

## Credit Union Failures: Why Liquidate Instead of Merge?

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**Abstract:** *We examine whether certain credit union (CU) characteristics are associated with the likelihood of CU liquidations. Using a sample of CU liquidations and a control group of CUs involved in a merger, we find that a CU's percentage of delinquent loans, provision for loan losses, and average loan balance are positively related to the likelihood of liquidation. Moreover, a CU's return on assets (ROA) is negatively associated with the likelihood of liquidation. We incorporate tests of the impact of the financial crisis on determinants of CU liquidation and find that neither ROA, percentage of delinquent loans, nor provision for loan losses are more important liquidation predictors in the post-financial crisis period. Our findings have implications for not only academics, but for anyone involved with CUs. Perhaps most significantly, regulators may benefit from our findings as they determine the appropriate level and method of intervention, and consider how to minimize costly liquidations.*

**Keywords:** Credit unions, liquidations, mergers, financial crisis

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## **1. Introduction**

Credit Unions (CUs) are part of the highly regulated financial services industry. They differ from banks in that they are member-owned, as opposed to owned by an external individual or group of investors. As a result of their unique ownership structure, they have different incentives than banks. For example, they may not be as motivated by the traditional profit motive (Bauer 2009). Instead, their goal is to reduce costs for participating members. CUs are not usually insured by the FDIC. Instead, they are insured by another fund, called the National Credit Union Share Insurance Fund (NCUSIF), which is controlled by the National Credit Union Association (NCUA).

When CUs fail, then, who suffers? Everyone that does banking through a CU, CU employees, and regulators. Because the NCUSIF must be used to cover shortfalls in cases of failure, credit union failures are costly for all credit unions, who must in turn pay to fund the NCUSIF. More failures mean greater insurance premiums for CUs. These funds must be recovered from individuals participating in CUs, which means higher interest rates on loans, lower interest rates on deposits and higher fees. In addition, these costs may affect members in the form of fewer automatic teller machines (ATMS), available tellers at CU locations and in the extreme, fewer CU branches.

A liquidation is such an undesirable outcome that regulators such as the NCUA often try to broker a merger between a failing credit union and a healthier one. Regulators may even offer financial incentives to the acquiring CU in order to avoid a liquidation by the struggling CU.

In the event that a CU fails, there are three possible outcomes:

- 1) The CU may be merged with another, more financially secure CU. This is the most desirable outcome.

- 2) The CU may be liquidated—that is, have its assets sold and its liabilities paid by proceeds with shortfalls covered by the NCUSIF.
- 3) The CU may experience an involuntary action called a purchase and assumption (P&A). This event is similar to a voluntary liquidation, but forced by the NCUA. In a P&A liquidation, some of the assets and liabilities of the CU are purchased and assumed by another, healthier CU.

The purpose of our study is to determine which factors are likely to lead to a liquidation outcome (which is costly for everyone) versus a merger outcome.

From the Great Depression era in the 1930s until the 1980s, CU liquidations dominated the relatively low-level of CU merger activity. However, prior research suggests that CUs, like other financial institutions, have had an increase in merger, as opposed to liquidation, activity over the past two decades (e.g., Bauer et al. 2009). According to the World Council of CUs, the number of CUs in North America<sup>1</sup> has decreased substantially over the past decade (from 10,593 CUs in 2002 to 8,227 CUs in 2011) while total assets have more than doubled during the same period (from \$617 billion in 2002 to \$1.3 trillion in 2011).

CU liquidations over the past two decades have been relatively limited. To illustrate, data from the Credit Union National Association (CUNA) indicates there were fewer than 20 CU liquidations on average, compared to more than 200 CU mergers, in each year from 1995 through 2011. Prior research explains why mergers may be preferred over liquidations in the CU industry. Bauer et al. (2009) suggest that target CU members (owners) enjoy gains when mergers remove risky CUs from the market. They indicate that if a CU liquidation represents a substantial loss to the NCUSIF, then it may be better for the regulator if the struggling CU merges with a

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<sup>1</sup> These numbers include the United States, Canada, and Mexico, however approximately 90% of the total CUs are in the United States.

healthy CU. They also suggest that regulators may, therefore, pressure a healthy CU to merge with a weak CU because allowing a troubled CU to liquidate is detrimental to all NCUA-insured CUs.

Wilcox and Dopico (2011) argue that the benefits (as measured by a reduction in noninterest expenses) of mergers, while primarily limited to target CU members, have shifted over time and now relate to acquiring CU members as well. Although they acknowledge that when the acquiring CU is substantially larger than the target CU, the acquiring CU members receive little benefit, they show that when the acquirer and the target are more equal in size, the benefits are shared more evenly among acquiring CU and target CU members. Yet, in spite of the potential benefit from mergers, some CUs are liquidated instead. Our investigation focuses on determining what factors, if any, explain the liquidation versus merger decision. This background leads to the primary focus of our paper which has not been addressed in the literature. We are interested in determining why CUs are allowed to liquidate when previous research suggests that mergers invoke potential benefits for target CUs, acquiring CUs, and regulators.

We compare the financial characteristics of target CUs involved in a merger with CUs that liquidate (i.e., not involved in a merger) in order to determine which factors are associated with the liquidation decision. To investigate this empirical question, we use a sample of CUs that went through liquidation from 2005 through 2007 and from 2010 through 2012. We also utilize a control sample of target CUs involved in a merger during this same sample period. We eliminate 2008 and 2009 from our sample period<sup>2</sup> in order to mitigate the effect that the financial crisis

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<sup>2</sup> Including 2008 and 2009 does not significantly alter our inferences. Nevertheless, these years remain excluded from the final analysis.

may have on results. Our multi-period sample allows us to identify whether CU characteristics that determine liquidations changed across the pre- vs. post-financial crisis periods.

