarter. This average deposit rate is the simple average of the rates at the end of periods t and $t-1$. End of quarter t deposit rates produce similar results and are available upon request.

Table 3 Determinants of growth rates of credit union total shares Q2:1994–Q1:2006

Dependent variable	Regressors									
	Total shares β_1	(Total shares)^2 β_2	Lagged growth β_3	Rate on share drafts γ_1	Rate on regular shares γ_2	Rate on money market γ_3	Rate on share certificates γ_4	Rate on IRA γ_5	Rate on 5-year treasury note/CD λ_1	Slope of the yield curve λ_2
One-way fixed effects model (no. cross-sections=490, time series length=47)										
(*a*) Growth rate of total shares	0.0004[b]	-0.0004×10^{-4}[b]	−0.0905[a]	−0.0224	0.4580[a]	0.5324[a]	1.9121[a]	0.0841[a]	−0.0364[b]	−0.1209[a]
(using Treasury rates for λ_1 and λ_2)	(2.44)	(−2.32)	(−13.86)	(−0.55)	(6.85)	(11.58)	(33.37)	(2.67)	(−2.17)	(−5.03)
(*a′*) Growth rate of total shares	0.0003[c]	-0.0003×10^{-4}[c]	−0.0948[a]	−0.0177	0.4810[a]	0.5260[a]	1.9355[a]	0.0859[a]	−0.0490[c]	−0.0062
(using CD rates for λ_1 and λ_2)	(1.84)	(−1.87)	(−14.57)	(−0.44)	(7.23)	(11.43)	(34.06)	(2.72)	(−1.83)	(−0.26)
(*b*) Growth rate of total shares	0.0005[a]	0.0004×10^{-4}[a]	−0.0945[a]	−0.0170	0.4916[a]	0.5276[a]	1.9474[a]	0.0872[a]	–	–
	(3.41)	(−2.92)	(−14.59)	(−0.42)	(7.41)	(11.47)	(34.47)	(2.76)		

t Statistics are reported in parentheses below coefficient estimates.
[a] Coefficient is statistically significant at 1% level (critical value of *t* statistics is 2.58).
[b] Coefficient is statistically significant at 5% level (critical value of *t* statistics is 1.96).
[c] Coefficient is statistically significant at 10% level (critical value of *t* statistics is 1.65).

β_1 estimate is positive and statistically significant and suggests that large credit unions grow faster than small credit unions. However, a negative and statistically significant β_2 implies that growth increases with size, but at a decreasing rate. Finally, a negative β_3 coefficient implies that credit unions experiencing above average growth of total shares in period $(t-1)$ grow slower in period t.

The above results are similar to the empirical findings in previous studies. Examining 7,603 credit unions over the period 1990–1999, Goddard et al. (2002) find strong evidence of a size effect based on total assets. Goddard and Wilson (2005) also find that larger credit unions grow faster in their study of 9,564 credit unions over the period 1992–2001. With respect to the sign of β_3 and persistence of growth, Goddard et al. (2002) provide evidence of negative serial correlation for total share growth rates.

The γ coefficients illustrate the effect of credit union specific deposit rates on the growth of total shares. The rate on share drafts is small and statistically insignificant. Whether share draft rates are unimportant for the growth rates of all deposit accounts or reflects offsetting substitution effects between accounts is a matter for the next set of regressions. However, the net result is that if a credit union increases its share draft rate relative to its competitors, it will have virtually no effect on total shares of the institution.

