COMMISSIONED RESEARCH

The Value of Federal Home Loan Bank Membership to Credit Unions

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Over the past 30 years, around 1,400 credit unions have joined the Federal Home Loan Bank System (FHLB), which provides low-cost liquidity to its members to invest in local needs including housing, jobs and economic growth. What value have these credit unions received from their membership?

EXECUTVE SUMMARY

Analysis of call report data from 1994 to 2024 found four key findings about credit unions that were members of Federal Home Loan Banks (FHLB):

1. They tended to grow loans and total assets.
2. They generally had more flexible balance sheets, with higher loan to share ratios, increased borrowing capacity and total borrowings, and increased access to capital markets through selling more first mortgages.
3. They achieved this additional growth and flexibility without changing their portfolio risk: the analysis found no statistically significant change in delinquencies or net charge-offs.
4. When disaggregated, impacts were found to be most pronounced in smaller credit unions. Credit unions with more than $50 million in assets saw increases in borrowings and expanded mortgage portfolios, while earnings or secondary market participation, on average, were unchanged.

Overall, the findings show that the FHLB System is an important mechanism that provides credit unions access to liquidity and helps them increase mortgage lending without harming portfolio quality.

BACKGROUND & METHODOLOGY

The Federal Home Loan Bank System was created by the Federal Home Loan Bank Act of 1932 to provide liquidity to its members to support housing and community development projects. As of 2024, there are 1,623 credit unions that are Federal Home Loan Bank members.

This research project aims to investigate the impact of FHLB membership on credit union growth, returns, liquidity and risk. It attempts to answer the general questions: How does FHLB membership affect credit unions' balance sheets, performance and growth? Does FHLB membership affect credit union liquidity and portfolio quality? How is credit union mortgage lending impacted by FHLB membership? Are there differences in how small, medium and large credit unions utilize FHLB funds?

To answer these questions, the analysis utilizes call report data from 1994 to 2024 to examine the impact of FHLB membership on various indicators of credit union risk and performance based on the National Credit Union Administration's (NCUA's) CAMEL ratings. We include at least 1-2 indicators from each of the main areas of Capital Adequacy, Asset Quality, Earnings and Liquidity.

However, we note that the NCUA is mainly focused on reducing risk and preventing credit union failure, whereas the FHLB System and credit unions are more focused on growth and expanding mortgage lending and home ownership. Therefore, we include additional indicators of credit union growth and mortgage lending, such as mortgage growth and 1st mortgages sold to the secondary market. The complete list of outcome variables appears in Appendix Table A.

FHLB MEMBERS VS NON-MEMBERS

First, let's examine how FHLB member credit unions perform compared to non-FHLB credit unions. As of year-end 2023, 1,554 of the 4,626 credit unions were members of the FHLB, almost exactly one-third (33.5%) of credit unions. We would expect to see significant differences between FHLB member credit unions and non-members, since around 30% of credit unions do not engage in any mortgage lending and are therefore unlikely to apply for FHLB membership. FHLB member credit unions offer mortgages and have achieved a certain level of assets and overall sophistication in

their operations. Thus, perhaps not surprisingly, FHLB credit unions tend to be much larger than non-FHLB credit unions, with the average asset size of FHLB credit unions being $1.31B compared to $78M for non-FHLB credit unions.

Figure 1 displays summary statistics comparing FHLB member credit unions to non FHLB credit unions for these eleven variables as of year-end 2023. FHLB members outperformed their counterparts in eight of the eleven metrics: total loans, membership and deposit growth, ROA, loan-to-share ratio, delinquencies, sold mortgages and borrowings. While FHLB members have lower capital ratios, it should be noted that FHLB members average capital ratio (10.98%) is well above the 7% guideline for safety and soundness.

FIGURE 1: FHLB MEMBERS VS NON-MEMBERS

	All CUs Average	All CUs Median	FHLB Members Average	FHLB Members Median	Non-FHLB Members Average	Non-FHLB Members Median
Total Loans (millions)	$351	$31	$949	$266	$47	$12
Loan Growth	7.47%	6.23%	5.64%	5.53%	8.45%	6.70%
Membership Growth	0.21%	0.00%	1.56%	1.29%	−0.51%	−0.61%
Deposit Growth	−2.43%	−2.89%	0.53%	−0.31%	−4.03%	−4.48%
ROA	0.63%	0.61%	0.65%	0.62%	0.61%	0.60%
Loan Share Ratio	69.68%	71.88%	81.21%	83.07%	63.74%	63.83%
Capital Ratio	13.31%	11.70%	10.98%	10.60%	14.57%	12.80%
Delinquency Ratio	0.97%	0.60%	0.73%	0.59%	1.14%	0.60%
Net Chargeoff Ratio	0.38%	0.24%	0.39%	0.29%	0.39%	0.20%
1st Mortgages Sold (millions)	$5.68	$0	$16.12	$0	$0.36	$0
Total Borrowing (millions)	$29.78	$0	$84.78	$5	$1.75	$0

Notes: Data as of year-end 2023. Summary statistics averaged across credit unions and do not represent industry aggregates. Growth variables are annualized growth over previous year.

But 2023 is just one year. When we look over the longer term, as in Figure 2, we see a clearer picture. FHLB members experienced dramatic growth in average loan portfolios from under $200 million in 1994 to nearly $1 billion as of 2024. On the other hand, non FHLB credit unions have mostly stagnated at under $50 million in average loans outstanding. Figures 3 and 4 show similar trends for average total assets and average mortgages outstanding.

