Credit Unions and Commercial Banks over the Business Cycle

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Contents

1 Introduction

Since 2009, 427 American commercial banks have failed and subsequently been taken over by the Federal Deposit Insurance Corporation (FDIC, 2012). On the other hand, the credit union sector– which serves 43.9% of the economically active population–only experienced 69 failures over the same time period (McKillop and Wilson 2011; NCUA, 2012). Mike Schenk, an economist with the Credit Union National Association, boasts that credit unions enjoyed relative success during the recent financial crisis because of their distinct governance structure and because credit unions tend to hold a high proportion of the loans they originate in their portfolio instead of attempting to sell or securitize them (Nader 2009).

The Occupy Wall Street movement also sings the praises of credit unions, initiating a Bank Transfer Day in November 2011 that called for consumers to switch from large commercial banks to credit unions (Roose 2011). The rationale behind this activism is that credit unions are less susceptible to the allegedly perverse incentives faced by profit driven, shareholder owned banks.

Are these ideas backed up by economic theory and empirical evidence? Do differences in governance structures, tax burdens and regulatory requirements lead credit unions to behave differently than their commercial bank counterparts? This essay will attempt to contribute to this discussion by comparing the behaviour of credit unions and commercial banks over the business cycle. I construct a panel dataset on American financial intermediaries from publicly available call report data to estimate how measures of financial health and performance for credit unions and commercial banks of similar size respond to various macroeconomic indicators.

The essay proceeds as follows: the next section is comprised of a brief history of the credit union movement in the United States and a review of the empirical literature on the differences between credit unions and commercial banks. Section 3 provides a simple economic model of a credit union and discusses more recent advances in the theory of the credit union while Section 4 addresses the growing role of macroprudential analysis in the study of financial sector stability. This latter section is relevant because the goal of this essay is to examine the resiliency of credit unions to the business cycle; this aligns well with the stated aim of macroprudential regulation, which is to reduce the procyclicality of the financial sector. The fifth section describes the sources of the data,

the key variables included in the analysis and how the panel dataset is constructed. Next, the econometric methodology is presented in Section 6: I will explain the regression specification that I use, as well as some of the robustness checks. I then provide results in the following section, before briefly discussing three extensions to the base model. Lastly, Section 8 contains some concluding remarks.

2 Credit Unions in the United States

2.1 History of the Credit Union Movement

Unlike commercial banks, credit unions are member-owned financial cooperatives that are governed by their depositors and borrowers rather than by external shareholders. The first cooperative financial institutions were founded in Germany during the middle of the nineteenth century. Two types of loan societies, the Schulze-Delitzsch and the Raiffeisen credit societies, are considered the ancestors of the modern North American credit union (Isbister 1994; Ferguson and McKillop 1997). The first of the Schulze-Delitzsch institutions, which were called Volksbanken (people's banks), was founded in 1850. These cooperatives were democratically controlled by the depositors and loans were approved based on the character of the borrower, rather than on the basis of collateral (Ferguson and McKillop 1997). Members were compelled to save a certain amount and loans were only made for "productive purposes" (Ibister 1994). Unlike Schulze-Delitzsch societies, Raiffeisen societies were founded on Christian rather than secular ethics and there was no compulsory saving. However, Isbister (1994) argues that most of the Raiffeisen societies were controlled by the petite bourgeoisie and not by the small farmers or urban workers who comprised the majority of the membership.

The cooperative financial movement was brought to North America by immigrant German craftsmen who introduced Schulze- Delitszch societies to New York City in the 1860s (Ferguson and McKillop 1997). However, the credit union did not gain widespread popularity until Alphonse Desjardins founded the first *caisse populaire* in Montreal in 1920 and then started several more credit unions across the border in New Hampshire and Massachusetts in 1908. The credit union

movement, led by Desjardins, rapidly became popular in Quebec; at the time of his death in 1920, there were 200 *caisses* in Quebec and by 1986, one-third of the savings of Quebecs population were held in *caisse populaires* (Isbister 1994). The American credit unions diverged from their European and Quebecois predecessors by not requiring that lending be solely for productive purposes. Instead, loans only had to be for "useful and beneficial" purposes and, according to Isbitser (1994:57), this quickly came to mean consumer purposes.

Furthermore, the use of a common bond was primarily voluntary during the beginning of the American credit union movement (Burger and Dacin 1991). Burger and Dacin (1991) argue that a common bond requirement "enabled credit unions to achieve economic benefits such as loan safety as well as moral responsibility and loyalty towards the organization." In 1934, with the passing of the Federal Credit Union Act, common bonds became a legal requirement for credit unions. The purpose of this legislation was to precisely define and limit the function and role of credit unions as part of an effort to prevent "a repetition of the severe problems in the financial system of the early 1930s that led to the failure of so many financial institutions" (Ferguson and McKillop 1997:47). The Act specified the three permissible types of common bond as occupational, associational and residential and also tied the credit union industry to a small market niche of small, short-term consumer loans. At the time, this was viewed as an "inherently unprofitable" segment of the financial system (ibid:48).

The next major development in the American credit union industry was a period of deregulation that began in the early 1970s. In 1972, a less restrictive interpretation of the common bond requirement was passed through Congress and this allowed for both increased membership and also for mergers between credit unions with different fields of membership (Ferguson and McKillop 1997). In 1977, credit unions were permitted for the first time to enter into the mortgage and credit card businesses and also were able to rely on the money market for external sources of financing (ibid). Isbister (1994: 60) takes a more cynical view of this deregulatory process, writing that this led to a transition from a credit union *movement* to a credit union *industry* where credit unions "transformed themselves into more ordinary business institutions, whose success was measured by their financial statements more than by the quality of their members lives."

In any case, credit unions entered a period of rapid growth. There are now over 8,000 credit unions in the United States that hold nearly one trillion dollars worth of assets (McKillop and Wilson 2011). Moreover, through a gradual process of mergers and legislative changes, credit unions today serve larger and more diverse member groups and thus compete more directly with for-profit financial intermediaries (ibid).

Credit unions can be chartered by federal or state governments and have "share insurance," which is analogous to deposit insurance, of up to $250,000 per member through the National Credit Union Insurance Fund. Since credit unions are non-profit institutions, they have been exempt from federal taxes since 1937 (McKillop and Wilson 2011). Credit unions are regulated by the National Credit Union Association (NCUA) and face different capital requirements than banks. For example, the Basel III accord and its new requirements for risk weighted capital levels will not apply to credit unions and, unlike commercial banks, credit unions must reach their capital requirements through only retained earnings rather than through a mix of retained earnings and capital instruments (Wilcox 2011). Wilcox (2011:3) argues that forcing credit unions to maintain a certain capital-to-earnings ratio rather than a capital-to-assets ratio reduces the ability of credit unions to fulfill their functions to act as "safe harbors for depositors and to act as a countercyclical source of lending."

During the recent financial crisis, American credit unions performed better than commercial banks on a number of key metrics. In 2008, while bank loans decreased by $31 billion, the amount of loans issued by credit unions increased by $35 billion (Crear 2009). Additionally, credit unions were not part of the federal government program to supply capital to commercial banks by purchasing up to 3% of their capital in non-voting preference preferred shares (ibid). This relative success has been attributed to factors such as lower involvement in the sub-prime mortgage market and a greater tendency to hold mortgage loans in their portfolios rather than securitize and sell mortgages once originated.

On the other hand, it would be inaccurate to claim that credit unions emerged unscathed from the financial crisis. For example, in 2008 alone, 14 credit unions were forced to shutter their doors and by September 2010, the National Credit Union Association had been forced to take on over $50 billion in troubled assets from five failed corporate credit unions which had been sources of

funding and other financial services to standard consumer credit unions (Maremont and McGrane 2010).

2.2 Review of Empirical Literature

A substantial amount of literature has been devoted to evaluating the performance and efficiency of the credit union sector. Focusing on the period after deregulation, Goddard, McKillop and Wilson (2008) examine whether diversification has helped or hindered credit union performance. The authors use the share of non-interest income in total operating income as a measure of diversification and they note that this share has been growing steadily during the past decade (ibid). While for commercial banks, non-interest income often is derived from non-retail activities such as corporate lending or investment banking, the source of non-interest income for credit unions is more likely to be in retail banking related activities such as service charges, fees, commissions and auto leasing. Goddard et al. (2008:1847) find that diversification only benefits larger credit unions since small credit unions "have neither sufficient scale nor the requisite expertise to diversify away from their core product of loan provision to members." On the other hand, larger credit unions– some of which already earn more than a quarter of their operating income through non-interest income– can increase profitability and lower income volatility by diversifying away from 'traditional' credit union activities.