The estimated coefficients for rates on regular shares and money market accounts are positive and statistically significant. For both accounts, if a credit union increases its rate 100 basis points relative to the industry average, its growth rate in total shares will increase by approximately 0.5%. The effect of the rate on share certificates is larger than for either of the other two time deposits. For share certificates, a 100 basis point increase will increase the credit union's total share growth rate nearly 2%. The fact that the effect of share certificate rates on total share growth is four times that of changes in rates on regular shares or money market accounts is likely due to the fact that share certificate accounts are long term deposits. Credit union members can lock in generous share certificate rates for a term of more than 1 year. Finally, rates paid on IRA deposits have little effect on total share growth. While statistically significant, a 100 basis point change will increase total shares by only 0.08%. This small effect may be due to the fact that IRA deposits are subject to annual limits for the purpose of tax deferred benefits. Moreover, individuals may have a yearly target amount to put away for retirement, and therefore, these accounts may be relatively insensitive to (own) interest rate changes.

The last set of variables is market determined interest rates. The small, negative values for both the 5-year Treasury note and slope of the yield curve suggest that market rates of interest have little independent effect on credit union total shares growth. This result holds for the alternative specification (regression a') that uses CD rates instead of Treasury yields. Because market interest rates (both from Treasury securities and CDs) have little effect on total share deposits, the final regression in Table 3 reports the results without estimating λ coefficients. As expected, there is little change to the estimated coefficients of the remaining independent variables.

Table 4 presents the regressions for individual account growth rates.[13] Of particular interest are the effect of a deposit rate on its own share growth and the

[13] Table 4 only reports regressions that use Treasury data to estimate market rate coefficients (λ). Given that there is high correlation between Treasury and CD rates, the individual account regressions using CD rates instead of Treasuries are qualitatively similar to those reported in Table 4 and may be obtained from the authors.

Table 4 Determinants of growth rates of individual accounts Q2:1994–Q1:2006

Dependent variable	No. cross-sections	Regressors									
		Total shares β_1	(Total shares)2 β_2	Lagged growth β_3	Rate on share drafts γ_1	Rate on regular shares γ_2	Rate on money market γ_3	Rate on share certificates γ_4	Rate on IRA γ_5	Rate on 5-year Treasury note λ_1	Slope of the yield curve λ_2
1(a). Growth rate of share drafts	413	0.0037^{a} (6.37)	-0.0003×10^{-3a} (−5.24)	-0.4349^{a} (−66.44)	0.0748 (0.63)	-0.6773^{a} (−3.53)	-0.3214^{b} (−2.45)	0.0158 (0.10)	−0.1075 (−1.17)	0.3280^{a} (6.73)	-0.3162^{a} (−4.60)
1(b). Growth rate of share drafts	413	0.0014^{a} (2.72)	-0.0009×10^{-4a} (−2.16)	-0.4330^{a} (−66.15)	0.0876 (0.73)	-0.7707^{a} (−4.04)	-0.3547^{a} (−2.70)	−0.1230 (−0.75)	−0.1073 (−1.17)	–	–
2(a). Growth rate of regular shares	441	0.0014^{a} (4.14)	-0.0009×10^{-4a} (−3.11)	-0.0871^{a} (−12.28)	0.0591 (0.81)	1.9475^{a} (16.10)	-0.8210^{a} (−9.84)	0.8602^{a} (8.29)	0.0730 (1.27)	-0.5627^{a} (−18.39)	1.0541^{a} (23.53)
2(b). Growth rate of regular shares	441	0.0053^{a} (17.50)	-0.0004×10^{-3a} (−12.85)	-0.0216^{a} (−3.11)	0.0572 (0.76)	1.9639^{a} (15.98)	-0.6562^{a} (−7.69)	1.0308^{a} (9.84)	0.0716 (1.22)	–	–
3(a). Growth rate of money market accounts	391	-0.0027^{a} (−6.63)	0.0001×10^{-3a} (4.73)	0.3104^{a} (43.65)	-0.1834^{c} (−1.86)	−0.0902 (−0.54)	3.4340^{a} (28.00)	2.1734^{a} (15.50)	0.0144 (0.19)	-0.2110^{a} (−5.16)	0.2286^{a} (3.87)
3(b). Growth rate of money market accounts	391	-0.0014^{a} (−4.14)	0.0009×10^{-4a} (2.61)	0.3188^{a} (45.76)	-0.1921^{c} (−1.94)	−0.0091 (−0.06)	3.4056^{a} (27.75)	2.2593^{a} (16.34)	0.0182 (0.24)	–	–
4(a). Growth rate of share certificates	373	0.0013^{a} (2.97)	-0.0008×10^{-4b} (−2.09)	0.2848^{a} (38.86)	-0.3258^{a} (−3.03)	−0.2278 (−1.28)	-0.6907^{a} (−5.80)	2.6900^{a} (17.85)	−0.1035 (−1.27)	0.9119^{a} (20.60)	-1.1044^{a} (−17.74)
4(b). Growth rate of share certificates	373	-0.0038^{a} (−9.74)	$0.0003\cdot10^{-3a}$ (7.38)	0.3429^{a} (47.48)	-0.1750^{c} (−1.59)	-0.6302^{a} (−3.49)	-0.8181^{a} (−6.71)	2.0146^{a} (13.34)	−0.0300 (−0.36)	–	–
5(a). Growth rate of IRA accounts	409	0.0001 (0.55)	-0.0004×10^{-5} (−0.18)	-0.1029^{a} (−14.24)	0.0269 (0.45)	0.2300^{b} (2.36)	0.2603^{a} (3.93)	1.5433^{a} (18.55)	0.4428^{a} (9.40)	-0.1258^{a} (−5.13)	0.0258 (0.74)
5(b). Growth rate of IRA Accounts	409	0.0008^{a} (3.69)	-0.0005×10^{-4b} (−2.37)	-0.1008^{a} (−13.98)	0.0300 (0.49)	0.2783^{a} (2.88)	0.2678^{a} (4.04)	1.6111^{a} (19.63)	0.4398^{a} (9.33)	–	–