FIGURE 2: AVERAGE LOANS OUTSTANDING PER CREDIT UNION
(1994–2024)

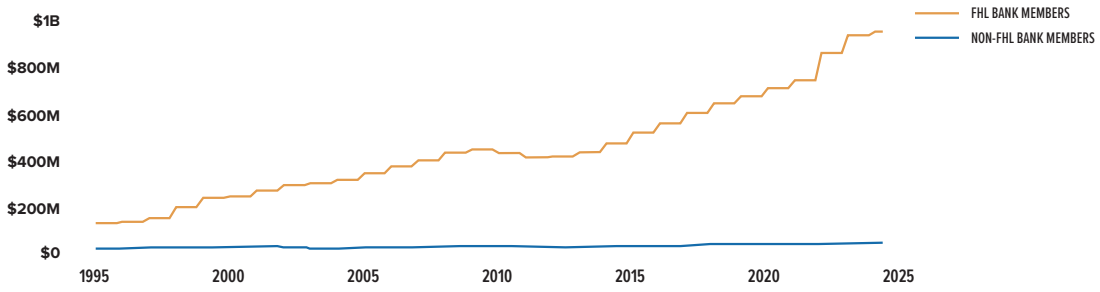


FIGURE 3: AVERAGE ASSETS PER CREDIT UNION
(1994–2024)

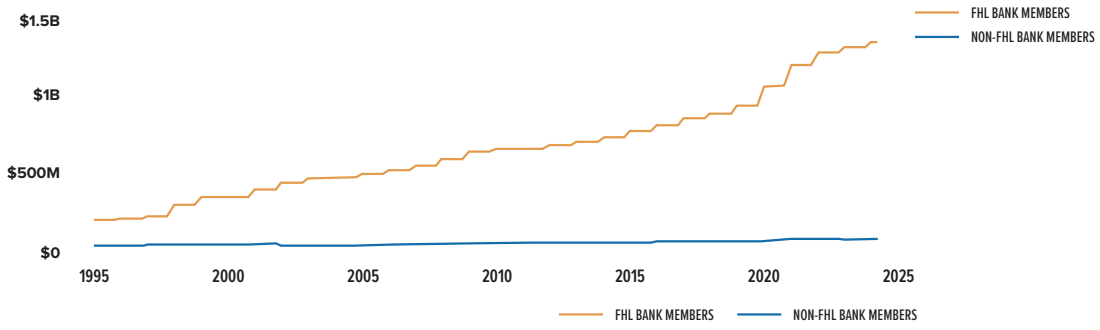
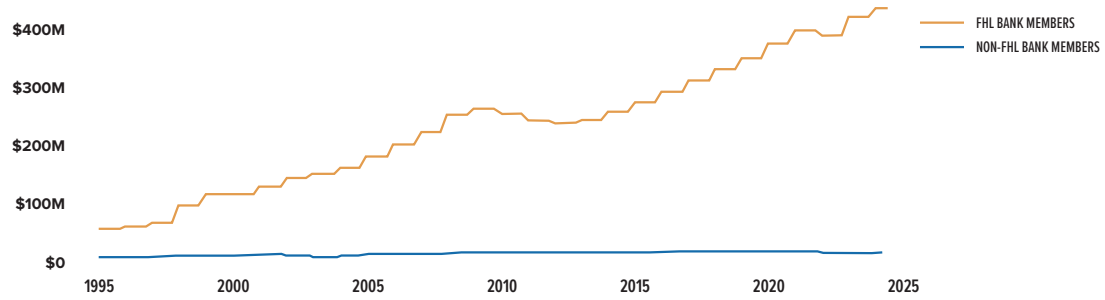


FIGURE 4: AVERAGE MORTGAGES OUTSTANDING PER CREDIT UNION

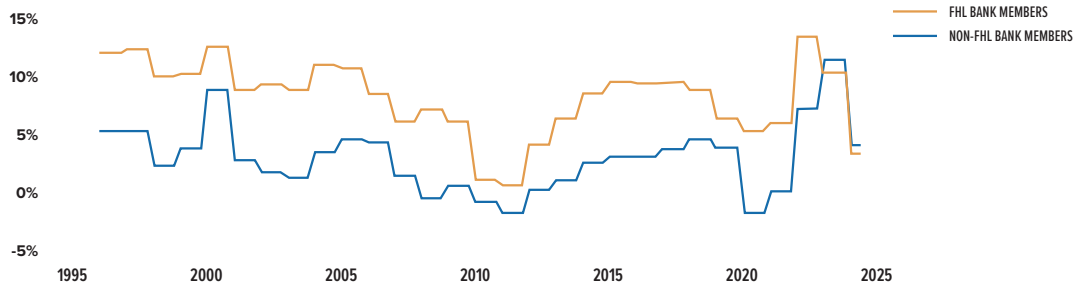
(1994–2024)



FHLB credit unions have also grown faster in terms of loans, members and deposits; Figure 5 shows the average annual growth rate for loans.

FIGURE 5: AVERAGE ANNUAL LOAN GROWTH PER CREDIT UNION

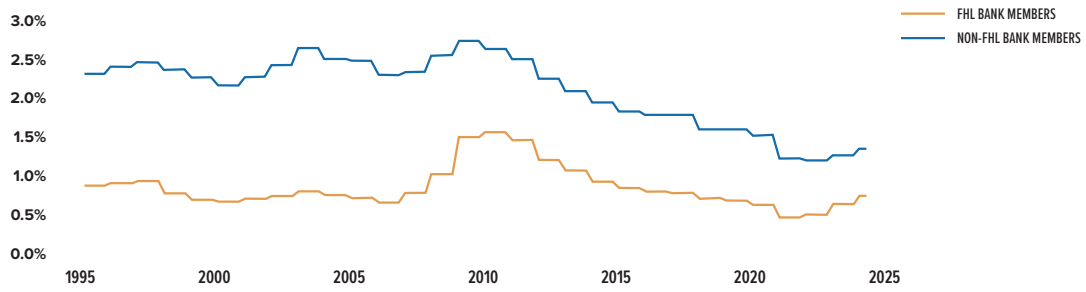
(1994–2024)



FHLB member credit unions also show a higher ROA and lower delinquency and net charge-off ratios. Figure 6 shows that the gap in delinquency narrowing, but still large.

