Performance and Assets and Liabilities Management in the U.S. Credit Union

Jalal El Fadil[1] and Helyoth Hessou[2]

Abstract

Our main research objective is to study the influence of different decisions inherent to allocating assets, and to the weights given to some types of loans on the profitability of credit unions. Only few studies having been carried out on these financial institutions and on their asset portfolio structural change. Another objective is to analyse the influence of increasing deposits, as part of liabilities, on their financial performance. In order to reach our research objectives, we carried out statistical analyses and panel regressions by using biannual data from a large sample of credit unions in the United States. In fact, we analyzed the influence of the choices of allocating some assets and liabilities, represented by ratios, on the profit of credit unions in the United States for 20 years, represented by the return on assets. The results of our analysis enable us to conclude that attracting more deposits would ensure better profitability for these credit unions. As regards to loan types, the increase of the first mortgage loans weight is a profitable strategy. Our research add value to the field of financial institutions management, since most studies concern banks profitability and cannot be generalized to credit unions.

Keywords: Credit unions, Credit unions performance, Credit unions asset portfolio structure, Credit union deposits, Assets and liabilities management in banking industry, First mortgage loan.

---

[1] Professor of finance, Department of management sciences University of Quebec at Rimouski, Rimouski, Quebec, Canada.
[2] Professor of finance, Department of finance, University of Sherbrooke, Sherbrooke, Quebec, Canada.

1. Introduction

During the last financial crisis, mortgage loan and associated derivative products such as MBS have poorly performed and caused major losses for financial institutions (Aggelopoulos [1], Curi, Lozano-Vivas and Zelenyuk [2], Sheehan [3], Youngha, Hwang and Satchell [4]). This led to suboptimal asset and liability adjustments in financial institutions with important real cost for the economy (Lu [5]).

Nonetheless, and recently, credit union institutions have intensively increased their holding of mortgage loans at the expense of new auto loans while keeping low the growth of their ratio of used auto loans. In fact, in average, the percentage of mortgage loans to the total loans increased from around 0.0873% in 1994 to 22.52% in 2015 and the percentage of new vehicle loans to the total loans decreased form 26% in 1994 to 15.20% in 2015. Given the potential effect of this change of portfolio allocation and its effect on credit union profitability, this paper investigates on the effect of the observed structural change on credit union performance and return.

While holding very few assets compared to banks, credit unions offer alternative to banks by serving people that otherwise would not have obtained loan from banks, knowing that these financial institutions assets have grown extensively (Wilcox [6]). In addition, since most large credit unions are professional credit unions, the non-profit orientation allow members to negotiate favorable rate and favor a more inclusive financial system. In addition to granting unsecured and consumer credits, they now devote a large part of their assets to credit cards, car loans, and business loans (Mckee and Kagan [7]; Bauer [8]; Wilcox [6]). Deregulation and more aggressive strategies were at the origin of the increase in the products and services credit unions offered, the deposits they received, and the credit they granted (Goddard and Wilson [9]). For example, their share of deposits in the market increased by 9% in 2001 in the United States. Yet, they nevertheless kept some characteristics, such as being exempted from federal taxes. These characteristics help them offer low-priced products and services while having to meet capital requirements more than banks, which does not encourage growth (Wilcox [6]).

The analysis and monitoring of credit union profitability is important for twofold. Firstly, and most importantly, is regulation motive. Credit unions rely on their profit to increase their stock of undivided earning that serve in meeting the minimum capital requirement. Secondly, is their privately-owned institution status. A credit union seeks to maximize mainly the profit attributed to its members who are both clients and providers of capital (Mckee and Kagan [7]; Rubin et al. [10]; Smith, Cargil, and Meyer [11]). Unlike banks, credit unions, as private institutions can not raise or issue capital to meet the requirement. This strengthens the first argument on the importance of their profit to meet the requirement.

Given that credit union performance is also dependent on their efficiency and cost management, we complemented our analysis by accounting for their funding structure. Since mortgage loans are long-term assets, it is expected that credit unions

increase their long-term funding source so as to limit maturity mismatch risk. Funding structure has been recognized as the major source of risk during the last financial crisis (Antoniades [12]; Dagher and Kazimov [13]; Cornett et al. [14]). Therefore, it is expected that if credit unions switched to more stable (but costly[3]) funding source, this should influence their overall portfolio profitability. Let's note that deposits of more than one year have increased from around 3.10 % in 1994 to 6.60% in 2015.

Against this background, we seek answer to the following research questions: Does the increase in mortgage loan holding improve credit unions profitability? Since it has been accompanied with an increase in source of stable funding, what is the overall effect on these financial institutions' profitability?