t Statistics are reported in parentheses below coefficient estimates.

[a] Coefficient is statistically significant at 1% level (critical value of *t* statistics is 2.58).

[b] Coefficient is statistically significant at 5% level (critical value of *t* statistics is 1.96).

[c] Coefficient is statistically significant at 10% level (critical value of *t* statistics is 1.65).

substitution effect between different savings accounts. We therefore focus our attention on the estimated γ coefficients in Table 4.

The deposit rate on share drafts has no effect on its own share growth. The estimated coefficient is small and nearly equals 0. Moreover, it is the only deposit rate that is statistically insignificant with respect to its own growth rate. This strongly supports the notion that people use share draft accounts mainly for transaction purposes. Because liquidity is highly valued, there is little in the way of deposit rates that will induce credit union members to change their share draft holdings.

Looking at other deposit rates, the less liquid the account, the lower the substitution effect. An increase of 100 basis points in the regular shares deposit rate will decrease share draft growth 0.68%, whereas a similar increase in money market rates cause share drafts to fall only 0.32%. The coefficients on the rates of the least liquid accounts, share certificates and IRAs, are statistically insignificant and have no effect on share draft growth. These results highlight the liquidity return tradeoff; credit union members are willing to hold less liquid assets in place of share drafts only if compensated for the marginal cost of converting the funds into cash.

Turning to regular shares, an increase in regular share rates of 100 basis points will increase a credit union's deposit growth rate nearly 2%. A rise in money market rates of 100 basis points would cause regular shares to fall 0.82% and suggests that money market accounts are a close substitute for regular shares saving. Finally, while rates on share drafts and IRAs have no effect on regular share deposits, a 100 basis point increase in share certificates leads to an *increase* in regular shares of 0.86%. A rise in share certificate rates may cause an increase in regular share deposits either because of a wealth effect or it may be due to new account activity. With high certificate rates, new customers may join a credit union, and it is customary to open a regular shares account first.

Money market accounts have the largest change of all deposits with respect to their own rates. A 100 basis point increase will increase money market growth 3.43%. Similar to regular shares, a boost in share certificate rates also increase money market accounts and again suggests that share certificates complement other account activity primarily used for savings. Increases in share drafts, regular shares and IRAs have virtually no effect on money market growth rates.