We estimate logistic regression models and find that a CU's percentage of delinquent loans, provision for loan losses, and average loan balance are positively related to the likelihood of liquidation (as opposed to a merger). Moreover, a CU's return on assets (ROA) is negatively associated with the likelihood of liquidation. We incorporate tests of the financial crisis impact on determinants of CU liquidation and find no significant difference in the effect of ROA, the percentage of delinquent loans, and the provision for loan losses as predictors of liquidation in the post- (as opposed to the pre-) financial crisis period.

Our study contributes to the literature in two primary ways. First, we extend prior research on factors related to CU merger activities and decisions by examining why certain CUs liquidate when potentially all major stakeholders (i.e., regulators, target and some acquiring CUs) can realize benefits when mergers occur. Second, we focus on the determinants related to the decision to allow CU liquidation, which is not addressed in prior research. This is important because existing CU liquidations impact regulators in a very significant way, and they impact CU employees, members and customers as well. Our findings are of interest to each of these groups, but especially to regulators in the ongoing debate about the appropriate level of involvement of the NCUA in mediating mergers by identifying characteristics associated with eventual liquidation (Rubenstein, 2012). The remainder of the paper is structured as follows. In section two, we discuss the background and hypotheses. Section three provides the sample and results. We discuss our findings in section four.

## **2. Background and hypothesis development**

### ***2.1 Credit union history and background***

CUs first appeared in North America around 1900 in Quebec, Canada (Clark 1943). In that instance, the founder, Alphonse Desjardin, instituted a CU to serve the needs of local farmers. Farmers were unable to obtain credit in reasonable amounts at reasonable rates due to the inability of banks to obtain reliable information about each farm and owner in a cost effective manner. Similar situations have historically served as the genesis of CUs.

CUs today represent an important part of the American depository system, with CU deposits accounting for more than 10% of all savings deposits and more than 12% of employees at depository institutions (Bauer 2012). CU market share has also increased over time.

According to Wheelock and Wilson (2011), CU market share has doubled over a 25 year period. While CUs serve a function similar to banks, they differ in some important ways.

The fundamental difference between CUs and banks is ownership. Whereas banks may have a variety of ownership structures, nearly all have the maximization of shareholder wealth as a shared objective. CUs, in contrast, are owned by the members. That is, those participating in the CU by depositing money are the only owners. It is also the case that CUs generally only lend money to CU members. This type of ownership structure renders most incentive theories inapplicable. Therefore, the objective of a CU is to meet the needs of its members efficiently as opposed to maximizing profit in the traditional sense. Although some members join a CU with the purpose of saving while others join a CU with the purpose of obtaining credit (Goddard et al. 2002), most CUs emphasize providing loans. Because CU assets are comprised primarily of loans, prior research tends to use total assets as a proxy for CU size (Amburgey and Dacin 1993; Barron et al., 1992, 1994; Smith 1986).

Fried et al. (1993) address the issue of evaluating the performance of U. S. CUs. They point out that CUs suffer from the disadvantage of being smaller, on average (less than \$100 million in assets), than banks and are thus less able to take advantage of economy-of-scale opportunities. However, they have a tax advantage as a result of only interacting with members and not producing a profit. Fried et al. (1993) evaluate the performance of CUs on the basis of efficiency (actual vs. potential) across a variety of categories including labor, operating expense, loan quantity, price and variation, and savings quantity. They find approximately 20% productive inefficiency for CUs which implies substantial room for improvement.

## ***2.2 Credit union merger and liquidations: potential benefits and costs***

Bauer et al. (2009) show that over a ten-year period, 25% of CUs merged. Most acquired CUs were struggling financially. They posit that many of the mergers that occur in this industry are mediated, at least in part, by the NCUA. This may be in the best interest of the industry, because “(a)ll institutions insured by the NCUSIF are jointly and severally responsible without limit for curing any shortage that might develop” (Kane and Hendershott 1996). In other words, the community of NCUA insured CUs may benefit more from merging troubled CUs than by letting them liquidate.

Fried et al. (1999) examine the impact of CU mergers on members. Based on a sample of 300 merger participants between 1988 and 1995, they find that the service provision to members of the acquired firm improves, whereas there is no impact on the service provision of the acquirer. Bauer et al. (2009) also report certain benefits from merger activity. Specifically, they find that CUs perform better following mergers and that CAMEL ratios for merged CUs improve substantially. Although they find no merger-related benefit to the acquiring CUs, they suggest

that regulatory motivations to merge may exist due to the improvement in financial stability (as measured by CAMEL ratios) for merged CUs.

In spite of indications that the acquiring firm may not directly improve its performance through a merger, there are still potential benefits. Regulators have established minimum reserve ratio requirements for CUs which may impede growth. As Bauer et al. (2009) indicate, CUs should desire growth because of economies of scale. CUs can grow by widening their margins or through merger activity. Although efficiency does not change for acquiring CUs, prior research suggests that target CUs, as well as all NCUA insured CUs, experience an increase in efficiency during the post-merger period. In summary, it appears that there are benefits, perhaps to both firms, when a merger takes place. Why, then, are some CUs allowed to liquidate? The purpose of our study is to answer this question.