Our contribution to the literature is threefold. Firstly, we contribute to the debate around credit union stability by detecting changes that could reinforce or weaken the performance of credit union portfolio. This is important since asset performance or asset quality are one of the CAMEL (Capital, Assets, Management, Earning and liquidity) and are detected as major factors influencing credit union profitability. Secondly, our analysis aims at testing whether the increase toward mortgage is the best strategy. Thirdly, studies on banks profitability were conducted with objectives different to ours and their findings while sometimes inconclusive cannot be generalized to credit unions for various motives such as difference in ownership structure, economic objectives, and regulatory constraints (Curi, Lozano-Vivas, and Zelenyuk [2]).

Let us note, regarding economic objectives, that credit unions are privately members-owned institutions and their objective is not to maximize profitability as in banks, but to serve their members by providing them with benefits in the form of high interested rates on their deposits and low interest rates on their lending. Given this, credit union might not consider profitability as their first goal but rather servicing their members. They can even sacrifice their profitability to benefit their members, but unfortunately doing this extensively will harm credit union asset expansion that rely heavily on their accumulated profit under retained earnings. As an illustration, according to Memmel and Schertler [15], the allocation of assets and liabilities, under the bank's asset-liability management, depends on the financial institution's objectives, which are generally, for credit unions, social or tied to regional development and affect the degree of risk that such institutions take (Altunbas et al., [16]).

Regarding their member-privately owned status, credit unions should balance their core objective - increase benefit to members through generous lending and deposit rat - with the regulatory one, which is mostly based on meeting minimum capital requirements. Given that profits and undivided earnings are the main source of their capital accumulation process, credit unions mostly the one that are regulated on the risk-based capital requirement could particularly switch to mortgage to reduce the

---

[3] Credit unions are privately own institution with an objective to provide benefits to their members through generous deposit or lending rates.

burden on capital regulation. Unlike credit unions, banks (mostly those listed on the stock market) have the option to raise or issue new equities and are not constrained such as credit unions are and therefore their behavior might be different. More importantly this analysis is welcomed with the post crisis requirement in the credit unions sector. As an illustration, the new requirements, particularly for increasing equity would push credit unions to increase their profits, ameliorate the management of their assets and investments, and pursue more funding to meet these requirements and increase their capital, which could lead to significant additional costs.

Regarding the regulatory constraints - the one beyond capital requirement - for a long-time credit union have been constrained on some type loans such as the commercial lending (Goddard et al. [17]). Such constraint could have induced a "limit to diversification" that could explain potential under optimal loan portfolio allocation. As an illustration, granting risky loans can increase the profitability of credit unions, but this comes with capital requirements that are greater than when granting less risky loans, like mortgages (Mckee and Kagan, [7]; Ely and Robinson, [18]; Kolari, Ou and Shin, [19]). In consequence, allocating weights for the different components of a loan portfolio must not only take into consideration the relationship between risk and return, but also the constraints relative to these requirements, which have become more important in the past few years.

Finally, regarding the effect of funding structure, our contribution will enlighten the ongoing debate around the adoption of banks-like stable funding requirement[4] policy in credit unions, especially the large ones (Sheehan, [3]). The shift toward mortgage loans, that are mostly long term, should normally be accompanied with stable funding. Thus, in the current context in which credit unions operate and with the current difficulties, costs, and constraints they are faced with, it would be relevant to study their profitability in relation to the allocation of assets and liabilities and analyze which of these assets and liabilities contributes the most to its increase, given that they do not have as many funding resources than commercial banks.

By undertaking this study, we extend the investigation efforts of the ones that came before us on credit unions profitability, such as Mckee and Kagan [7] and Goddard et al. [17]. Despite their different corporative organization, their growth and potential impact on the market and the economy, few studies have been carried out on these financial institutions (Bauer [20]; Ryder and Chambers [21]; Goddard et al. [17]; Bauer [8]) and these studies were mainly on issues different from change in their asset portfolio structure.

In our study, we try to fill part of the gap with research on the influence of some decisions inherent to allocating assets, and to the weights given to some types of loans, mainly first mortgage loans, on their profitability in the case of United States.

---

[4] Managing deposits and liabilities must take into consideration the liquidity requirements recently implemented by the Basel Committee with the new standards on Liquidity Coverage Ratio (LCR) for the short term, as well as the Net Stable Funding Ratio (NSFR) for the long term.

We will also study the influence of increasing deposits, as part of liabilities, on their financial performance. This will enable us to draw conclusions about some aspects of their business model and its impact on their performance. In order to reach our research objectives, we carried out statistical analyses and panel regressions by using biannual data from a large sample of credit unions in the United States.

In the following section, we begin by presenting a literature review of the different aspects that can influence the profitability of credit unions and banks, mainly their allocation of assets and liabilities. Then, we discuss our research hypotheses and the methodology that we used to verify them. Finally, we finish with an analysis and a conclusion summarizing the lessons learned.