FIGURE 6: AVERAGE DELINQUENCY RATIO PER CREDIT UNION

(1994–2024)



As many smaller credit unions struggle to grow and lend, it is not surprising that FHLB member credit unions—who tend to be much larger—have higher loan-share ratios and lower capital ratios, on average.

FIGURE 7: AVERAGE CAPITAL RATIO PER CREDIT UNION

(1994–2024)

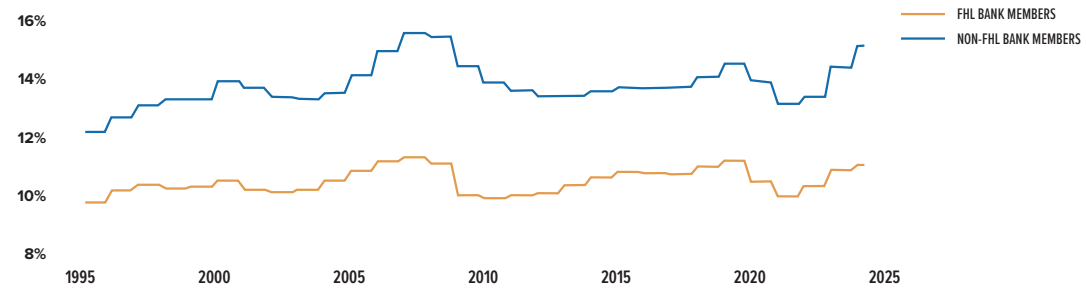
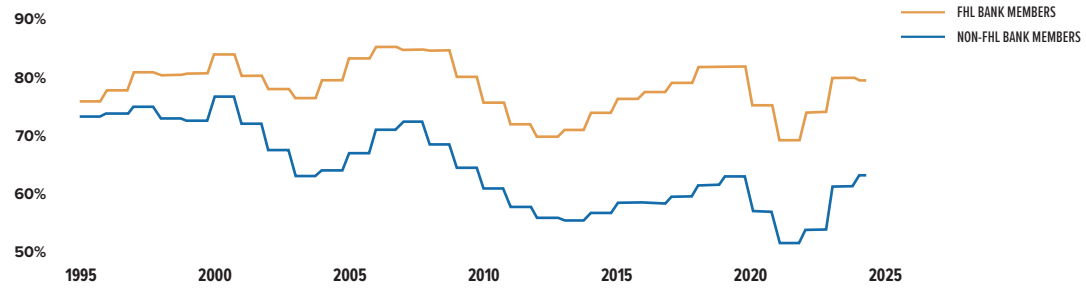


FIGURE 8: AVERAGE LOAN-SHARE RATIO PER CREDIT UNION

(1994–2024)



Finally, FHLB credit unions are significantly more likely to borrow relative to non FHLB credit unions. The latter borrow, on average, $1.8 million per credit union compared to $84.8 million at FHLB member credit unions.

FHLB MEMBERS BEFORE & AFTER

Since FHLB member credit unions are so distinct from non-member credit unions, let's examine what happens to a member credit union when it joins the FHLB system. We do this by comparing credit unions before and after they join. Figure 9 displays summary statistics of FHLB member credit unions before and after membership.

FIGURE 9: BEFORE & AFTER FHLB MEMBERSHIP

	PRE-FHLB MEMBERSHIP			POST-FHLB MEMBERSHIP		
	Mean	S.D.	Obs.	Mean	S.D.	Obs.
Total Loans (millions)	$125	$269	71,567	$565	$2,220	95,835
Loan Growth	7.5%	10.6%	65,992	7.8%	10.1%	94,923
Membership Growth	2.5%	6.6%	66,000	2.6%	6.5%	94,923
Deposit Growth	7.2%	7.6%	65,999	6.9%	7.8%	94,923
ROA	0.77%	0.81%	71,494	0.68%	0.69%	95,833
Loan Share Ratio	71.0%	16.8%	71,565	77.3%	17.2%	95,835
Capital Ratio	11.1%	3.1%	69,667	10.6%	2.6%	95,628
Delinquency Ratio	0.95%	0.96%	71,558	0.82%	0.94%	95,835
Net Chargeoff Ratio	0.51%	0.77%	71,489	0.47%	0.54%	95,833
1st Mortgages Sold (millions)	$3.2	$20	71,567	$22.0	$154	95,835
Total Borrowing (millions)	$3.1	$54	71,567	$34.0	$290	95,833

Notes: Data is from 1994 - 2024. Summary statistics averaged across credit unions and quarters, and do not represent industry aggregates. Growth variables are annualized growth over previous year.

There are a few notable trends: First, credit unions that join the FHLB System become significantly larger after joining: they have an average loan portfolio of $565 million compared with $125 million prior to membership, on average. However, note that all credit unions were growing during this period, so it is yet unclear whether this growth is due to FHLB membership or other factors, such as improved economic conditions, new marketing strategies, or greater demand for loans.

Second, indicators of growth are fairly similar pre- and post-FHLB membership. For instance, annual loan and membership growth for credit unions after joining the FHLB are 7.8% and 2.6%, respectively, versus 7.5% and 2.5% prior to joining.

However, FHLB members have significantly lower ROA after FHLB membership (0.68% versus 0.77%), a higher loan-share ratio (77.2% versus 71.0%), and lower capital (10.6% versus 11.1%). They also have lower delinquency and net charge-off ratios of 0.82% and 0.47%, respectively, versus 0.95% and 0.51% prior to joining.