Moving to Table 4(a), an increase of 100 basis points on share certificates cause deposit growth to rise 2.69%. There is some substitution of money market shares and a smaller effect of share draft rates on share certificate deposits. Rates on regular shares and IRAs have no effect on the growth rate of share certificates.

The last account type is IRAs. With the exception of share drafts, the smallest change in deposit growth with respect to changes in own interest is for IRAs. This further supports the notion that IRA deposits are determined mainly by tax limitations as well as being a function of long-term retirement considerations. Deposit rate increases of 100 basis points increase IRA growth by only 0.44%. Once more share certificates appear to complement IRA activity, perhaps owing to new account activity. Rates on share drafts, regular shares and money market accounts have little effect on IRA growth.

Generally, the alternative specifications, without market interest rates, yield similar results to those just discussed. For only two type deposits, regular shares and share certificates are the coefficients greater than 0.5 in absolute value. Moreover,

the signs on 5-year Treasuries and slope of the yield curve are opposite one another for both accounts. This suggests that if rates and the slope of the yield curve are high, the two effects will be largely offsetting, and market rates would have little separate effect on deposit rate growth.

4 Conclusions

Legislation over the last 30 years has led to significant changes in the credit union industry. With the liberalization of membership requirements and new financial products, the modern credit union now offers a full range of financial services. Borrowing from Walter (2006), this is "not your father's credit union."

Given the recent evolution of credit unions, there has been little empirical work analyzing the growth of individual deposit accounts. While others have considered determinants of total share growth, we extend the analysis by also examining the growth rate of five individual share accounts. The sample includes 490 relatively large credit unions that offered share drafts, regular shares, money market accounts, share certificates and IRAs over the period 1994–2006.

The results suggest that share certificate rates have the biggest impact on total share growth, while regular share and money market rates have a more modest effect on credit union growth. Changes in share draft rates and the returns to IRAs have little impact on credit union total shares. These results imply that credit unions trying to grow their share deposits get the biggest return from increasing share certificate rates; attracting new shares by raising rates on regular shares or money market accounts will only be moderately successful.

The results for total shares mask the substitution between accounts. Estimation of individual account growth rates illustrates the different definitions of money and reveals the tradeoff between the more liquid forms of savings and the higher returns of less liquid accounts. At the one extreme are share drafts, demand deposits primarily used for transaction purposes. These deposits are insensitive to changes in their own rates; moreover, there is limited substitution with other accounts. Essentially, credit union members will only transfer share draft deposits to other accounts if compensated for the additional cost of later converting the funds into cash when needed for a transaction.

At the other extreme are IRA deposits. The growth rate of these illiquid accounts that carry penalties for early withdrawal change only a little when deposit rates increase. Further, when deposit rates of other accounts increase, there is virtually no effect on IRA deposits.

A final result is that share certificates appear to be a complement to the other deposit accounts. This may be the result of individuals shopping around for high CD rates that can be earned for long periods of time. The high rates may induce new memberships, thereby increasing the deposit growth rates of all accounts. Ultimately offering high share certificate rates appears to be the most effective way for credit unions to stimulate total share growth.

While this analysis is the first to examine the effect of deposit rates on credit union shares, future research might consider at least two related issues. The first is to examine the separate impact of loan rates on credit union share growth. To the extent

that only members can borrow from a credit union, shares will increase if new members join to take advantage of competitive loan rates. A second line of future research is to compare credit union share growth with the business activity of subchapter-S (sub-S) banks. Sub-S corporations do not pay corporate income tax on income paid to shareholders and thus avoid double taxation of dividends. In sharing similar tax advantages with credit unions, sub-S banks are able to compete directly with credit unions by offering comparable deposit rates. Thus, future research might examine to what extent sub-S banks compete directly with credit unions for deposits as well as for loans.

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