2. Literature Review

2.1 Theory and empirics of credit union assets allocation and its effect on profitability

There is no clear theory on assets allocation by credit unions. The intermediation of these financial institutions is guided by the objective to provide benefit to their members (Smith, Cargil, and Meyer [11]) by offering them (depositors and lenders) mostly favorable rate[5] (Goddard et al. [17]; Tokle and Tokle [22]). This can lead to making suboptimal portfolio mix choice to meet their clients demands[6]. Therefore, the decisions inherent to the loan portfolio and its constituent can be viewed differently in the case of credit unions, as these financial institutions should decide simultaneously on their loan portfolio allocation and on how much benefit they would like to convey to their members. Therefore, we would expect the loan portfolio composition to have unexpected effect on credit union profitability (measured by their ROA), whish makes the relation between asset allocation and profitability a distinctive issue from the one in the case of banks where portfolio allocation is mostly guided by profit concerns. In addition, credit union loan portfolio depends both on the demand of loan from their clientele and the constraints on certain of their activity such as limit on their business loans. While the decisions inherent to loan allocation are driven by credit union objectives and constrains, there is clear evidence that the portfolio structure determines their profitability (Kuhil and Boru [23]; Mckee and Kagan [7]; Edmister and Srivastava [24]).

According to Furfine [25] four factors can explain the weight change of each component in banks' (and by extension credit union) asset portfolios. These factors are higher capital requirements, fewer demands for some type of loans, stronger regulatory verification, and a secular trend. In the banking industry, capital regulation is considered as one of the most important sources of change in banks assets allocation. For instance, Thakor [26] and Passmore and Sharpe [27] demonstrate that an increase in capital requirements based on risk can lead a bank

---

[5] They can achieve this simply by extending their tax subsidies to their members in the form of low interest rate on loans and higher deposits rates (See Goddard, 2008).

[6] specific loan demand from credit union clientele could traduce in suboptimal loan composition in the objective to benefit members.

to reduce the loans granted and increase its investment in government securities. Whatever its origin, loan portfolio allocation in conjunction with asset management have an effect in the overall credit union profitability (Kuhil and Boru, [23]; Edmister and Srivastava, [24]). Recent trend in loan portfolio allocation by credit union make their analysis appealing. As an illustration, credit union changed the structure of their assets and loans portfolio by increasing, for example, their real state loans (Mckee and Kagan, [7]).

Empirically, various studies highlighted the relationship between loan portfolio composition and their total of assets performance. Miller and Noulas [28], who studied the effect of different asset and liability choices on banks' profitability, analyze different ratios [7] including the ratios of mortgages, commercial and consumer loans on the total of loans. Their finding points to a negative effect of mortgage loans on credit unions profitability. Moreover, a study carried out by Edmister and Srivastava [24] demonstrates that banks consumer and commercial loans are positively associated with the losses reserve while weight associated to mortgage is uncorrelated to the reserve. This suggests that banks develop an ex-ante acknowledge of the potential losses that could arise from some loan types, such as commercial and personal loans. In addition to loan portfolio allocation, its diversification[8] (both geographically and the type of collateral) can also affect loan portfolio performance (Youngha, Soosung and Steve [4]; Calem and La Cour-Little [29]). Indeed, this diversification can considerably reduce the risk of a loan portfolio and increase the overall profitability of the bank or the credit union concerned. These characteristics are hard to measure and might be endogenous in the observed overall performance of the portfolio.

2.2   Other driven forces of the profitability: the revenue diversification and noninterest income

Credit union performance is not only driven by returns from their loan portfolio but can also originate from their non-credit activity such as noninterest activities. Based on Australian credit unions data spanning the period 1993-2001, Esho et al. [30] study the effect of diversification of revenues, including the noninterest ones, on the financial performance of credit unions. They document that for the period 1993-2001, credit union with more highly concentrated income streams tended to have higher risk and return. More specifically, credit unions with higher proportion of their total income from interest on residential loans have higher risk and return. On another side, credit unions with lower proportion of income from interest on residential loans and on personal loans had significantly lower return and risk.

---

[7] These ratios include securities on total of assets ratio, the loan to assets ratio, the deposit to assets ratio, as well as the provisions relative to losses linked to loans on the total of loans (to analyze deposits and loan quality, respectively).

[8] like the diversification related to the geographic location of properties to which are associated mortgages granted or that associated with industries in which operate businesses receiving commercial loans.