### **2.3 *Credit unions in the context of the financial services industry***

In the larger context of the financial services industry, performance determinants, and regulatory decisions are both of interest to researchers. For example, Fahlenbrach et al. (2012) find that a bank's stock performance during the 1998 crisis predicts stock performance and the likelihood of failure during the most recent crisis. Berger and Bouwman (2013) focus on the performance of banks during the most recent financial crisis. Chen (2013) examines the impact of regulatory decisions and macroeconomic factors on bank productivity. Savona et al. (2013) examine regulatory decisions in the context of European banks.

Our focus, is on credit unions. Credit unions, while not publicly traded firms, are an important part of the financial services market. CUs fared better in the last two financial crises than did banks (Bauer 2012). This may be due in part to the different objective function of CUs. In the absence of a profit motive, the incentive to make risky loans decreases. Of course, some

CUs did struggle. A few received Troubled Asset Relief Program funds, and though most of those struggling were merged with larger, more solvent CUs, some CUs were liquidated.

A substantial amount of prior research investigates determinants of bank failure (e.g., Cole and Gunther 1995, 1998; Estrella et al. 2000; Wheelock and Wilson 1995, 2000). Cole and Gunther (1995, 1998) suggest that common bank condition indicators, such as capital and troubled assets, are associated with the timing of bank failure. Estrella et al. (2000) examine how well various capital ratios (risk-weighted, leverage, and gross revenue ratios) predict future bank failure and find that all three are informative. However, the simpler leverage ratio and gross revenue ratio predict failure almost as well as the more complex risk-adjusted ratio in the short-term. The risk-adjusted ratio outperforms the leverage ratio and gross revenue ratio over longer time horizons. Wheelock and Wilson (1995, 2000) find that bank inefficiency increases (decreases) the likelihood of failure (acquisition).

Research on the determinants of *CU failure* is far more limited. Wilcox (2005) suggests that younger, smaller, and less capitalized CUs are more likely to fail and that macroeconomic conditions are related to CU failure rates. Goddard et al. (2009) investigate determinants of CU acquisition and find that growth-constrained CUs are less likely to be acquired. Moreover, undercapitalized CUs and those with smaller loan portfolios are more likely to be acquired.

Our study is related to, though distinct from Goddard et al. (2009). Goddard et al. compares merged CUs to healthy CUs, whereas we compare a liquidated CU group to a merged CU group. In addition, we compare factors across two different time periods (pre- and post-financial crisis) in the determinants of liquidation models. Goddard et al. (2009) eliminate any liquidated CUs during their sample period. This distinction is important because our focus is on determining which characteristics are associated with the decision to allow CUs to liquidate.

Regulators play a major role in arranging mergers, therefore our research question relates to regulatory decision-making with regard to the survival of business entities. Although all CUs suffer a loss through CU liquidation with NCUSIF involvement, there is also a cost of regulator assisted mergers. Assisted mergers and P&As typically involve financial assistance from the NCUA (NCUA, 2010). The NCUA is only required to take action if a CU is critically undercapitalized (i.e. CU has a net worth ratio of less than two percent). The NCUA is therefore restricted in its ability to assist with mergers via capital adequacy rules. Furthermore, the NCUA has proposed higher capital requirements for CUs that engage in risky activities, however, Hunt (2014) argues that other factors bear greater responsibility for CU failure. Consequently, by the time a CU is critically undercapitalized, many potential acquirers may no longer be interested in merging with the failing CU. This study not only aims to determine which factors could signal the likelihood of CU liquidation, it also highlights the implications of regulator rules.

#### **2.4 Hypothesis development**

To find the determinants of liquidation, we turn to the CAMEL rating system and the associated CAMEL ratios. The CAMEL rating system was adopted by the NCUA in October 1987 to assess a CU's financial health by reviewing the CU's capital adequacy, asset quality, management, earnings and asset/liability management (NCUA, 2000). We focus on the asset quality and earnings elements of the CAMEL rating system, specifically loan management and the associated profitability, because of the importance of loans to a CU's business model. According to prior research, CUs are primarily in business to make loans (Goddard et al. 2002; Smith 1986; Barron 1992). Therefore, we argue that delinquent loans will be a key factor in the decision to merge or liquidate. Specifically, we expect higher levels of delinquent loans to increase the likelihood of CU liquidation.

To the extent that delinquent loans are likely to impact CU profitability, we expect profitability will also impact the liquidation decision. We segregate earnings to determine the key drivers of the profitability ratio. Provision for loan losses is a CU's primary reserve. This reserve is discretionary by nature and as a result of its size, it is likely to have a material effect on profitability. Furthermore, the provision for loan losses is also directly related to loan management. Thus, we expect a positive association between the provision for loan losses and the decision to liquidate. We therefore predict the following:

**H1a:** *A CU's percentage of delinquent loans is positively associated with the likelihood of liquidation (a decision not to merge with another CU).*

**H1b:** *A CU's ROA is negatively associated with the likelihood of liquidation (a decision not to merge with another CU).*

**H1c:** *A CU's level of provision for loan losses is positively associated with the likelihood of liquidation (a decision not to merge with another CU).*

According to Marx (2010), the number of CU liquidations increased following the financial crisis. We expect that the NCUA may be more "on the alert" in the post-financial crisis period to identify CUs with poor loan management (e.g., higher percentage of delinquent loans, higher level of provision for loan losses, etc.) and poor financial performance (lower ROA) in order to not support merger activity (i.e., allow liquidation). Therefore, we make the following interaction predictions:

**H2:** *The association between profitability measures and the likelihood of CU liquidation is greater during the post-financial crisis period.*