Finally, we see clear and large differences in first mortgages sold to the secondary market and total borrowing: FHLB members, on average, sell $22.0 million in first mortgages to the secondary market and borrow $34.0 million, relative to just $3.2 million and $3.1 million, respectively, for FHLB credit unions prior to becoming members.

Nonetheless, as indicated, this analysis is only suggestive and does not control for factors that affect all credit unions equally over time, such as economic conditions, changes in consumer demand, the federal funds rate, or many other potential variables.

For example, it could be that ROA is lower at credit unions after they join the FHLB System because many credit unions joined prior to the 2007–2008 financial crisis when all credit unions experienced lower ROA.

Therefore, the subsequent analysis uses more sophisticated statistical techniques to attempt to control for these factors, as well as for observable differences between credit unions. While the details are in the Appendix, the general approach is to compare credit unions that join the FHLB system to similar credit unions prior to joining, while accounting for general factors that affect all credit unions (e.g., economic growth and the federal funds rate), and important differences between credit unions (such as asset size, earnings and portfolio quality). This allows us to more clearly identify the impact of FHLB membership on credit unions and distinguish it from other variables that may also influence credit union growth, earnings, risk and liquidity.

TAKING A DEEPER LOOK

We start with an initial regression analysis for all 1,617 FHLB member credit unions that were members of the FHLB system at some point from 1994 to 2024. We compare credit unions that join a FHLB with observably similar credit unions that did not yet become FHLB members but later joined. We

also account for general economic trends and other factors that affect all credit unions equally. (Table 4 in the Appendix).

The regression analysis indicates that after joining the FHLB system, FHLB member credit unions have loan portfolios that are 6.7% larger, relative to observably similar credit unions, and accounting for general economic trends and other factors that affect all credit unions equally. While this is useful information, we can also identify when and how the increase happens during the membership experience.

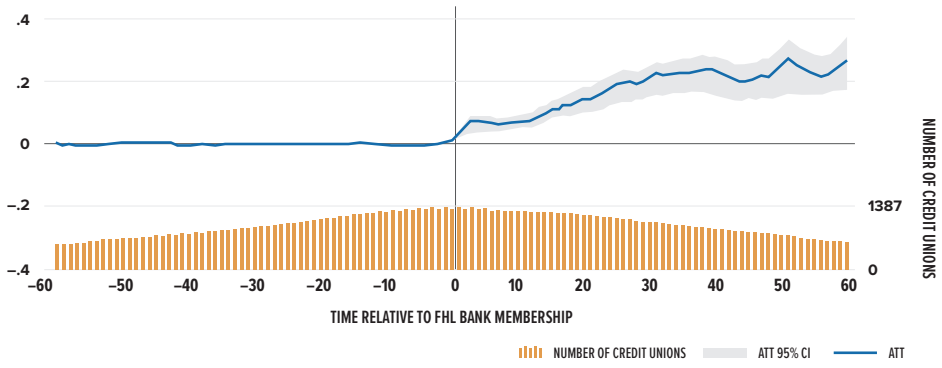
The following graph provides a visual analysis of the synthetic control method (see Appendix) and shows how the impact of FHLB membership grows or fades over time.

To read the graph, note that he horizontal axis represents quarters before and after FHLB membership, and the blue bars show the number of credit unions that were impacted during that period. The dark line is the estimated impact of FHLB membership, and the shaded area is the 95% confidence interval. If the shaded area of the graph remains above the horizontal axis at zero, there is a statistically significant impact of FHLB membership on the outcome variable.

Thus we see that, after joining the FHLB, credit unions experience an increase in loan portfolios of approximately 10% 4 to 5 years (16–20 quarters) after joining. Moreover, this impact appears to grow over time, to around 20% after 10 years (40 quarters). Although not the focus of this project, we also find a very large and statistically significant increase in commercial lending at FHLB member credit unions after joining.)

FIGURE 10: ESTIMATED ATT* OF FHLB MEMBERSHIP ON LOANS OUTSTANDING

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

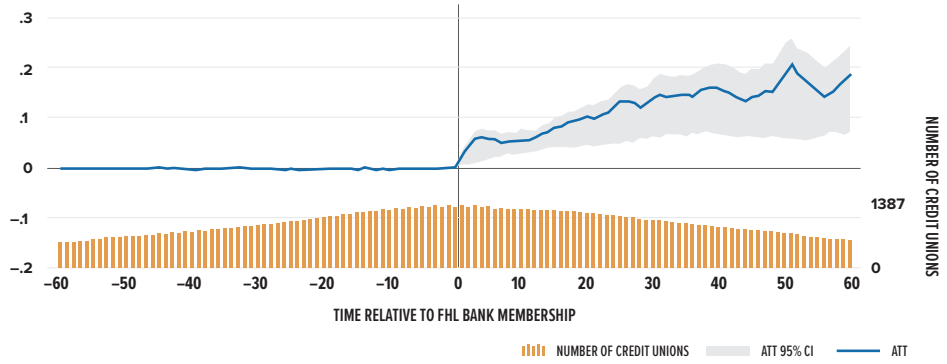


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

From the regression analysis, we find that FHLB member credit unions also have 2.2% more total assets, although this result is only significant at the 90% confidence level. The synthetic control method shows that they experience 15% more assets after 8–10 years.