Karels and McClatchey (1999) study whether the introduction of federal deposit insurance for credit unions in the 1970s caused a rise in risk-taking behaviour. They approached this moral hazard problem by applying time series analysis to financial ratios measuring liquidity, loan delinquency and capital adequacy. Interestingly, Karels and McClatchey (1999) do not find that the introduction of deposit insurance caused any increase in the riskiness of credit unions' portfolios and balance sheets. They suggest that the combination of credit unions' unique ownership form, their common bond requirements and their more stringent regulations on lending and capital managed to prevent the increase in risk-taking that is often seen in financial intermediaries after the introduction of insurance programs (ibid). Although their work is unrelated to the issue of procyclicality in financial institutions, this study by Karels and McClatchey does provide evidence that credit unions are less

likely to adopt risky behaviour.

The effect of the common bond is another topic that has attracted a fair amount of academic research. Frame, Karels and McClatchey (2001) examine differences in institutional risk profiles of federally chartered credit unions based on the type of common bond. They find that occupational credit unions, in response to their increased exposure to concentration risk, tend to hold higher amounts of capital. Moreover, delinquency rates are generally lower at occupational credit unions: the authors suggest the simple reason for this phenomenon is that members are necessarily employed at these credit unions. Frame et al. (2001) also show that multiple bond credit unions tend to hold less capital than single bond credit unions– perhaps because of perceived decreased concentration risk– and also have lower delinquency rates. Lastly, the authors' regression analysis contains the result that multiple bond credit unions have greater income variability than single bond credit unions and that single bond manufacturing credit unions have greater income variability than single bond educational and government credit unions. This latter result is expected since income and employment are generally more stable in public sector positions. Black and Schweitzer (1987) similarly compare financial characteristics of credit unions by types of common bond, although they restrict their sample to credit unions controlled by African-Americans. Their principal finding is that occupational credit unions make more loans, make higher quality loans and experience lower loan losses than either residential or associational credit unions. However, Black and Schweitzer (1987) find that all three types of black credit unions were profitable, which they report is not in general the case for black community banks or savings and loans institutions.

There has also been a large body of empirical research on the differences between credit unions and commercial banks. Credit unions typically pay higher interest rates on deposits[1] while collecting lower interest rates on loans. Thus, the aggregate cost of assets (i.e., interest expense as a proportion of total assets) has been larger for credit unions than for banks throughout most of the last twenty years (McKillop and Wilson 2011). Kaushik and Lopez (1996) find that American credit unions were at least as profitable as commercial and saving banks in the 1980s and early 1990s and also

[1]Credit unions usually refer to their deposits as 'shares' and thus call interest payments on savings 'dividends.' Throughout this essay, I will use the standard terms of deposits and savings rates to make comparisons with commercial banks as clear as possible.

displayed faster loan growth. Esty (1997) looks at intermediaries that converted from cooperative to stockholder governance structures and finds that these intermediaries hold riskier portfolios of assets after they convert. Saunders, Stock and Travlos (1990) draw similar conclusions: they find that stockholder controlled banks take more risks than other financial institutions. A recent study by Woodbury and Smith (2010) evaluates the relative riskiness of credit unions and banks not by examining their portfolio composition but by estimating how delinquency rates and net charge-off rates vary with changes in the unemployment rate. They find that banks' non-performing loans rates are more sensitive to business cycles and thus conclude that banks must be making more risky types of loans. Allred and Adams (2000:52) examine how service quality differs between different types of intermediaries; their research shows that credit unions "rate significantly higher than banks" on nearly all measures of service quality.

Another area of focus is the competitive interaction between banks and credit unions. Tokle and Tokle (2000) employ an ordinary least squares regression approach with a sample of banks in Idaho and Montana to test whether bank interest rates on deposits are affected by the local market share of credit unions. They find that the coefficient on this variable is positive and statistically significant at the 95% confidence level and thus they conclude that the presence of credit unions drives up interest rates on deposits at commercial banks. Hannan (2002) finds similar results when he applies a similar technique to a national sample of thrifts and retail banks.

Lastly, there is some evidence that suggests credit unions are losing their unique character. For example, Worthington (2004) studies Australian credit unions and observes that they are moving towards a more 'commercial orientation.' He attributes this shift to the process of deregulation and increased competition from specialized financial service providers such as mortgage brokers and insurance specialists. Since 1995, over 30 American credit unions have converted to bank charters. These conversions follow a demutualization process, where members receive actual stock and cash rather than options to purchase stock in an initial public offering. Wilcox (2006) examines these conversions and finds that most members do not benefit; instead, the financial gains from conversion mainly accrue to buying members and external investors.

2.3 Theoretical Models of Credit Union Behaviour

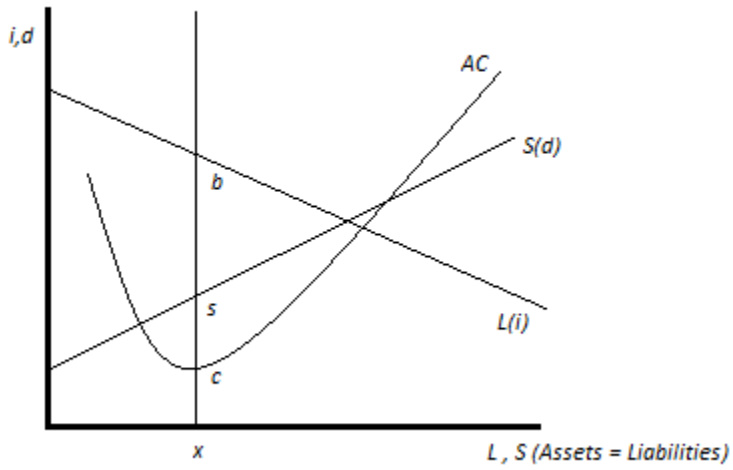
Taylor (1971) develops one of the earliest theoretical models of the credit union: his basic premise is that a credit union is unique because it must balance the competing interests of members who are savers and members who are borrowers. The issue is that savers want as high an interest rate on deposits as possible while borrowers want as cheap credit as possible. Of course, high savings rates can only be financed by high rates on loans while low borrowing rates imply a low rate of return for savers; thus, there is an inevitable conflict between the two types of members. Taylor observes that most forms of cooperatives represent either a group of consumers who collectively purchase goods or a group of producers who collectively market and sell their goods. However, a credit union is a 'purchasing' cooperative from the standpoint of borrowers and a 'marketing' cooperative from the standpoint of savers. Thus, Taylor (1971:207) states that the credit union is often considered the "purest of all cooperatives since it deals exclusively with its members."

Taylor's solution is to define three sets of credit unions: neutral, saver dominated and borrower dominated. He then demonstrates that equilibrium output for a neutral credit union should be at the point where the spread between the interest charged on loans and the interest paid on deposits equals the cost of the credit union's operations. A saver dominated credit union will attempt to maximize the average net return. This type of credit union will always welcome new borrowers since this will give the credit union more capacity to pay higher savings rates. On the other hand, it will be reluctant to accept new savers. The converse is true for a borrower dominated credit union because new savers will provide the cheapest source of funds for the existing group of borrowers (Taylor, 1971).

A simple graphical depiction of a neutral credit union that faces economies of scale is presented in Spencer (1996) and Fergusion and McKillop (1997). We first assume that the credits union's assets are only the loans it makes to its members while its liabilities are comprised of only its members' savings. $S(d)$ is the supply of savings provided by all potential and existing members of the credit union: it is a positive function of the dividend rate paid to savers, d. Similarly, $L(i)$ is the amount of loan revenue at any given interest rate for borrowers, i. AC represents the average cost curve for the joint costs of production. As shown in Figure 1, the equilibrium amount of savings

and loans is given by x, which is the point where the amount of interest paid by borrowers, bx, exactly covers the dividends paid to savers, sx and the operating costs, cx.