Additionally, Mester et al. (2007) find that the average size of troubled loans is 37% greater than the average size of healthy loans and that troubled loans are associated with lower credit ratings when investigating a sample of commercial banks. Thus, we expect that CUs with

higher average loan balances will be more likely to be allowed to liquidate instead of merge with another CU. This argument leads to our final alternative hypothesis as follows:

**H3:** *A CU's average loan balance is positively associated with the likelihood of liquidation (a decision not to merge with another CU).*

### **3. Sample and Hypothesis Testing**

#### **3.1 Sample**

Our study investigates why CUs are liquidated instead of merged; therefore our sample consists solely of CU closures.<sup>3</sup> CU closures from 2005 through 2012 were provided by the CUNA. The CUNA classifies these CUs as mergers, liquidations, or purchased and assumed. We include CUs classified as purchased and assumed in our liquidation treatment group because purchased and assumed CUs must first enter into involuntary liquidation before they are purchased and assumed. The CU balance sheet and income statement data are compiled from the '5300 Call Reports' published by the NCUA. We use quarterly data from December 2003 to December 2012.

The sample selection process is reported in Table 1. There were 2,137 CU closures from 2005 to 2012. In order to be included in this study, we require four consecutive complete quarterly call reports prior to the CU's closure in order to compute explanatory and control variables. However, to remove the effects of the financial crisis, we exclude all 2008 and 2009 CU closures. We exclude 556 closures which occurred during the financial crisis and an additional 17 closures as a result of missing financial data. This process results in a final sample of 1,564 CU closures, of which 109 are classified as 'liquidated' or 'purchased and assumed' CUs. The remaining closures represent a control group of 1,455 target CUs involved in a merger.

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<sup>3</sup> For the purpose of our study, all CU membership types are considered for inclusion in our sample.

### 3.2 Tests of Hypotheses

We employ three distinct models to test our hypotheses: 1) a logistic model with the probability of liquidation as the dependent variable and proxies for our constructs and control variables as independent variables, 2) a logistic model with additional variables included to consider the impact of the financial crisis and 3) A follow-up model that breaks down elements of Return On Average Assets (ROAA) to determine more precisely the drivers of liquidation.

Specifically, the primary model is constructed as follows:

$$Liquidation = \alpha_0 + \beta_1 DLoanTL + \beta_2 AnnualROAA + \beta_3 Borrow + \beta_{4-7} Control\ variables + \varepsilon \quad (1)$$

where *DLoanTL* refers to the ratio of delinquent loans to total loans,

*AnnualROAA* refers to average return on assets over the last four quarters

*Borrow* refers to the average loan amount

*Control variables* include proxies for size, liquidity and other performance measures (see Table 4 for more details)

Table 4 contains the results of our main hypothesis tests. Model 1 shows the results from the base model. Delinquent loans to total loans reflects our test of H1a, that a target CU's percentage of delinquent loans is positively associated with the likelihood of liquidation. Consistent with expectations, the percentage of delinquent loans is significantly positively associated with liquidation (p value <.001). H1b, that a CU's ROA is negatively associated with the likelihood of liquidation, is also supported (p-value <.10) based on a predicted one-tailed test.

Model 2 includes tests of the impact of the financial crisis on determinants of CU liquidation (*Rec* is an indicator variable that takes the value of 1 for events after the great recession (financial crisis) which started in December 2007 and 0 otherwise). Results (not

reported) indicate that the number of liquidations increased in the wake of the financial crisis. H1a and H1b are still significant in the predicted directions (both with a p-value <.001). The interaction of delinquent loans to total loans (DLoanTL) and recession (Rec) captures one test of H2. Using a joint test, we find that the delinquent loans ratio continues to be significantly positively associated with the likelihood of liquidation (p-value <.01). However, inconsistent with expectations, the percentage of delinquent loans does not become a more important liquidation predictor in the post-financial crisis period (p-value = .47). In another test of H2, that after the financial crisis the negative association between ROA and the likelihood of liquidation becomes more pronounced, is not supported in the model. In fact, the opposite may be true.

Model 3 differs from model 1 in that it excludes annual ROAA in favor of the inclusion of several of its components. This allows us to test H1c, that the provision for loan losses is positively associated with the likelihood of liquidation. Consistent with expectations, the provision for loan losses is significantly positively associated with the probability of liquidation (p-value <.001). H1a and H2a are not tested in this specification.

Model 4 differs from model 3 in that it includes the impact of the financial crisis as explicit variables, enabling us to test the third facet of H2. The result of the joint test indicates that the provision for loan losses continues to be significantly positively associated with the likelihood of liquidation (p-value <.001), though, the importance of the provision for loan losses does not appear to increase in the post-financial crisis period. Additionally, in all 4 models, the average loan balance (Borrow) is positively and significantly associated with the likelihood of liquidation. This finding supports our prediction in H3.

(Insert Table 4 about here)

These results suggest that, consistent with expectations, poor financial performance, as proxied by ROA, is positively associated with CU liquidation. They also suggest that poor loan management, as proxied by delinquent loans and the provision for loan losses, and the average loan balance are positively associated with the decision to liquidate a CU. However, in contrast to expectations, these associations are not incrementally stronger in the wake of the financial crisis.

### ***3.3 Sensitivity Analysis: Using only P&A closures for the dependent variable***

Apart from financial performance reasons, there are several other reasons a CU may liquidate. For example, a credit union may close as a result of CEO retirement or an occupational CU may liquidate when the firm moves or closes. Thus, CU liquidations may be voluntary or involuntary, and voluntary liquidations are likely to create noise in our dependent variable. This noise creates a bias against finding results. In our sensitivity analysis, we leave only the P&A closures as our dependent variable. All P&A liquidations are involuntary which suggests they are more likely to be the result of problems with the CU's financial performance, and less likely to be the result of non-financial factors.