FIGURE 11: ESTIMATED ATT* OF FHLB MEMBERSHIP ON ASSETS

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

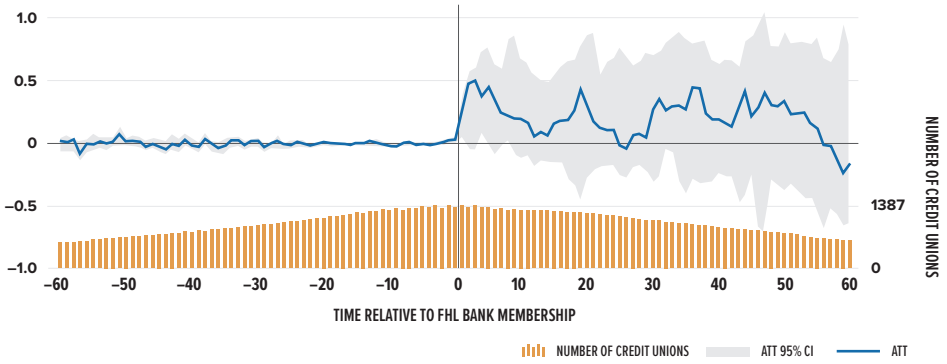


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

Figure 12 demonstrates that there are no statistically significant differences in mortgages outstanding; however, as Figure 13 shows, there is a very large and statistically significant increase in first mortgages sold to the secondary market among credit unions that join the FHLB system.

FIGURE 12: ESTIMATED ATT* OF FHLB MEMBERSHIP ON MORTGAGES OUTSTANDING

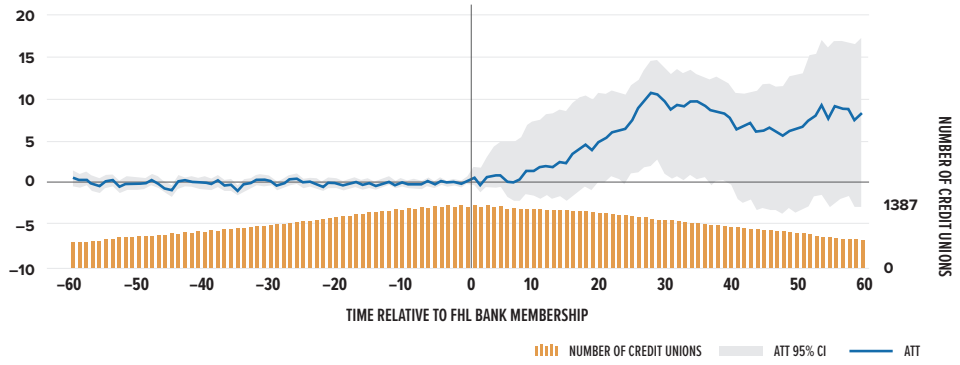
GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024



** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

FIGURE 13: ESTIMATED ATT* OF FHLB MEMBERSHIP ON FIRST MORTGAGES SOLD

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024



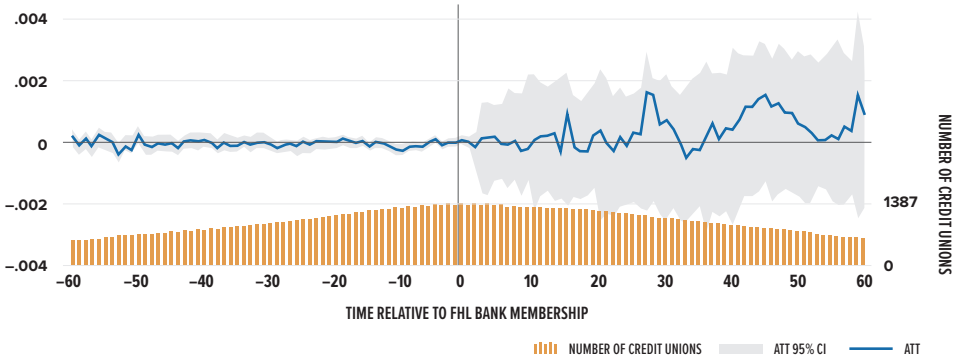
** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

In fact, it appears that the FHLB program encourages credit unions to engage more with the secondary market. For example, prior to FHLB membership, only 29.6% of the credit unions in the sample sold first mortgages to the secondary market, whereas after FHLB membership, 55.6% of these credit unions sold first mortgages to the secondary market. In addition, mortgages sold at FHLB credit unions increase dramatically.

This may also explain why we see no significant increase in mortgages outstanding for FHLB members—instead of increasing total mortgage balances (which may increase interest rate risk), it appears that FHLB member credit unions increase mortgage lending but sell the additional mortgages to the secondary market.

FIGURE 14: ESTIMATED ATT* OF FHLB MEMBERSHIP ON ROA

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

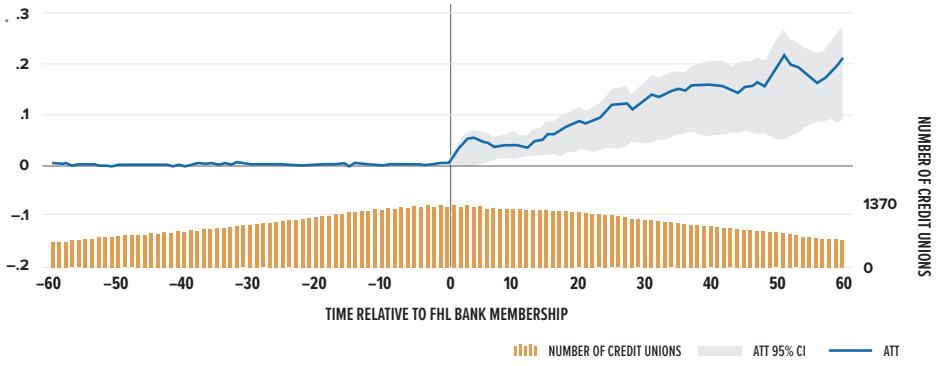


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

While the regression analysis shows no statistically significant changes in ROA or net income growth for FHLB member credit unions after joining the FHLB System, the synthetic control method shows that credit unions do experience an increase in net income that mirrors the timeline of an overall increase in lending.