Figure 1: Simple Model of a Neutral Credit Union



This basic graphical set up can also be used to show the cases of saver and borrower dominated credit unions. In the former case, the credit union wants to maximize its average net return, which is simply its loan revenue minus its operating costs. This is denoted by the ANR curve in Figure 2. Here, the ideal level of savings and loans is x^s. At this point, new savers are not welcomed since they will decrease the dividend rate while new borrowers are encouraged since they will increase the dividend rate for the existing group of savers. On the other hand, if the level of savings x is less than x^s, new savers are encouraged since that can increase the average net return through economies of scale.

Figure 3 shows the case of a borrower dominated credit union. The credit union now attempts to minimize the average net cost of funds, which is the sum of the operating costs and the supply of savings and is denoted ANC. The equilibrium level of savings and loans is now x^b. At a level of loans less than x^b, the borrower dominated credit union seeks out more borrowers since a greater level of output leads to a decline in operating costs that outweighs the increase in savings costs. However, this credit union will resist new borrowers at a level of output equal to or greater than x^b since a larger amount of loans will incease the average net cost of funds.

Figure 2: A Saver Dominated Credit Union

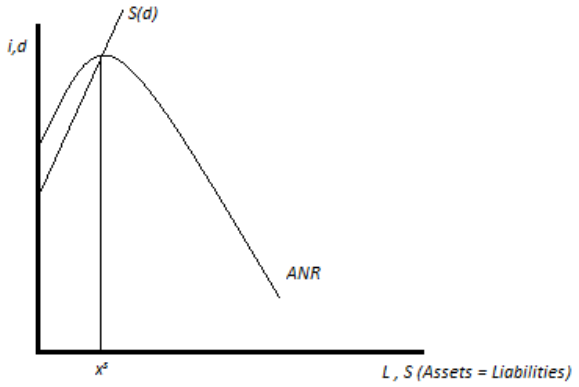
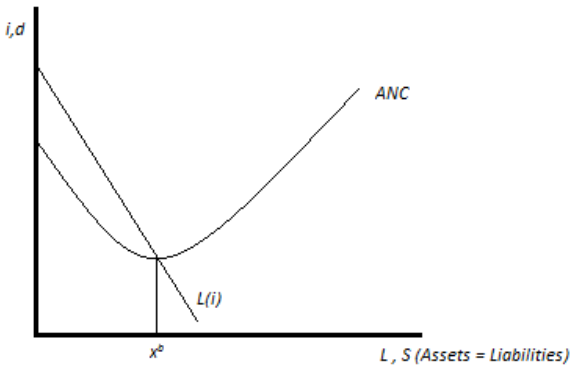


Figure 3: A Borrower Dominated Credit Union



The traditional mathematical model of the credit union is developed by Smith, Cargill and Meyer (1981), who argue that since members both own the credit union and consume its output, a standard profit maximizing objective is not appropriate. I adapt Smith et al.'s model slightly and adjust the notation so that it will be easier to compare the results with the predictions made by the standard model of riskless financial intermediation presented in Neave (2009).

Smith et al. (1981) propose that the value of the credit union to a borrower is measured by the difference between the credit union's loan rate and the alternative market loan rate, multiplied by the level of loan activity. We call this variable NGL; that is, the Net Gain on Loans. Similarly, the value of the credit union to a saver is the spread between the credit union's saving rate and the alternative market rate, multiplied by the level of savings. This is the Net Gain of Savings, or NGS. Lastly, we let λ and σ be weight parameters that reflect the relative importance to the credit union of the value to borrowers and savers. If $\lambda > \sigma$, we have a borrower-oriented credit union and if $\lambda < \sigma$, we have a saver-oriented credit union. If $\lambda = \sigma$, the credit union is neutral between borrowers and savers. Thus, the credit union chooses the interest rates on deposits, r_S, and loans, r_L, to maximize the following objective function:

$$\begin{aligned}
\max_{r_S, r_L} \quad & \lambda NGL + \sigma NGS + \pi \\
\text{s.t.} \quad & S - L = M \\
& L, S \geq 0 \\
& \pi = r_L L - r_S S + r_M M - c_L L - c_S S - \bar{F} \geq 0
\end{aligned}$$

L and S are the level of loans and savings while M is the amount that the credit union invests in the money market to offset the difference between their assets and liabilities. This amount can either be negative (the credit union is issuing debt) or positive (the credit union is investing in the market) and in either case the exogenous interest rate, r_M, applies. Smith et al. (1981) describe π as an 'operating surplus,' which is a function of the credit union's net income and its costs. c_L and c_S are the costs of processing loans and savings accounts; these are both assumed to be constants. Lastly, $\bar{F}$ can be interpreted either as the credit unions' fixed costs or as a reserve account for future contingencies. In order for the credit union to remain solvent, this operating surplus must be non-negative.

Smith et al. then suggest the following linear forms of loan demand and savings supply, where r_{SM} and r_{LM} are the exogenously determined market interest rates for savings and loans:

$$L = \alpha(r_{LM} - r_L), \alpha > 0$$

$$S = \beta(r_S - r_{SM}), \beta > 0$$

The credit union's optimal choice of the borrowing and savings rate is found by substituting these latter two equations into the objective function. Thus, the credit union maximizes the net gain to borrowers and savers subject to the borrowing constraint and the non-negativity operating surplus constraint. It is worth noting that if $\lambda = \sigma = 0$, the problem collapses to the standard objective function of a profit maximizing bank with the following optimal interest rates and profit level:

$$r_L^* = \frac{r_{LM} + r_M + c_L}{2}$$

$$r_S^* = \frac{r_M + r_{SM} - c_S}{2}$$

$$\pi^* = \frac{\alpha(r_{LM} - r_M - c_L)^2 + \beta(r_M - r_{SM} - c_S)^2}{4} - \bar{F}$$

The non-negativity surplus constraint implies that for the bank to operate, the following condition must be satisfied:

$$\bar{F} \leq \frac{\alpha(r_{LM} - r_M - c_L)^2 + \beta(r_M - r_{SM} - c_S)^2}{4}$$

Next, we will look at the case of a neutral credit union, where $\lambda = \sigma = 1$. In this case, the operating surplus constraint is binding and thus we have the following optimal interest rates and profit level:

$$r_L^* = \frac{r_{LM} + r_M + c_L}{2} - \frac{r_{LM} - r_M - c_L}{2}\left[1 - \frac{4\bar{F}}{\alpha(r_{LM} - r_M - c_L)^2 + \beta(r_M - r_{SM} - c_S)^2}\right]^{\frac{1}{2}}$$

$$r_S^* = \frac{r_M + r_{SM} - c_S}{2} + \frac{r_M - r_{SM} - c_S}{2}\left[1 - \frac{4\bar{F}}{\alpha(r_{LM} - r_M - c_L)^2 + \beta(r_M - r_{SM} - c_S)^2}\right]^{\frac{1}{2}}$$

$$\pi^* = 0$$

For any level of $\bar{F}$ less than its maximum possible value, the second term in both interest rate equations is positive and thus a credit union will offer lower borrowing rates and higher saving rates than profit maximizing banks but will have zero operating surplus. The intuition here is that credit unions distribute any residual surplus to their members in the form of more attractive interest rates on loans and deposits. In the special case where $\bar{F}$ equals its maximum value, the credit union will have identical interest rates and profit levels as a commercial bank. Smith et al. (1981) also solve this problem for the borrower dominated ($\sigma = 0$) and saver dominated ($\lambda = 0$) credit unions. The borrower dominated credit union sets the saving rate to maximize the surplus and then uses the surplus to subsidize the lowest possible loan rate, while the saver dominated credit union sets the loan rate to maximize the surplus in order to set the highest possible savings rate. The intuition and math are identical to the neutral case; the credit union is still distributing the residual surplus to the members it cares about. However, Smith et al. (1981) argue that the neutral case is probably the best approximation to reality. First, weighting borrowers' and savers' interests equally is consistent with the fairness and equity philosophy that underlies many cooperative institutions. Second, borrowers or savers would be reluctant to join a union that intentionally subjugates their interests. Finally, the authors suggest that it is likely individuals switch back and forth between

saving and borrowing roles: thus, the borrower - saver conflict may be weaker than anticipated because the two groups overlap over time (ibid).

In the past thirty years, this basic model has been extended in a variety of ways. Smith et al. (1981) themselves introduce stochastic money market interest rates into the model. This extension implies that a risk averse credit union may choose rates that lead to a positive expected operating surplus. Smith (1984) examines a regulatory constraint on interest rates and in a later paper develops the model to include taxation and uncertainty (Smith 1988).