Table 5 reports the results of our logistic regression of the determinants of a P&A liquidation. These results are similar to our findings in our main analyses and provide further support of our hypotheses. Specifically, consistent with hypotheses H1a and H1b, in model 5 delinquent loans to total loans is positively associated with the likelihood of liquidation (p value <.001), and ROA is negatively associated with the likelihood of liquidation (p value = .088). Also consistent with H1c, in model 7 the provision for loan losses is positively associated with the likelihood of liquidation (p-value <.001). However, these associations are not incrementally stronger in the post-financial crisis period. Furthermore, the average loan balance is positively

and at least moderately significantly associated with the likelihood of liquidation for the provision for loan losses models (models 7 and 8) only based on a predicted one-tailed test.

#### **4. Discussion**

Over the past two decades, there has been a dramatic shift away from credit union (CU) liquidations, which were very common in the early to mid-1900s, to CU mergers. Prior research suggests that one of the primary reasons for this shift is that there are benefits gained by various CU stakeholders if CUs merge rather than liquidate. However, a relatively small segment of CUs are still allowed to liquidate rather than merge with another CU. Our study determines which specific CU factors might affect a decision to allow a CU to liquidate rather than be involved in a merger.

We examine which CU characteristics are associated with liquidations when compared to a group of CU mergers. We estimate logistic regression models and find that a CU's percentage of delinquent loans, provision for loan losses, and average loan balance are positively related to the likelihood of liquidation. Moreover, a CU's ROA is negatively associated with the likelihood of liquidation. We incorporate tests of the financial crisis impact on determinants of CU liquidation and find that, interestingly, neither ROA, percentage of delinquent loans, nor provision for loan losses are more important liquidation predictors in the post-financial crisis period.

Our findings suggest that unprofitable CUs with large delinquent loans are not attractive to potential acquirers. Therefore, the NCUA is unable to entice an acquirer to merge with such a CU, even after offering assistance. However, our findings suggest that such firms may go through a P&A liquidation, whereby an acquirer will only accept specific assets of the failing

CU. P&A liquidations are invariably much more costly than unassisted mergers and even assisted mergers.

We expect that regulators could entice potential acquirers into merging with failing CUs before loans deteriorate to unacceptable levels. However, NCUA rules prevent the regulator from acting before capital adequacy limits have been violated. A conceivable impact of the NCUA capital adequacy rule would be to stop the NCUA providing assistance for mergers with CUs that are not at great risk of failing. Thus, the NCUA rules could save the CU community costs if the failing CU eventually recovers unassisted or an acquirer voluntarily merges with the failing CU partially because of the failing CU's adequate net worth.

However, it appears that an alternative effect of the NCUA capital adequacy rules could be to make P&A liquidations more likely to occur when a failing CU with adequate capital deteriorates. Given the high costs of P&A liquidations, the NCUA rules may therefore cost the CU community under alternative circumstances. It could be argued that the NCUA capital adequacy rules makes CUs with adequate capital 'too strong to save'. Whether the capital adequacy rules saves or costs the CU community money overall is an empirical question which future researchers may wish to investigate. Certainly, the number of liquidations is small relative to the number of mergers, which may suggest that regulators are doing a good job in catching most of the 'at risk' CUs. However, in untabulated results, capital adequacy as proxied by the net worth ratio is not a significant determinant of liquidation. Thus, our findings suggest that if the NCUA wishes to minimize liquidations, it should focus less on capital adequacy rules and more on delinquent loans, the provision for loan losses, the average loan balances and profitability.

Why have the determinants of liquidation not become more discriminatory after the financial crisis? We hypothesized that the relationships between liquidations and the pre-

financial crisis determinants would strengthen after the crisis. However, it appears that just because there are more liquidations, it does not necessarily follow that the correlation between liquidation factors and liquidation strengthens. It appears that the poor performance of many CUs as a result of the financial crisis has reduced the distinction between CUs strong enough to be good merger candidates and failing CUs too weak to be merged. Specifically, one possible explanation is that after the financial crisis, if most failing CUs had a large percentage of delinquent loans, then potential acquirers had no choice but to merge with CUs with bad loans. We posit that after the crisis, poor economic performance resulted in CUs being merged that had worse loan quality and higher provisions for loan losses. Thus, the differences between failing CUs that merged and those allowed to liquidate decreased. It will be interesting to see if this trend continues once the economy recovers or if the differences between merged CUs and liquidated CUs return to pre-financial crisis levels.

Although liquidations are a costly outcome for the CU industry, our results suggest that, after the financial crisis, poor loan management and poor performance was not a more important predictor related to the liquidation versus merger decision. This is an important result and we suggest that further research is needed in this area. Specifically from a regulatory standpoint, future research could examine qualitatively the process by which the NCUA determines the correct method of intervention among struggling CUs and how that process changed (or failed to change) in the wake of the financial crisis. From the standpoint of CU performance, In addition, future research might profitably focus on the compensation structures and other managerial characteristics that drive management's decision making and predict CU performance.