FIGURE 15: ESTIMATED ATT* OF FHLB MEMBERSHIP ON NET INCOME

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

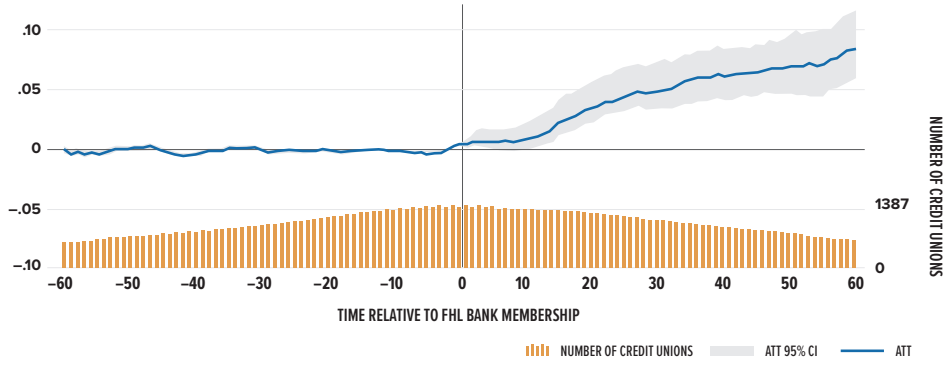


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

Unsurprisingly, FHLB members experience an increase in the loan-share ratio of 3.58%, with the increase beginning around three years into membership, before reaching about 5.00% seven years in.

FIGURE 16: ESTIMATED ATT* OF FHLB MEMBERSHIP ON LOAN-TO-SHARE RATIO

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

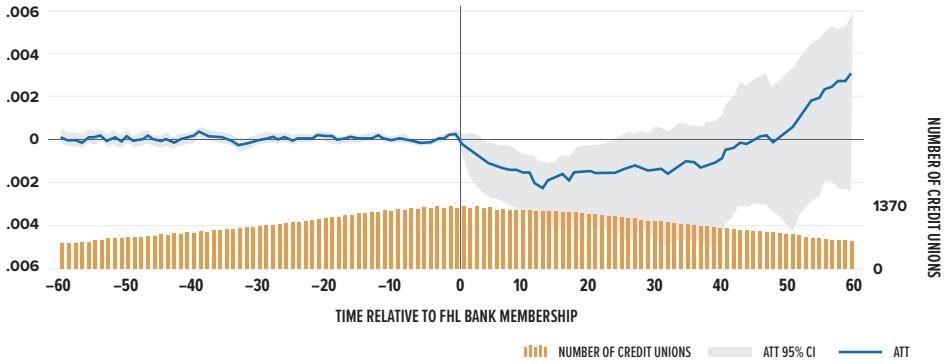


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

Credit unions experience a modest decrease in the capital ratio of 0.35%, but an initial dip in the capital ratio may only be a temporary phenomenon, as the capital ratio for FHLB member-credit unions appears to recover 4 to 5 years after FHLB membership.

FIGURE 17: ESTIMATED ATT* OF FHLB MEMBERSHIP ON CAPITAL RATIO

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

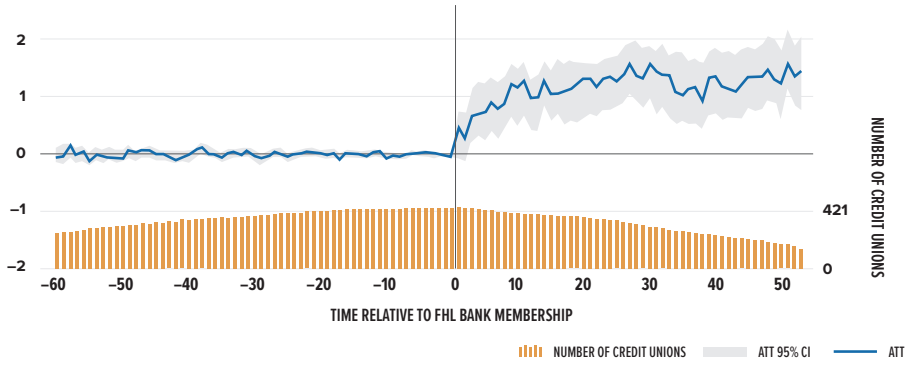


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

Moreover, we find a very large increase in total borrowing among FHLB member-credit unions of many thousands of percent. Like with secondary market participation, FHLB System membership appears to encourage credit unions to borrow and increases liquidity. For example, prior to FHLB membership, only 9.6% of the sample credit unions had any borrowing whatsoever. However, after FHLB membership, nearly half (45.4%) of FHLB member credit unions borrowed. This makes perfect sense given the FHLB System's ability to offer low-cost funds to credit unions and indicates that many credit unions take advantage of this option to increase liquidity and mortgage lending. This also indicates that credit unions generally find FHLB liquidity to be a better option than other sources of borrowing that might have higher interest rates, or more fees and requirements.

FIGURE 18: ESTIMATED ATT* OF FHLB MEMBERSHIP ON TOTAL CU BORROWING

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024

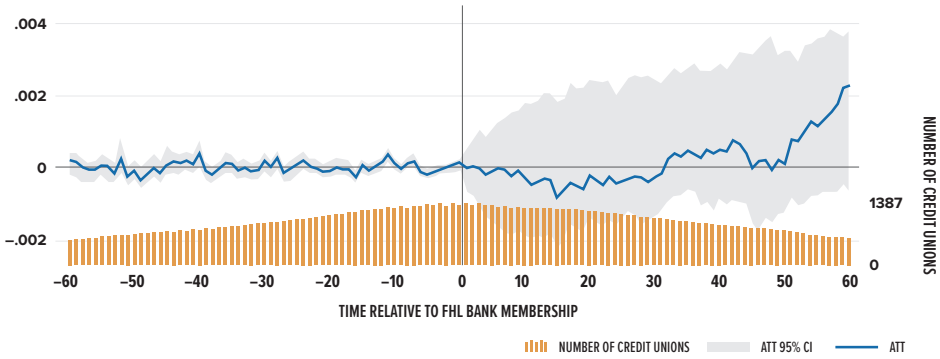


** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

Finally, although one concern may be that the increase in mortgage lending goes to higher risk borrowers with lower credit scores and increases credit risk, we find no statistically significant differences in asset quality for credit unions that join the FHLB System relative to before they joined. There are no statistically significant differences in the delinquency or net charge-off ratios, either for total loan portfolios or for mortgages outstanding. Therefore, the increased liquidity and mortgage lending does not appear to come at the expense of credit risk.