More recent work has continued to advance theories of credit union behavior. Rubin et al. (2009) use optimal control theory to extend Smith's one period framework to an intertemporal setting while Hannafin and McKillop (2006) incorporate an altruism component into the credit union's objective function. Leaving behind the standard approach, Deller and Sundaram - Stukel (2011) rely on central place theory to build a location model for credit unions. Their model finds that credit unions will choose to operate in areas with low concentrations of commercial banks and are "fundamentally capturing a different share of the market than traditional banks" (ibid:1). Davis (2001:197) studies how a one member / one vote governance mechanism could lead to a credit union converting to a joint-stock form because of the "adverse incentives created by accumulated financial surpluses."

The common thread in this literature is that credit unions face different objective functions than commercial banks and thus will make different decisions with respect to interest rates and deposit and loan levels. Of course, in reality, there are many more control variables than just interest rates: for example, financial intermediaries make investments and loans of heterogeneous quality and also choose levels of screening and monitoring on their loans. However, the basic principle remains: cooperative intermediaries have different incentives than shareholder owned banks and thus it is not unreasonable to expect banks and credit unions to behave differently– and therefore perform differently– across the business cycle.

3 Macroprodential Analysis

3.1 Macroprudential Regulation: Theory, Tools and Implementation

Since the recent financial crisis, there has been an increased interest in macroprudential analysis, a branch of the financial systems literature that involves the "identification, measurement and monitoring" of macroeconomic indicators of systemic risk (Borio, Furfine and Lowe 2001:23). In contrast to the traditional microeconomic approach to stability that focuses on firm level risk and behaviour, macroprudential analysis examines the interaction between macroeconomic indicators and the performance of the aggregate banking sector. This method takes aggregate risk as endogenous and attempts to reduce system-wide distress rather than firm level distress (Borio 2003). The primary concern motivating this field of study is that the financial sector has become excessively procyclical[2] and thus, the macroeconomic environment can disrupt financial sector stability which in turn can amplify business cycle fluctuations.

There are two major theories that describe how this process works. The first, bank lending channel theory, posits that banks will have less capital available for lending during a downturn because of the increased risk (Bikker and Hu, 2002). Moreover, the tightening of monetary policy can drain the amount of deposits (liabilities) held at financial intermediaries and thus, due to reserve requirements, banks will need to decrease their lending (ibid; Bernanke and Gertler 1995). The second, balance sheet channel theory, explains changes in bank behaviour across the business cycle from a demand rather than supply perspective. During a recession, the changes in net capital positions of businesses and households will cause a decline in credit demand (Bikker and Hu 2002). In either case, the implication of the macroprudential approach is that regulatory bodies should use capital requirements and other monitoring and regulatory tools to reduce the procyclicality of the financial system (Borio 2003; Quagliariello 2007).

Reinhart and Rogoff (2009) argue that the collapse of the credit channel in recessions is especially damaging for small and medium-sized borrowers. This is because smaller borrowers have less access to bond or equity markets and are thus more constrained to relationship-oriented bank finance.

[2]Following Beatty and Liao (2009:1), I use the term procyclicality in this essay to refer to the "property of exaggerating or exacerbating the cyclical tendencies of aggregate economic activity."

Empirical evidence for this position is found in Bernanke and Gertler (1995:16), who report that small firms, which "have more limited access to short term credit markets," are more likely to respond to cash flow squeezes in recessions by decumulating inventories, cutting production and decreasing fixed investment. Although neither Reinhart and Rogoff (2009) nor Bernanke and Gertler (1995) mention credit unions explicitly, it seems apparent from this discussion that it is thus particularly important to monitor the procyclicality of the credit union sector because the vast majority of their membership is comprised of these small to medium sized borrowers.

Governments and other financial regulators have a wide variety of macroprodential tools available to them. These tools are designed to safeguard the financial system as a whole and to take into account the importance of general equilibrium effects (Hanson, Kashyap and Stein, 2012). Some of the suggested policy instruments include caps on loan-to-value ratios and debt-to-income ratios in order to prevent procyclicality of banks' assets and liability, time varying reserve requirements, countercyclical capital buffers, limits on leverage and minimum haircuts on asset backed securities (ibid). According to Borio (2011), the Basel III accord includes elements of a macroprudential approach to regulation. For example, in an attempt to limit procyclicality, the Basel Committee introduced a countercyclical capital buffer; that is, the capital buffer is accumulated during times of credit expansion (which may signal increased systemic risk) and then "released in times of incipient financial stress" (Borio 2011:13). Additionally, the Committee has for the first time taken the stance that institutions whose failure will have a larger effect on the wider financial system should face more stringent standards (ibid). This is another way of emphasizing the importance of system wide stability, rather than merely focusing on each institution as a separate and independent entity.

3.2 Procyclicality in the Financial Sector: A Review of Previous Literature

There is a large empirical literature that studies the links between financial sector performance and business cycles. For example, Bikker and Hu (2002), responding to concerns that the Basel II accord would increase procyclicality, analyze the interaction between macroeconomic variables and banking performance in twenty-six industrial countries. The macroeconomic variables used in this study include real GDP growth, the long term interest rate, inflation, money supply and

unemployment. Bikker and Hu's work demonstrates that profits and lending growth move with the business cycle, although they state that the "distortion caused by procyclical behaviour has been limited, banking crises excepted" (Bikker and Hu 2002:3). A similar paper by Quagliariello (2007) uses panel data on Italian intermediaries to investigate whether loan loss provisions and non-performing loan rates display cyclical behaviour. He finds that all macroeconomic variables used in the analysis are significantly correlated with the riskiness of intermediaries' portfolios and that delinquency rates are higher during downtowns. Concluding that "the impact of recessionary conditions [on bank balance sheets] is significant and long lasting," Quagliariello (2007:120) suggests that is appropriate to introduce rules aimed at limiting procyclicality and that financial surveillance should be tighter during recessions. He also states that this type of work has value for designing stress tests to assess the impact of macroeconomic shocks on the aggregate banking sector.

Albertazzi and Gambacorta (2009) employ similar techniques on data from ten industrialized countries between 1981 and 2003. They find that macroeconomic conditions affect net interest income and loan loss provisions. The former effect is attributed to economic slowdowns reducing the demand for firm borrowing while the latter effect is a result of business cycles causing credit portfolio quality to fluctuate. Interestingly, this study does not find any connection between non-interest income and GDP growth; thus, it is possible that financial intermediaries can become less procyclical by diversifying their revenue. Albertazzi and Gambacorta (2009) also split their sample into two groups and find that banking sectors are more profitable but also more procyclical in Anglo-Saxon countries than in the euro area.

Although much of the empirical macroprudential analysis has been conducted with European data, there have been several studies that evaluate whether macroeconomic variables have an effect on North American banks. Guidara, Lai and Soumare (2011) use quarterly financial statements and stock market data for the six large Canadian banks to analyze how capital buffers and stock performance are related to business cycles and regulatory adjustments. Their regression results indicate that Canadian banks' hold larger capital buffers during recessions; the authors state that these findings partially "explain why [Canadian banks] weathered well the recent financial crisis" and lend support to the appropriateness of a "macro-prudential 'through the cycle' approach to

capital adequacy." Gambera (2000) uses state-level data from the American Midwest to model the relationship between regional and national macroeconomic variables and the financial health of banks. Unlike nearly all of the other literature in this area, Gambera does not use panel data techniques; instead, he uses a bivariate VAR to forecast financial conditions of banks. He finds that a small number of aggregate variables (including state unemployment rate, per capita income and bankruptcy filings) can forecast financial conditions of banks. Gambera also suggests that this vector autoregressive approach and the use of impulse response functions can be applied to stress testing regional banks.

Finally, there has been some recent work on the success of macroprudential tools in reducing the amplitude of business cycles. For example, Saurina (2009:5) argues that dynamic rules for loan loss provisioning have "proved to be useful for Spanish banks during the current crisis" and have managed to "increase the stability of the system as a whole." On the other hand, Aiyar, Calomiris and Wieladek (2011) examine UK banking microdata and find that the efficacy of regulating bank capital "as a means of smoothing the credit cycle" is reduced because unregulated banks (in this case, resident foreign branches) increase their own lending in response to an increase in reserve requirements for regulated banks. The authors argue that this 'leakage' substantially reduces the impact of the countercyclical policy.