In conclusion, we extend prior research on factors related to CU merger activities and decisions by examining why certain potential target CUs liquidate if the liquidation decision is

costly and major stakeholders (i.e., regulators, target CUs and some acquiring CUs) realize gains when mergers occur. We find that CU liquidation is positively associated with delinquent loans, provision for loan losses and negatively associated with ROA. We do not find that these trends strengthen in the wake of the financial crisis, and find some evidence that these associations weaken after 2009. We find that average loan balance is positively associated with the likelihood of CU liquidation. These findings do not appear to change significantly when our sample is restricted to involuntary liquidations, suggesting that our results are not driven by non-financial considerations. Actual and potential CU members, customers and those employed in this industry would do well to avoid CUs demonstrating these characteristics. Perhaps most significantly, regulators may be able to make better decisions in terms of when and how to intervene with struggling CUs by focusing on loan management characteristics rather than capital adequacy.

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**Table 1 - Sample Selection Summary**

	Total Obs
CU Closures from CUNA dataset (2005 - 2012)	2,137
Less:	
Closures using Dec 2007 and all 2008 financial data	-556
Closures with missing 5300 Call Report data	-17
Observations used in logistic regressions	1,564

**Table 2 – Descriptive Statistics - Credit Union Liquidation events compared to Mergers  
(2010 to 2012 and 2005 to 2007)**

<b>Variable</b>	<b>Mean Liq</b>	<b>Mean Merger</b>	<b>Pooled Diff</b>		<b>Median Liq</b>	<b>Median Merger</b>
n = 109 (1455) for Liquidation (Merger) events						
Total Assets	17,701,439	13,591,757	4,109,682		1,045,995	3,698,699
Net Worth	975,772	1,322,499	-346,727		31,199	379,734
Delinquent Loans	590,034	156,227	433,806	***	27,678	35,632
Prov. for Loan Losses	1,369,385	141,814	1,227,571	***	3,986	5,653
Total Cash	2,266,063	1,823,526	442,538	***	231,393	638,492
Borrow	0.01	0.00	0.00	***	0.00	0.00
DLoanTL	0.10	0.04	0.06	***	0.07	0.02
ROAA	0.03	(0.01)	0.05	**	-0.02	0.00

**Table 3**

Bivariate Correlations for Variables of Interest (Pearson above the diagonal; Spearman below)

N=1,564	Liquidation	DLoanTL	AnnualROAA	AnnualProvLLAA	Borrow
Liquidation		.158***	-0.116***	0.041	.102***
DLoanTL	.219***		-0.325	.408***	.295***
AnnualROAA	.049*	.091***		.480***	.163***
AnnualProvLLAA	.153***	.443***	.067***		.113***
Borrow	.142***	.375***	-0.011	.079***	

\*\*\* indicates significance at the .001 level

\*\* indicates significance at the .05 level

\* indicates significance at the .1 level

Correlations between variables of interest and control variables (not reported) were generally within acceptable ranges

**Table 4: Determinants of Liquidation Regression Models**

Equation 1: Liquidation =  $\alpha_0 + \beta_1 DLoanTL + \beta_2 AnnualROAA + \beta_3 Borrow + \beta_{4-7} Control\ variables + \varepsilon$   
 Equation 2: Liquidation =  $\alpha_0 + \gamma_3 DLoanTL + \gamma_5 AnnualROAA + \gamma_7 Borrow + \gamma_8 Rec + \gamma_9 DLoanTL * Rec + \gamma_{10} AnnualROAA * Rec + \beta_{4-7} Control\ variables + \varepsilon$   
 Equation 3: Liquidation =  $\alpha_0 + \theta_1 Lassets + \theta_2 NWAssets + \theta_3 TLoanTA + \theta_4 AnnualProvLLAA + \theta_5 AnnualOpExpAA + \theta_6 AnnualNetIntAA + \theta_7 AnnualNonIntIncAA + \theta_8 Liq + \theta_9 Borrow + \varepsilon$   
 Equation 4: Liquidation =  $\alpha_0 + \varphi_1 Lassets + \varphi_2 NWAssets + \varphi_3 TLoanTA + \varphi_4 AnnualProvLLAA + \varphi_5 AnnualOpExpAA + \varphi_6 AnnualNetIntAA + \varphi_7 AnnualNonIntIncAA + \varphi_8 Liq + \varphi_9 Borrow + \varphi_{10} Rec + \varphi_{11} AnnualProvLLAA * Rec + \varepsilon$

Dependent Variable		ROA Models				Prov. For Loan Losses Models			
		Model 1		Model 2		Model 3		Model 4	
Variable	Pred	Coef. est.	Pr >  t	Coef. est.	Pr >  t	Coef. est.	Pr >  t	Coef. est.	Pr >  t
DLoanTL	<b>H1a +</b>	6.877	<.001	5.999	<.001				
AnnualROAA	<b>H1b -</b>	-1.080	0.068	-11.288	<.001				
AnnualProvLLAA	<b>H1c +</b>					16.088	<.001	16.830	<.001
Borrow	<b>H3 +</b>	33.426	0.082	38.555	0.060	54.223	0.012	54.756	0.012
Rec	<b>+</b>			1.214	<.001			0.690	0.004
DLoanTL * Rec	<b>H2 +</b>			0.162	0.473				
AnnualROAA * Rec	<b>H2 -</b>			11.248	0.999				
AnnualProvLLAA * Rec	<b>H2 +</b>							-1.888	0.813
Intercept		-3.486	0.023	-4.026	0.009	-2.577	0.146	-2.281	0.196
Hosmer and Lemeshow Goodness-of-Fit Test			0.343		0.633		0.269		0.211
n			1,564		1,564		1,564		1,564
Pseudo R <sup>2</sup>			4.36%		6.22%		4.21%		4.77%

Note: Control variables included but not reported: Lassets, NWAssets, TLoanTA, Liq, Borrow. P-values are one (two) tailed when a prediction is (is not) made.