FIGURE 19: ESTIMATED ATT* OF FHLB MEMBERSHIP ON DELIQUENCY RATIO

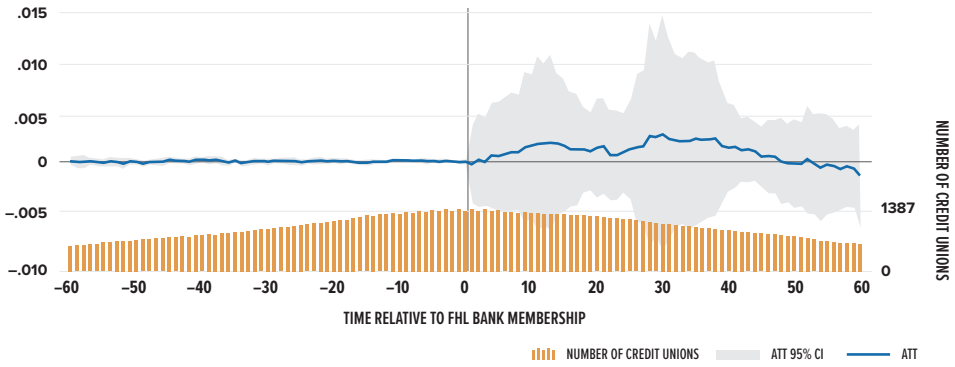
GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024



** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

FIGURE 20: ESTIMATED ATT* OF FHLB MEMBERSHIP ON NET CHARGEOFF RATIO

GENERALIZED SYNTHETIC CONTROL METHOD, 1994–2024



** ATT: Average Treatment Effect on the Treated; CI: Confidence Interval. Time measured in quarters.*

THE IMPACT OF SIZE

To delve deeper into the value of joining the FHLB system, we broke credit unions into three groups, based on their size: small credit unions (< $50 million in assets), medium credit unions ($50–$300 million), and large credit unions (> $300 million).[2] We find that all three groups experience statistically significant and substantial increases in total borrowing.

The smallest credit unions appear to benefit the most from FHLB membership. After joining the FHLB System, these credit unions experience statistically significant and large increases in loans outstanding (11.9%) and total assets (6.4%) and are the only group to see an increase in net income (3.9%) and first mortgages sold to the secondary market.

Larger credit unions, on the other hand, experience no significant increases in loans outstanding, total assets, first mortgages sold to the secondary market or net income.

However, both medium and large credit unions see significant increases in mortgages outstanding of around 10% to 25%. This may indicate that smaller credit unions are able to use the FHLB program as a strategy to grow and increase earnings but prefer to sell their mortgages to the secondary market to reduce interest rate risk.

On the other hand, larger credit unions may have already grown to a point where they can use the additional liquidity to increase mortgage lending but not overall growth and earnings. Moreover, larger credit unions seem

better able to absorb the additional mortgage lending in their portfolios without needing to increase sales to the secondary market.

CONCLUSION

Membership in a Federal Home Loan Bank has distinct advantages for credit unions, including increased mortgage lending and opportunities for liquidity. The greatest advantages are for smaller credit unions, making membership a valuable step on the path to growth.

Credit unions should consider membership in their regional FHLB and the potential benefits of greater borrowing capacity, low-cost funding and market access for sold mortgages. For most small credit unions, particularly, the value seems clear.

APPENDIX

Methodology

TABLE A: OUTCOME VARIABLES

Performance Area	Ratio
Growth	Loan growth = % change in loans outstanding
Growth	Asset growth = % change in total assets
Growth	Mortgage growth = % change in mortgages outstanding
Growth	1st mortgages sold = % change in 1st mortgages sold to the secondary market
Earnings	Returns on assets (ROA) = net income / average assets
Earnings	Net income growth = % change in net income
Liquidity	Loan-share ratio = total loans / total shares
Liquidity	Total borrowing = % change in total borrowing
Capital	Capital ratio = capital / total assets
Asset Quality	Delinquency ratio = delinquent loans / total loans
Asset Quality	Net charge-offs ratio = net charge-offs / total loans

1. Difference-in-differences (DID) & Event Study Approaches

When analyzing the impact of FHLB membership on credit union growth, returns, risk and liquidity, one major challenge is that there are many factors that influence these variables besides FHLB Membership, including interest rates, inflation, economic growth, consumer demand, and many others. For instance, we might see an increase in mortgage lending after credit unions become FHLB members simply because around the same time that credit unions joined the FHLB System mortgage rates also fell or the economy grew, and consumer demand went up. This creates a spurious correlation between FHLB membership and credit union mortgage lending. One common econometric approach to estimate the causal impact of an event (e.g., FHLB membership) while controlling for other factors is to use a difference-in-differences (DID) methodology that compares credit unions that join the FHLB to non-members, before and after they join. In other words, this approach estimates the average effect of joining the FHLB System for credit unions that joined relative to credit unions that did not, controlling for time invariant unobserved factors that might bias the analysis, such as prevailing interest rates.