In the following sections of this essay, I plan to apply macroprudential analysis to examine whether different parts of the banking sector display different levels of procyclicality. In particular, I am interested in whether the unique governance structure and objective function of the credit union makes it more resilient to business cycles. If this is the case, it has implications for the overall soundness and stability of the retail banking system: for example, regulators and government should provide incentives for the growth of the sector which is less sensitive to macroeconomic shocks. Furthermore, if commercial banks and credit unions respond differently to recessions, it is then logical that they should face separate levels of regulation and supervision that take these differences into account.

4 Data

The data for credit unions are taken from the quarterly call reports of individual credit unions from 1994 - 2010 that are published by the National Credit Union Association. I first dropped all credit unions with less than $50,000,000 in total assets because they faced less frequent reporting requirements before 2001. In 2010, less than 7% of total credit union assets were held at these smaller credit unions so I do not expect this action to significantly affect the results. I then constructed state level aggregate variables for loan loss provisions, net interest income, return on assets, non-performing loan rates and capital-asset ratios. Each variable has 3,468 observations (50 states and Washington, D.C. over 68 quarters). The data for commercial banks is collected similarly: the Federal Financial Institution Examination Council releases quarterly call reports for all commercial banks. I again dropped all commercial banks with less than $50,000,000 in total assets from the sample so that I can compare financial intermediaries of similar size. Since less than 0.1% of all commercial bank assets are held in banks with less than $50,000,000 in total assets, this also should not affect the results. I then combined the two datasets to create a final panel of 6,936 observations. Thus, the panel variable is a state-intermediary combination. Table 1 provides summary statistics for the commercial bank and credit union sectors in the fourth quarter of 2011:

Table 1: Credit Unions and Commercial Banks, 2011

	(1) Credit Unions	(2) Commercial Banks
Number of Institutions	7240	6789
Average Size, in thousands of dollars of total assets	134,721	1,712,376
Percentage of total sector loan portfolio...		
Secured by real esate	54.86	57.83
Secured by a vehicle	28.79	4.37
Comprised of unsecured credit card loans	6.53	8.89
Average business loan size, in dollars	123,663.63	560,244.38
Average agricultural loan size, in dollars	42,056.84	55,840.29

While commercial banks are on average much larger than their credit union counterparts, the composition of the two sectors' loan portfolios is somewhat similar. Credit card and real estate loans, for example, are represented in nearly the same proportion in both credit union and commercial bank portfolios. On the other hand, loans secured by vehicles– which are mainly automobile loans– are a much more significant proportion of the lending business for credit unions. As expected, business and agricultural loans from commercial banks are on average significantly larger than credit union loans. In particular, the average business loan from a commercial bank is more than four times as large as the average business loan at a credit union. Unfortunately, the call report data for commercial banks is not sufficiently detailed to allow for a similar comparison of consumer loans.

The five measures of financial health and performance are chosen to follow the previous empirical literature and also to fit with the theoretical models of financial intermediaries. These five variables are also all included in the CAMEL rating system, which is a method of assessing the financial health of individual credit unions that the NCUA has used since 1987 (NCUA 2000). This rating system assesses credit unions' capital, asset quality, management, earnings and liquidity and is used as an "internal tool to measure risk and allocate resources for supervision purposes" (ibid:1).

The non-performing loan rate is included to capture the quality of the credit portfolio; following Bikker and Hu (2002) and Quagliariello (2007), I expect this rate to be procyclical and the level of procyclicality can be interpreted as a proxy for the riskiness of loans made by the intermediary. Unfortunately, credit unions and banks have different slightly different reporting requirements with respect to loan delinquency rates. For credit unions, I construct this variables as the percentage of total loans and leases that are delinquent by two or more months while for banks, this non-performing loan rate is the percentage of total loans and leases either that are more than ninety days past due or that have been placed in nonaccrual status. Another issue with using call report data on non-performing loan rates is that their accuracy has been questioned: for example, Rogoff and Reinhart (2009: 32) write that "in any event, reports of nonperforming loans are often wildly inaccurate, for banks try to hide their problems for as long as possible and supervisory agencies often look the other way." However, despite this concern, non-performing loans are still the most

commonly used proxy for the creditworthiness of a financial institution. Recent papers by Smith and Woodbury (2010), Albertazzi and Gambacorta (2009), Bikker and Hu (2002) and Quagliarello (2007) all use the non-performing loan rate as one of the primary independent variables in their analyses.

Loan loss provisions are the amount of reserves set aside to cover bad loans. Since these represent a cost to the intermediary and reduce the book value of assets, loan loss provisions affect both profitability and capital (Quagliariello 2007). However, in practice, loan loss provisions are often backwards looking; in times of economic expansion, for example, banks tend to underestimate future losses (ibid). Thus, I expect loan loss provisions to be negatively correlated with GDP growth. Net interest margin and return on total assets are common measures of an intermediary's financial performance and thus I expect these variables to be procyclical. Net interest margin is calculated as the interest income on loans less the interest expense on deposits, expressed as a percentage of total assets. Return on assets is calculated as total net income (including non-interest income) as a percentage of total assets. Since it makes sense that interest income and expenses will depend more on macroeconomic conditions than non-interest income and expenses (which include a lot of fixed fees and operating costs), I expect net interest margin to be more sensitive to the business cycle than return on total assets.

It is possible that return on assets and net interest income are not perfect measures of a credit union's financial performance because, since the credit union's objective is not profit maximization, it may choose to sacrifice income in favour of providing below market rates to borrowers or above market rates to savers. I have still chosen to include return on assets and net interest income in my analysis for several reasons. First, as argued by Goddard, McKillop and Wilson (2008), while credit unions do offer preferential rates on regular savings accounts, there is no evidence for preferential rates for many other financial products, including mortgages and credit cards. Furthermore, the NCUA itself uses return on assets as the core earnings variable in their CAMEL assessment of credit union performance (NCUA 2000). In fact, the NCUA states that ROA reflects "the level, growth trends and stability of earnings, particularly the return on average assets; and the sufficiency of earnings to cover necessary formation of physical capital and financial commitments (ibid:15)."

Lastly, profitability measures such as return on assets are commonly used in empirical evaluations of credit unions and other cooperative institutions (McKillop and Wilson 2008; Kaushik and Lopez 1996).

Finally, I include the capital-asset ratio to see whether banks and credit unions adjust their degree of leverage over the business cycle. For banks, total equity capital is an item on call reports while for credit unions, I summed together the call report items for undivided earnings, regular reserves, appropriation for non-conforming investments, other reserves, uninsured secondary capital and net income in order to find the total net worth for each credit union. More volatility in the capital-asset ratio could be an indicator of system instability. Summary statistics for these financial variables are presented in Tables 2 and 3.

Table 2: Financial Health and Performance of the American Banking Sector, 1994-2010

	(1)	(2)	(3)
	1994-2000	2000-2005	2006-2010
Non-Performing Loans / Total Loans (%)	1.017	1.545	2.617
Total Equity / Total Assets (%)	7.649	8.542	9.540
Loan Loss Provisions / Total Assets (%)	0.299	0.483	0.826
Return on Total Assets	1.007	0.950	0.665
Net Interest Margin	2.990	2.760	2.456

Table 3: Financial Health and Performance of the American Credit Union Sector, 1994-2010

	(1)	(2)	(3)
	1994-2000	2000-2005	2006-2010
Non-Performing Loans / Total Loans (%)	0.701	0.805	1.139
Total Equity / Total Assets (%)	10.15	10.34	10.42
Loan Loss Provisions / Total Assets (%)	0.314	0.416	0.653
Return on Total Assets	0.837	0.542	0.0398
Net Interest Margin	3.549	3.310	3.032

The four macroeconomic variables included in the analysis are GDP growth, the long term interest rate, the inflation rate and the state unemployment rate. GDP growth is the most standard measure of macroeconomic development and it also reflects the level of demand for banking services. The long term interest rate affects financial intermediaries in two ways: first, most loans issued by banks are long term and thus the interest income earned by banks depends on the prevailing interest rate and second, there is the indirect effect that the long term interest rate has on economic growth (Bikker and Hu, 2002). I have used the interest rate on ten year Treasury bonds for this variable. Although unemployment rates have less of a direct effect on bank income, they are an important business cycle indicator. Lastly, inflation reduces the value of bank assets, can affect business and household spending and also captures aspects of the business cycle (ibid).