Joint test of DloanTL and DloanTL\*rec (Pr>|t| 0.002)

Joint test of AnnualROAA and AnnualROAA\*rec ( Pr>|t| 0.957)

Joint test of AnnualProvLLAA and AnnualProvLLAA\*rec (Pr>|t| <.001)

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**Variable Definitions:****Dependent Variable:**

Liquidation is an indicator dependent variable taking the value of 1 if the CU closure was not a merger and 0 otherwise.

**Variables of Interest:**

DLoanTL is computed by dividing delinquent loans by total loans and computing the mean of this measure for the 4 consecutive quarterly call reports prior to the event. This variable is a measure of asset quality.

AnnualROAA is a continuous variable that represents the credit union's earnings. It is computed by dividing the sum of the CU's last 4 quarter's net income by the average assets over the last 4 quarters' results.

AnnualProvLLAA is a continuous variable that represents the credit union's provision for loan losses. It is computed by dividing the sum of the last 4 provision of loan losses by the average assets over the last 4 quarters' results.

Borrow is a continuous variable that represents the average loan balance. This is computed by dividing the total loans value by total assets. Next, this number is divided by the number of Borrowers and the mean of this measure is computed for the 4 consecutive quarterly call reports prior to the event.

Rec is an indicator variable that takes the value of 1 for events after the great recession (financial crisis) which started in December 2007 and 0 otherwise.

**Control Variables (not reported):**

Lassets is the natural log of total assets.

NWAssets is computed by dividing net worth by total assets and computing the mean of this measure for the 4 consecutive quarterly call reports prior to the event. This represents the capital adequacy.

TLoanTA is a continuous variable which is a measure of the asset mix and used as our proxy for management. This variable is computed by dividing total loans by total assets and computing the mean of this measure for the last 4 quarterly call reports.

AnnualOpExpAA is a continuous variable that represents the credit union's operating expenses. It is computed by dividing the sum of the last 4 quarter's non-interest expenses by the average assets over the last 4 quarters' results.

AnnualNetIntAA is a continuous variable that represents the credit union's net interest income. It is computed by dividing the sum of the last 4 quarter's net interest income before the provision of loan losses by the average assets over the last 4 quarters' results.

AnnualNonIntIncAA is a continuous variable that represents the credit union's non- interest income. It is computed by dividing the sum of the last 4 quarter's non- interest income by the average assets over the last 4 quarters' results.

Liq is a continuous variable that represents the credit union's liquidity. It is computed by dividing cash and short-term investments by total assets and computing the mean of this measure for the 4 consecutive quarterly call reports prior to the event.

**Table 5: Determinants of Liquidation Regression Models (P&A closures only)**

Equation 1: Liquidation =  $\alpha_0 + \beta_1 \text{DLoanTL} + \beta_2 \text{AnnualROAA} + \beta_3 \text{Borrow} + \beta_{4-7} \text{Control variables} + \varepsilon$

Equation 2: Liquidation =  $\alpha_0 + \gamma_3 \text{DLoanTL} + \gamma_5 \text{AnnualROAA} + \gamma_7 \text{Borrow} + \gamma_8 \text{Rec} + \gamma_9 \text{DLoanTL} * \text{Rec} + \gamma_{10} \text{AnnualROAA} * \text{Rec} + \beta_{4-7} \text{Control variables} + \varepsilon$

Equation 3: Liquidation =  $\alpha_0 + \theta_1 \text{Lassets} + \theta_2 \text{NWAssets} + \theta_3 \text{TLoanTA} + \theta_4 \text{AnnualProvLLAA} + \theta_5 \text{AnnualOpExpAA} + \theta_6 \text{AnnualNetIntAA} + \theta_7 \text{AnnualNonIntIncAA} + \theta_8 \text{Liq} + \theta_9 \text{Borrow} + \varepsilon$

Equation 4: Liquidation =  $\alpha_0 + \phi_1 \text{Lassets} + \phi_2 \text{NWAssets} + \phi_3 \text{TLoanTA} + \phi_4 \text{AnnualProvLLAA} + \phi_5 \text{AnnualOpExpAA} + \phi_6 \text{AnnualNetIntAA} + \phi_7 \text{AnnualNonIntIncAA} + \phi_8 \text{Liq} + \phi_9 \text{Borrow} + \phi_{10} \text{Rec} + \phi_{11} \text{AnnualProvLLAA} * \text{Rec} + \varepsilon$

Dependent Variable		ROA Models				Prov. For Loan Losses Models			
		Model 5		Model 6		Model 7		Model 8	
Variable	Pred	Coef. est.	Pr >  t	Coef. est.	Pr >  t	Coef. est.	Pr >  t	Coef. est.	Pr >  t
DLoanTL	<b>H1a +</b>	15.990	<.001	12.349	<.001				
AnnualROAA	<b>H1b -</b>	-1.375	0.088	-14.055	0.004				
AnnualProvLLAA	<b>H1c +</b>					22.621	<.001	21.878	<.001
Borrow	<b>H3 +</b>	-87.606	0.911	-62.568	0.825	121.900	0.019	97.641	0.063
Rec	<b>+</b>			1.655	0.001			0.918	0.038
DLoanTL * Rec	<b>H2 +</b>			2.303	0.296				
AnnualROAA * Rec	<b>H2 -</b>			13.459	0.996				
AnnualProvLLAA * Rec	<b>H2 +</b>							1.338	0.438
Intercept		-14.936	<.001	-14.594	<.001	-11.253	<.001	-10.210	<.001
Hosmer and Lemeshow Goodness-of-Fit Test			0.655		0.530		0.475		0.764
n			1,501		1,501		1,501		1,501
Pseudo R <sup>2</sup>			6.44%		7.54%		7.08%		7.53%

Note: P-values are one (two) tailed when a prediction is (is not) made.