More specifically, the main econometric specification is a two-way fixed effects model with credit union and time fixed effects:

$$y_{it}=\gamma_i+\delta_t+\beta M_{i,t}+\varepsilon_{it} \qquad (1)$$

where i denotes a credit union, t denotes a quarter, y_{it} is the outcome variable of interest for credit union i in quarter t, $M_{i,t}$ is an indicator variable for whether credit union i is an FHLB member in period t, γ_i is a credit union fixed effect, δ_t is a time fixed effect, and ε_{it} is a stochastic error term. The coefficient of interest is β which estimates the average treatment effect on the treated (ATT) of FHLB membership. In other words, the coefficient, β, represents the average difference in outcomes for credit unions that join the FHLB System relative to credit unions that do not, controlling for credit union and time fixed effects. Moreover, it is quite straightforward to add control variables that one might be concerned with, such as asset size, memberships, charter type and geographic location.[3]

However, as mentioned above, there are substantial differences between credit unions that join the FHLB System versus those that do not. For example, around 30% of credit unions do not offer mortgage lending at all and are relatively very small. Therefore, it seems unwise to include these in the control group as that would likely create an upward bias in the coefficient estimates for mortgage lending and possibly other outcome

variables. So, we restrict our analysis to only those credit unions that were FHLB members at some point during the sample period from 1994–2024. In other words, the analysis compares credit unions that are or become FHLB members relative to credit unions that have not yet joined. Thus, we exclude all credit unions that are never members of the FHLB System during the sample period.

In addition to the DID approach, a similar method is an event study DID design that considers the impact of the change in FHLB membership status over time for each year before and after joining; for example, 10 years before to 10 years after. This allows one to see if the impact of FHLB membership grows or fades over time, and whether credit unions were already generally trending in the direction of impact prior to membership. In other words, if one expects an increase in mortgage lending after credit unions join the FHLB, one might expect FHLB membership to have no effect on mortgage lending during the 10 years prior to membership, but mortgage lending should start trending upwards after membership starts. In some cases, there may also be a discontinuous "jump" immediately after membership which can be seen in the event study graphs. However, it is often more common to see impacts that begin 2 or 3 years after the "event". (See van Rijn, 2024 for examples of this type of analysis).[4]

Nonetheless, the simple DID method has received criticism from economists in recent years and has several limitations. Most importantly, it can be difficult to control for all factors that might influence whether a credit union joins the FHLB system, and there may be unobserved time variant factors that affect both important outcome variables and the decision to join the FHLB system. This motivates the synthetic control approach listed below as an additional robustness check.

Table B displays the results of the initial regression analysis for all 1,617 FHLB member credit unions that were members of the FHLB system at some point from 1994 to 2024.

TABLE B: TWO-WAY FIXED EFFECTS DIFFERENCE IN DIFFERENCES REGRESSION

	GROWTH				RETURNS		CAPITAL & LIQUIDITY			RISK	
Variables	(1) Log Loans	(2) Log Total Assets	(3) Log Mortgages	(4) 1st Mortgages Sold	(5) ROA	(6) Log Net Income	(7) Loan Share Ratio	(8) Capital Ratio	(9) Total Borrowing	(10) Delinquency Ratio	(11) Net Chargeoff Ratio
FHL Membership	0.0674***	0.0220*	0.107	3.704***	0.000180	-0.00907	0.0358***	-0.000353***	11.30***	0.000288	0.000169
	(0.0140)	-0.0118	(0.0955)	(0.738)	(0.000146)	(0.0131)	(0.00411)	(0.000643)	(0.726)	(0.000224)	(0.000122)
CU Fixed Effects	x	x	x	x	x	x	x	x	x	x	x
Time Fixed Effects	x	x	x	x	x	x	x	x	x	x	x
Observations	167,393	167,402	167,402	167,402	167,327	165,289	167,400	165,295	167,401	167,393	167,322
Number of CUs	1,617	1,617	1,617	1,617	1,610	1,617	1,617	1,617	1,617	1,617	1,610
R-squared	0.762	0.819	0.083	0.083	0.184	0.782	0.158	0.083	0.157	0.119	0.070

** Notes: Robust standard errors in parentheses. Above regressions are also attempted with standard control variables, but results are unchanged. Therefore, we only present regression output without controls. *** p<0.01, ** p<0.05, * p<0.1*

2. Generalized Synthetic Control Method

In some cases, the DID methodology may show that there is a positive impact of FHLB membership but that credit unions were already trending in the same direction prior to membership. For example, perhaps credit unions that were already expanding their mortgage loan portfolios decided to also join the FHLB, and simply continued their upward trend in mortgage lending after membership. The above analysis might show a positive impact on mortgage lending, but this would be due to credit unions that were already focused on mortgage expansion prior to joining the FHLB System, and not the impact of the FHLB System and added liquidity on credit union mortgage lending.

To help control for this and related biases, we implement a generalized synthetic control method. This approach creates an approximation of the control group by weighting the various control variables to create an artificial control group in which the synthetic controls mostly closely resemble the controls for the treatment group. This naturally creates a flat pre trend, and allows for clear visual analysis. While this approach also has its limitations, it is helpful as a robustness check, allows for visual analysis of impacts over time, and can be seen as an upper bound on the potential impacts of FHLB membership.

END NOTES

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[2] To maintain consistent asset-size groups throughout the sample period from 1994 to 2024, we divide credit unions into small, medium and large based on their assets as of the beginning of the sample in 1994. In other words, while a credit union may grow and have more than $50 million in assets after 1994, if it has less than $50 million in assets in 1994 it is considered "small" for the entirety of the sample period. The same holds true for the "medium" and "large" credit unions based on their asset sizes as of 1994.

[3] Note that for all above regressions I generally attempt them both with and without common control variables and find very similar results. Therefore, I prefer displaying the regression results from the specifications without control variables.

[4] Note that the author has implemented the event study analysis and created the corresponding graphs, which are available upon request.