5 Methodology

5.1 Regression Specification

To estimate how the various balance sheet measures respond to macroeoconomic variables, I would need to fit the following regression specification:

$$F_{it} = \beta_1 GDP_t + \beta_2 INFL_t + \beta_3 UR_{it} + \beta_4 LTIR_t + \theta\eta_i + \epsilon_{it}$$

where F_{it} is a financial health or performance variable for state-intermediary combination i in quarter t, GDP_t is the growth rate of real GDP in quarter t, UR_{it} is the unemployment rate for state-intermediary combination i in quarter t, $INFL_t$ is the inflation rate in quarter t and $LTIR$ is the interest rate on ten year Treasury bonds in quarter t. η_i is a fixed effect for state-intermediary combination i. Since the goal is to test whether credit unions and banks display different levels of procyclicality, I then substitute two interaction terms for each explanatory variable. For example, GDP_t is replaced by $GDP_t CU_{it}$ and $GDP_t Bank_{it}$ where CU_{it} is a dummy variable that takes a value of one for a credit union observation and zero otherwise while $Bank_{it}$ is a dummy variable that takes the opposite values. In effect, this is like estimating separate regressions for the credit union panel and the bank panel, except that by nesting the two models I will be able to test whether the parameter estimates are statistically different. This follows the general approach taken by Albertazzi and Gambacorta (2009) when they examine the differences in procyclicality between Anglo-Saxon and euro area financial sectors. The models were also estimated with lags of the various independent variables. However, the lagged coefficients were rarely significant and did not improve the R^2 and thus were omitted in the interest of parsimony. Thus, my analysis relies on the following econometric framework:

$$\begin{aligned} F_{it} = {} & \beta_1 GDP_t CU_{it} + \beta_2 INFL_t CU_{it} + \beta_3 UR_{it} CU_{it} + \beta_4 LTIR_t CU_{it} \\ & + \beta_5 GDP_t Bank_{it} + \beta_6 INFL_t Bank_{it} + \beta_7 UR_{it} Bank_{it} + \beta_8 LTIR_t Bank_{it} + \theta\eta_i + \epsilon_{it} \end{aligned}$$

5.2 Robustness

The rationale behind using a fixed effects approach is that it is likely that each state-intermediary combination has individual characteristics that may affect the financial health and performance

variables. Including the time-invariant entity specific intercept, η_i, controls for this issue. However, the assumption is that the error terms for the state-intermediary combinations are not correlated. To evaluate the appropriateness of this approach, I conduct Hausman tests for each of the five regressions, where the null hypothesis is that the unique errors are uncorrelated with the regressors. In other words, the null hypothesis is that the random effects model is the correct model. In each case, the Hausman test statistic, which has a Chi-square distribution, is larger than 100 and thus the null hypothesis can be rejected at any significance level. Therefore, the models are estimated with fixed effects.

Similarly, a modified Wald test is employed to test for heteroskedasticty in all five of the regressions. The null hypothesis here is that the errors are homoskedastic: in each of the five regressions, the p-value was less than 0.05. This indicates that the null could be rejected at a 95% confidence level and thus the model is adjusted to compute robust variance estimators. Therefore, the estimates reported in the results section feature heteroskedasticity robust standard errors.

6 Results

As shown in Table 3, non-performing loan rates move with the business cycle. For commercial banks, the interaction terms are all highly significant and display a positive correlation between non-performing loan rates and GDP growth, the long term interest rate and inflation while there exists a negative correlation between the state unemployment rate and the non-performing loan rates. The directions of these correlations are expected and consistent with the previous literature: in poor economic conditions, a higher proportion of a bank's loans are delinquent. The interaction terms have the same sign for credit unions, although only the state unemployment rate has a statistically significant effect. In each case, the bank explanatory variables are of greater magnitude and this difference is statistically significant for each of the business cycle indicators. Thus, delinquency rates for banks are more sensitive to the business cycle than for credit unions. Lastly, the adjusted R^2 of 0.49 shows that just this small set of macroeconomic variables explains nearly half of the variation in non-performing loan rates.

The results are very similar when the same model is estimated with loan loss provisions as

a percentage of total assets as the dependent variable. Loan loss provisions, as expected, display countercyclical behaviour: banks set less aside during upturns to cover future losses. The coefficients on the interaction terms are again smaller for credit unions than for banks. In particular, loan loss provisions for credit unions are much less correlated with the growth rate in GDP. Overall, the lower adjusted R^2 in this model shows that loan loss provisions are not as closely tied to macroeconomic conditions as non-performing loan rates.

Using the capital-asset ratio as the endogenous variable yields more ambiguous results. The coefficients on the credit union terms are all very close to zero and are not significant, while only inflation and the long term interest rate are significant for predicting banks' capital-asset ratio. The correlation is negative for inflation but positive for the long term interest rate. Therefore, in contrast to Guidara, Lai and Soumare's (2011) findings, there is no clear evidence here that financial intermediaries adjust their leverage in response to economic shocks. This result is however in line with Andrew Lo's position that the idea that banks radically increased their leverage leading up to the financial crisis is merely "folk wisdom" (2012:152).

Table 4: Regression Results for Measures of Financial Health

	(1)	(2)	(3)
	Non-Performing Loan Rate	Loan Loss Provisions	Total Equity / Total Assets
Bank x INFL	-0.0822***	-0.0589***	0.150***
	(0.0187)	(0.0137)	(0.0386)
Bank x UR	0.445***	0.0885***	-0.0138
	(0.00759)	(0.00553)	(0.0157)
Bank x GDP	-0.138***	-0.0730***	0.0330
	(0.0162)	(0.0118)	(0.0335)
Bank x LTIR	-0.140***	-0.0645***	-0.506***
	(0.0101)	(0.00738)	(0.0209)
Credit Union x INFL	-0.0115	-0.0107	0.00330
	(0.0187)	(0.0137)	(0.0386)
Credit Union x UR	0.179***	0.0844***	-0.00156
	(0.00760)	(0.00553)	(0.0157)
Credit Union x GDP	-0.0286	-0.0360**	-0.00349
	(0.0162)	(0.0118)	(0.0335)
Credit Union x LTIR	-0.0153	-0.0400***	0.00132
	(0.0101)	(0.00738)	(0.0209)
Observations	6933	6936	6933
Adjusted R^2	0.491	0.143	0.085
F_f	29.37	49.78	97.99

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

For commercial banks banks' net interest margin, the coefficients on the GDP growth rate and long-term interest rate terms are both positive and significant. The largest coefficient is on the interest rate variable; since the ten year rate on Treasury bonds directly affects the interest income earned on bank loans, this result is also consistent with expectations. The coefficients on the credit union interaction terms display the same behaviour, although again they are significantly smaller in magnitude. Thus, although net interest margin for both types of financial intermediary is procyclical, interest income varies more with the business cycle for commercial banks than for credit unions.

The final model uses return on total assets as the dependent variable. For both banks and credit unions, the inflation interaction term is not significant but return on total assets is positively correlated with GDP growth and the long term interest rate and negatively correlated with unemployment. The coefficients are larger for banks with regards to GDP growth and unemployment although interestingly, the long term interest rate has a larger effect on return on assets for credit unions than for banks. Therefore, it is difficult to draw any conclusions as to whether banks or credit unions display more procyclicality in terms of returns on total assets. Another surprising result from this last model is that the adjusted R^2 of 0.36 is greater than the adjusted R^2 of 0.16 from the net interest margin model. Thus, it appears that this set of macroeconomic variables is better at explaining the variation in returns on total assets than the variation in net interest margins. This is counterintuitive because return on total assets includes forms of income and expenses (such as building costs, salaries and fees on accounts) that should be less dependent on the state of the economy. One possible reason for this result is that income from investments is included in the non-interest part of the income statement and this form of income is likely highly sensitive to the business cycle. The results from these last two models are provided in Table 5.