Joint test of DloanTL and DloanTL\*rec (Pr>|t| <.001)

Joint test of AnnualROAA and AnnualROAA\*rec ( Pr>|t| 0.585)

Joint test of AnnualProvLLAA and AnnualProvLLAA\*rec (Pr>|t| <.001)

See previous table for variable definitions

## **Appendix**

### ***Additional discussion of explanatory variables***

Our logistic model starts by using CAMEL ratio variables to explain the likelihood of a CU liquidating as opposed to being merged with another CU. As discussed previously, this system is based on five critical elements of a CU's operations: capital adequacy, asset quality, management, earnings and liquidity/asset-liability management. In addition to variables based on the CAMEL rating system, we also include proxies for credit risk and CU size. We use two CAMEL ratio variables (DLoanTL and ROAA) and the credit risk variable as our explanatory variables in the base model.

DLoanTL is a continuous variable that represents asset quality. A high ratio may indicate deficient asset quality or credit administration practices that threatens the CU's viability or subjects the CU to potential losses. If financial difficulties or deficient credit administration policies deter acquirers from merging with another CU, then we would expect a positive coefficient on DLoanTL.

Low profitability may increase the likelihood of liquidation, therefore, we expect a negative association between ROAA and Liquidation.

Although productivity is not included as one of the elements in the CAMEL rating system, productivity ratios are reported by the NCUA in financial performance reports. If high loan balances increase the risk of CU losses, then we would expect a positive association between Borrow and Liquidation.

In model 2, we consider the impact of the financial crisis on the determinants of liquidation. Rec is an indicator variable that takes the value of 1 for events after the financial crisis which started in December 2007 and 0 otherwise. Given that CU liquidations increased

after the financial crisis (Marx, 2010), we predict a positive association between the financial crisis (Rec) and the likelihood of liquidation. Furthermore, we hypothesize that after the financial crisis, greater delinquent loans and low profitability will increase the probability of liquidation compared to a merger. Therefore, we predict a positive association between  $DLoanTL * Rec$  and Liquidation (hypothesis 1b) and a negative association between  $ROAA * Rec$  and Liquidation (hypothesis 2b).

We segregate ROAA into its various components to investigate the key reason CUs with low profitability are liquidated instead of merged. We suspect that anticipated loan losses is the critical profitability element associated with liquidations. Thus, we use the provision for loan losses scaled by average assets (AnnualProvLLAA) to test hypothesis 3a. We expect extremely high levels of AnnualProvLLAA to decrease profitability and potentially threaten the CU's viability. Therefore, we predict a positive association between AnnualProvLLAA and Liquidation.

#### ***Additional discussion of control variables***

We use the natural log of total assets (Lassets) as our proxy for CU size. Prior research finds a positive relationship between CU size and performance (Wheelock and Wilson, 2011), and Wilcox and Dopico (2011) find that CU size produces efficiency gains by reducing operating costs. Furthermore, Goddard et al. (2009) argue that poor performing CUs are more likely to be acquired through a merger than remain independent. The researchers find a negative association between CU size and CU acquisitions, which suggests CU size is positively related to performance. In this study, we expect the poorer performing CU (i.e., CUs with lower ROA) to be liquidated and therefore we expect a negative association between Lassets and Liquidation.

Our proxy for capital adequacy is net worth scaled by total assets (NWAssets). Higher levels of capital adequacy suggest sound capital relative to the CU's risk profile whereas lower levels of capital adequacy could signal deficient capital that could threaten the CU's viability. If the poorer performing CU's are more likely to be liquidated, then we would expect a negative association between NWAssets and the dependent variable. However, Goddard et al. (2009) argue that CUs with low capital adequacy are more likely to be merged. Furthermore, poor performing CUs with a high capital adequacy clearly have other severe problems which may make them poor candidates for a merger. Therefore, we are unable to predict the relationship between NWAssets and Liquidation.

We use total loans scaled by total assets (TloanTA) as a proxy for management performance. We expect TloanTA to be negatively associated with Liquidation as having more loans results in greater income. Also, a liquid CU is less likely to be liquidated than an illiquid CU. In fact, Goddard et al. (2009) argue and find that a CU with greater liquidity is more likely to be acquired via a merger. Therefore, we predict a negative association between liquidity and the likelihood of liquidation.

In model 3, we use the remaining ROAA components as control variables. One of the motivations CUs have to merge is to benefit from economies of scale and reduce operating costs. However, extremely high operating costs may also threaten the CU's viability and result in liquidation. Thus, we predict a positive association between operating costs and liquidation. We use operating (non-interest) expenses scaled by average assets (AnnualOpExpAA) to proxy for operating costs. Net interest income scaled by average assets (AnnualNetIntAA) increases CU profitability and should reduce the likelihood of liquidation. Therefore, we predict a negative association between AnnualNetIntAA and Liquidation. Finally, non-interest income scaled by

average assets (AnnualNonIntIncAA) also increases CU profitability and should reduce the likelihood of liquidation. Therefore, we predict a negative association between AnnualNonIntIncAA and Liquidation.