Table 5: Regression Results for Measures of Financial Performance

	(1)	(2)
	Net Interest Margin	Return on Total Assets
Bank x INFL	-0.0838***	0.00149
	(0.0158)	(0.0131)
Bank x UR	-0.00616	-0.150***
	(0.00642)	(0.00531)
Bank x GDP	0.0971***	0.195***
	(0.0137)	(0.0113)
Bank x LTIR	0.209***	0.0697***
	(0.00856)	(0.00708)
Credit Union x INFL	-0.0504**	-0.0201
	(0.0158)	(0.0131)
Credit Union x UR	-0.00377	-0.0636***
	(0.00642)	(0.00531)
Credit Union x GDP	0.0562***	0.128***
	(0.0137)	(0.0113)
Credit Union x LTIR	0.133***	0.181***
	(0.00856)	(0.00708)
Observations	6936	6936
Adjusted R^2	0.160	0.356
F statistic	75.25	32.87

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

7 Extensions

7.1 Size Restrictions

The first extension to the base model revolves around the size of the banks and credit unions included in the sample. As shown in Table 1 above, the mean total dollar value of assets at a commercial bank is an order of magnitude larger than at a credit union. This discrepancy raises the possibility that the commercial banking sector's procyclicality may be the result of risky practices at the large urban, national and multinational banks which derive a large proportion of their income from investment and wholesale banking and trading rather than from retail banking. By restricting the sample to banks and credit unions that have less than $5 billion in total assets, I can better compare banks and credit unions of similar size. This cap on asset size removes 137 commercial banks from the sample, including the vast majority of the national and multinational banking franchises as well as some of the larger urban banks. Thirteen credit unions are also removed from the sample – these are all corporate credit unions, which provide funding and other financial services for normal credit unions. The resulting sample is more evenly matched. The average size, in terms of total assets, of the remaining banks is $222 million, while the average asset size of the remaining credit unions is $113 million. The same set of five regressions are then estimated, with results displayed in Tables 6 and 7 in the appendix. Similar robustness checks as the ones described in the methodology section are again used to ensure the validity of the results.

Interestingly, the results are nearly identical to the base case. In terms of the non-performing loan rate, loan loss provisions and the capitalization ratio, all of the parameters that were significantly different from zero are still significantly different from zero and all of the signs are the same. The difference between the credit union and bank interaction terms is also maintained: in other words, even the 'country' banks are less resilient to the business cycle than credit unions. The only difference is that the capitalization ratio for commercial banks is now significantly negatively correlated with the unemployment rate. Thus, at least by this one metric, procyclicality is greater for the smaller commerical banks than for the entire universe of commercial banks. For the two profitability measures, the only difference is that the net interest margin of commercial banks is

now negatively correlated with the unemployment rate for at a 99.9% confidence level and that the smaller credit unions' return on total assets is no longer significantly affected by the inflation rate. However, the overall inference is unchanged: credit unions are significantly less responsive to macroeconomic indicators than commercial banks. Thus, the greater resiliency of credit unions does not appear to be only a result of risky practices by the J.P Morgans and Bank of Americas of the world but also because of differences between 'country' banks and credit unions. The other result from this extension is that it appears that smaller commercial banks, which rely more heavily on the retail sector, are more vulnerable to increases in the unemployment rate.

7.2 Sand States

The next extension is an attempt to deal with the possibility that the lesser procyclicality of credit unions could be because they are located primarily in different geographic regions than commercial banks. For example, it is possible that credit unions might appear more resilient than banks if they are less heavily concentrated in areas hit harder by the foreclosure crisis and the recent recession. To address this issue, I restrict the sample to only the four 'sand states' of Arizona, California, Florida and Nevada. These four states featured the fastest increase in home prices during the 1990s and 2000s and they also faced some of the largest increases in unemployment and foreclosure rates once the housing bubble burst (Matthews, 2012). The results from estimating the effects of macroeconomic indicators on the five measures of financial health and performance in the four sand states are provided in Tables 8 and 9 in the appendix.

Unsurprisingly, the coefficients on the interaction terms for both credit unions and commercial banks are larger in this model: this demonstrates that both types of financial institutions are more sensitive to macroeconomic conditions in the states which were most affected by the recession. However, less of the parameters have values that are statistically significant at a 95% confidence level. This is also expected because the panel has been greatly reduced from 6,936 state-intermediary combinations to only 544. However, where results are significant, the familiar pattern still holds. For example, the unemployment rate has a significant effect on the non-performing loan rate for both banks and credit unions, but this effect is larger for commercial banks and the difference is

statistically significant. Similarly, increases in the GDP growth rate reduce the non performing loan rate for both types of intermediary but this result is only significant for commercial banks. On the other hand, there are some unexpected results: for example, GDP growth and the unemployment rate only have a significant effect on loan loss provisions for credit unions. Overall, however, the results are much less robust in this case because of the dramatically reduced sample size: the adjusted R^2 values are much lower in four of the five regressions. However, there is still some evidence that in terms of net interest margin, non-performing loan rates and return on total assets, commercial banks are more sensitive to the business cycle than credit unions even in the region of the United States that had the largest response to the recession of the late 2000s.

7.3 Membership Bonds

The previous two extensions both suggest that it is the distinct nature of credit unions that make them less procyclical rather than their size or geographic concentration. The final extension to the base model attempts to partially identify which part of the credit union's uniqueness leads to its greater resiliency to the business cycle. The first alternative, advanced in Section 3, is that the cooperative governance structure leads to different incentives and thus different behaviour and performance. The other alternative is that credit unions are less responsive to macroeconomic indicators simply because of selection bias. The argument here is that because of common bond requirements, the average credit union member might are more likely to be employed and to have closer ties with his or her community than the average client of a commercial bank. This assertion can be tested by first comparing the procyclicality of credit unions that have no common bond requirement with credit unions that have any type of occupational bond. The methodology is very similar to the base model, except that the sample now only contains credit unions and the dummy variables now indicate whether the credit union is open or bonded. Thus, the panel variable is now a state-bond combination rather than a state-intermediary combination. The other major difference is that the sample is restricted to federally chartered credit unions because state chartered unions do not indicate their field of membership requirement on their quarterly call reports.

The results from this set of regressions are also in the appendix, displayed in Tables 10 and

11. The major finding is that the coefficients on the interaction terms for credit unions with an occupational bond are not significantly different from the coefficients on the interaction terms for credit unions with no common bond requirement. In other words, this analysis provides zero evidence that credit unions with a common bond are more or less procyclical than credit unions without a common bond. This result in turn suggests that it is not selection bias in terms of membership that leads to greater resiliency on the part of cooperative financial institutions.

Similar analysis was conducted comparing federally charted credit unions with a manufacturing membership base and those with a membership base in the military, education or government sectors. Since the latter sectors are less cyclical than manufacturing, I expected that these public sector credit unions would be less sensitive to the business cycle. However, the results demonstrate that there is no significant differences in the procyclicality of these different types of credit unions. Again, this may indicate that credit unions are less procyclicical than commercial banks because of different governance structures and management practices rather than because of differences in client bases. However, there were some problems with this last analysis because not all states had credit unions with the different type of bonds in every quarter. The ensuing unbalanced panel led to less robust results.

8 Conclusions

The main result from estimating these models is that the American credit union sector is in general significantly more resilient to business cycle effects then commercial banks. Measures of financial performance such as return on assets and net interest margin and measures of credit quality such as loan loss provisions and the non-performing loan rate respond more to macroeconomic conditions for commercial banks. Loan loss provisions for both credit unions and commercial banks move counter to GDP growth; thus, rather than using loan loss provisions to smooth income over time (i.e., set more aside for potential future losses in good economic times), financial intermediaries are backward looking with respect to their loan loss provisions. This is consistent with the findings of Albertazzi and Gambacorta (2009). I also found no clear evidence that the degree of leverage, measured by total equity as a percentage of total assets, was procyclical for either commercial

banks or credit unions.

Furthermore, these results remain significant even when large banks are removed from the sample or when the sample is restricted to just the 'sand states' of Arizona, Florida, Nevada and California. This finding demonstrates that the steadier performance of credit unions is not just a function of risky investment banking practices skewing the commercial banking data or because credit unions potentially have less exposure to the geographic region hardest hit by the mortgage crisis. Instead, this lends evidence to the view that the distinct governance structure is a major factor in credit unions' lower level of procyclicality. Similarly, there were very few significant differences between credit unions that had occupational bonds and credit unions that had open membership and between credit unions that had occupational bonds in manufacturing and credit unions that had membership comprised of public service workers. These results help show that the success of credit unions is not merely due to selection bias in terms of membership.

There are several implications of these results. First, the greater sensitivity of commercial banks to the business cycle may help explain why banks experienced a higher failure rate and more upheaval during the recent recession. Second, if the goal of policy makers is to improve financial stability by reducing procyclicality, it may be worthwhile to provide incentives to increase the relative size of the credit union sector or to place relatively more stringent regulatory constraints on commercial banks. However, it is worth noting that this essay makes no attempt to evaluate the relative performance of credit unions and banks but instead examines the relative volatility of their financial health and performance.

There are also several ways to improve and extend the results of this analysis. The robustness of the econometric analysis could be improved; for example, rather than simply estimating a static fixed effects model, I could include lags and leads of the dependent and variables and then estimate the dynamic model with the Arellano and Bond generalized method of moments approach. It also would be interesting to look at this same question in other jurisdictions. Are the differences between credit unions and commercial banks unique to the United States or do they extend to other OECD countries? In Canada, for example, the commercial banking sector is much more concentrated and so the interaction between the two types of financial intermediaries might be very different.

Unfortunately, other countries' financial sectors–including Canada's– do not have the same amount of publicly available microdata and so it would be difficult to conduct the same type of analysis.

While this work is limited to the question of *whether* the degree of procyclicality is different between banks and credit unions, it could be extended to delve more into *why* this difference exists. This issue could be addressed by taking a more micro-oriented approach: for example, I could examine balance sheet data to observe how loan portfolios and investments vary in terms of maturity and risk between banks and credit unions. Credit unions are largely prohibited from participating in the subprime mortgage market and are also more likely to keep the loans they make on their books and so I could test whether these decisions play a role in their resiliency to business cycle effects. One issue here is that banks and credit unions face very different reporting requirements and so it is difficult to compare balance sheet entries with only publicly available data. Finally, Quagliariello (2006) discusses the possibility of second round effects, where the financial sector's performance affects real economic activity. My analysis instead assumes that the macroeconomic variables are purely exogenous and so another area for improvement would be to allow for these feedback effects between financial intermediaries and the larger macroeconomic environment.

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10 Appendix

Table 6: Regression Results for Measures of Financial Health (Sand States Only)

	(1)	(2)	(3)
	Non-Performing Loan Rate	Loan Loss Provisions	Total Equity / Total Assets
Bank x INFL	0.133	0.0150	-0.122
	(0.170)	(0.150)	(0.177)
Bank x UR	0.442**	0.0460	-0.329
	(0.0872)	(0.114)	(0.322)
Bank x GDP	-0.216	-0.0222	0.269
	(0.106)	(0.140)	(0.508)
Bank x LTIR	-0.145*	-0.164	-0.868***
	(0.0608)	(0.119)	(0.128)
Credit Union x INFL	0.0428	-0.0336	0.00222**
	(0.0218)	(0.0232)	(0.000581)
Credit Union x UR	0.399***	0.239**	-0.00226**
	(0.0699)	(0.0518)	(0.000614)
Credit Union x GDP	-0.0288	-0.201**	-0.00122
	(0.0398)	(0.0557)	(0.00127)
Credit Union x LTIR	-0.171**	-0.153**	0.000834
	(0.0413)	(0.0304)	(0.000865)
Observations	543	544	543
Adjusted R^2	0.729	0.287	0.146

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 7: Regression Results for Measures of Financial Performance (Sand States Only)

	(1)	(2)
	Net Interest Margin	Return on Total Assets
Bank x INFL	-0.0881	-0.0791
	(0.0777)	(0.143)
Bank x UR	-0.0995	-0.262**
	(0.112)	(0.0594)
Bank x GDP	0.170	0.402***
	(0.125)	(0.0453)
Bank x LTIR	0.0667	0.0811
	(0.153)	(0.0892)
Credit Union x INFL	-0.0637*	0.0166
	(0.0217)	(0.0248)
Credit Union x UR	0.0565***	-0.197**
	(0.00163)	(0.0551)
Credit Union x GDP	0.0665*	0.345***
	(0.0210)	(0.0381)
Credit Union x LTIR	0.175**	0.284***
	(0.0361)	(0.0244)
Observations	544	544
Adjusted R^2	0.071	0.456

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 8: Regression Results for Measures of Financial Health (Total assets under $5 billion)

	(1)	(2)	(3)
	Non-Performing Loan Rate	Loan Loss Provisions	Total Equity / Total Assets
Bank x INFL	-0.0888***	-0.0410**	0.148***
	(0.0208)	(0.0125)	(0.0400)
Bank x UR	0.441***	0.0986***	-0.0746***
	(0.00844)	(0.00508)	(0.0162)
Bank x GDP	-0.164***	-0.0513***	-0.0520
	(0.0180)	(0.0109)	(0.0346)
Bank x LTIR	-0.124***	-0.0514***	-0.625***
	(0.0113)	(0.00678)	(0.0216)
Credit Union x INFL	-0.0100	-0.0108	0.00333
	(0.0208)	(0.0125)	(0.0400)
Credit Union x UR	0.181***	0.0842***	-0.00159
	(0.00844)	(0.00508)	(0.0162)
Credit Union x GDP	-0.0298	-0.0348**	-0.00358
	(0.0181)	(0.0109)	(0.0347)
Credit Union x LTIR	-0.0159	-0.0380***	0.00117
	(0.0113)	(0.00678)	(0.0216)
Observations	6933	6936	6933
Adjusted R^2	0.432	0.158	0.120
F_f	24.88	42.43	101.7

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 9: Regression Results for Measures of Financial Performance (Total assets under $5 billion)

	(1)	(2)
	Net Interest Margin	Return on Total Assets
Bank x INFL	-0.0547***	-0.00245
	(0.0134)	(0.0153)
Bank x UR	-0.0189***	-0.169***
	(0.00543)	(0.00622)
Bank x GDP	0.0764***	0.165***
	(0.0116)	(0.0133)
Bank x LTIR	0.148***	0.0603***
	(0.00724)	(0.00829)
Credit Union x INFL	-0.0490***	-0.0196
	(0.0134)	(0.0153)
Credit Union x UR	-0.00374	-0.0667***
	(0.00543)	(0.00622)
Credit Union x GDP	0.0553***	0.129***
	(0.0116)	(0.0133)
Credit Union x LTIR	0.130***	0.184***
	(0.00724)	(0.00829)
Observations	6936	6936
Adjusted R^2	0.153	0.294
F_f	80.80	31.20

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 10: Regression Results for Measures of Financial Performance (Open vs. Common Bond)

	(1)	(2)	(3)
	Non-Performing Loan Rate	Loan Loss Provisions	Total Equity / Total Assets
Open x INFL	-0.0117	-0.0122	0.00221***
	(0.0135)	(0.00799)	(0.000315)
Open x UR	0.206***	0.0644**	-0.00197***
	(0.0402)	(0.0215)	(0.000414)
Open x GDP	-0.0399*	-0.0185	-0.000799*
	(0.0168)	(0.0144)	(0.000345)
Open x LTIR	0.0439	-0.0773***	-0.000676
	(0.0304)	(0.00967)	(0.000729)
Bond x INFL	-0.0115	-0.0133*	0.00330***
	(0.00783)	(0.00556)	(0.000276)
Bond x UR	0.179***	0.0455***	-0.00156*
	(0.0276)	(0.0123)	(0.000697)
Bond x GDP	-0.0286*	-0.00796	-0.00349***
	(0.0111)	(0.00892)	(0.000778)
Bond Union x LTIR	-0.0153	-0.0455***	0.00132
	(0.0157)	(0.00873)	(0.00168)
Observations	6242	6936	6242
Adjusted R^2	0.315	0.218	0.044

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 11: Regression Results for Measures of Financial Performance (Open vs. Common Bond)

	(1)	(2)
	Net Interest Margin	Return on Total Assets
Open x INFL	-0.0348	0.00479
	(0.0325)	(0.0124)
Open x UR	-0.245***	-0.129***
	(0.0132)	(0.00503)
Open x GDP	0.251***	0.166***
	(0.0291)	(0.0111)
Open x LTIR	-0.553***	-0.0235***
	(0.0177)	(0.00671)
Bond x INFL	-0.106**	-0.0287*
	(0.0327)	(0.0124)
Bond x UR	-0.207***	-0.104***
	(0.0133)	(0.00504)
Bond x GDP	0.257***	0.127***
	(0.0283)	(0.0108)
Bond Union x LTIR	-0.261***	0.0303***
	(0.0177)	(0.00672)
Observations	6936	6936
Adjusted R^2	0.156	0.214

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$