Goddard et al. [17] find evidence that diversification is beneficial to large credit unions but destroys value for smaller one. In the banking literature, despite the acknowledgement that diversification increases the performance of banks, the most recent financial crisis has demonstrated that this is not always true (Curi et al. [2]). On the other hand, the development of other non-traditional bank services and non-interest revenues (Kuhil and Boru [23]), like selling insurance or securities brokerage, has promoted the development of off-balance-sheet revenue and reduced the banking institutions' dependence on interest revenue as well as the gravity of the risk associated with asset-liability mismatch. Thus, with these different developments in the banking sector, the firms in this sector, including credit unions, have less need to adopt a strict asset-liability management since their asset structure becomes increasingly independent from that of liabilities (DeYoung and Yom [31]). On the other hand, Elsas et al. [32] put forth that diversifying revenue sources improves banks profitability. However, some studies on the bank sector in the United States show that there is no advantage in combining interest revenues and revenues other than those related to interest, whether at the level of profits or earnings volatility (Stiroh and Rumble [33]). This is due to the fact that activities linked to management fees make volatility more important and the fact that the two types of revenues are correlated. Other authors, like Lepetit et al. [34], who studied European banks, find that increased revenues other than interest increases the risk of volatility and insolvency, especially for small banks. Additionally, the results are different concerning the influence of asset diversification and the characteristics of loans granted on the profitability and risk in the case of banks. While Acharya et al. [35] conclude that the diversification of loans granted is not strictly synonym with high profits and low risk, Rossi et al. [36] find that this diversification improves profitability.

2.3   Other driven forces of the profitability: deposits and fund raising

Curi et al. [2] examined banks' business model based on the analysis of the allocation of loans granted, the nature of revenues, and the characteristics of the deposits and funds collected. According to these authors, in addition to asset management, fund raising plays an increasingly important role in defining bank profit since the industry of financial intermediation is becoming more complex with financial deregulation and innovation. Regarding the diversification of funds, Demirguç-Kunt and Huizinga [37] find that increasing funds other than deposits from a low level decreases the risk, but if these funds and revenues other than those from interest are high, then an increase in this case can make the risk greater. For their part, Berger et al. [38] find that specialization in deposit collection is associated with a high level of profit among Chinese banks.

2.4 Other factors affecting credit unions profitability: The management quality and costs

Other factors can also affect credit union performance. These factors include: the management quality, the variation of provisions related to the loss of loans, and the characteristics of loans granted (Edmister and Srivastava [24]). In this way, Miller and Noulas [28] put forth that part of the variation of banks' profitability is caused by the variation of provisions relative to the losses associated with loans. They add that best performing banks are those with high management qualities.

Moreover, credit unions costs consist mainly of the interests payed to members for their deposits and to liabilities holders. These costs are sensitive to interest rate changes and can influence negatively the performance of credit unions if not managed adequately and their management is not taking into consideration the asset mix chosen (Curi et al. [2]; Tokle and Tokle [22]). The total costs include also noninterest expenses, such as human resources and operating expenses. In this way, Miller and Noulas [28] put forth that best performing banks are those with low expenses other than interests. Many factors can affect these expenses. We can mention the technology used, the human resources management practices, the operations organization and the management quality (Mckee and Kagane, [7]). For instance, online banking can improve significantly credit unions financial performance (Goddard et al. [17]; Acharya et al. [35]). Goddard et al. [39] concluded in his study that the change in the non-interest expenses to assets ratio would reflect an anticipated tendency for a credit union to encounter difficulties in maintaining adequate capitalization if his operating costs are high. Thus, excessive operating costs have a clear negative impact on these institutions net income, making it difficult for them to increase capital in line with growth in lending (Goddard et al., [39]).

2.5 ROA as a measure of credit union profitability

The return on asset (ROA) is acknowledged by many authors as a relevant performance measure in the banking industry (Isshaq, Aoah and Appiah-Gyamerah [40]; Chazi Kallaf and Zantout [41]; Akbar and Akbar [42]; Kristianti and Yovin [43]; Kashian and Tao [44]; Goddard et al. [17]). Nonetheless the non-profit orientation of credit union, existing literature on credit profitability have employed the ROA and investigate how it responds to various credit union decision such as their diversification choice (Goddard et al. [17]; Esho et al. [30]). The main argument behind the reliability of the ROA as a measure of credit union benefit being that better profit strengthens credit union capital accumulation ability[9] and its ability to grant future benefit to its members (Goddard et al. [17]; Bauer [8]; Wilcox [6]). While it is clear that credit union objective is distinct from that of banks, credit unions with profitable assets can redistribute the proceed to increase the benefit of their members.

---

[9] Unlike banks, credit unions cannot issue equities on stock markets and rely heavily on their profits.

2.6   Credit union portfolio risk

While the focus has been on credit union profitability measured by their ROA, the portfolio theory suggests that optimal portfolio should mix return with risk. Therefore, we should take into consideration the risks faced by credit unions, knowing that different sources of risk are inherent to their activities. These are the credit risk (the most important one), the interest rate risk, the liquidity risk and the operational risk (Memmel and Schertler [15]; Kolari and Shin [19]). While credit risk is inherent to assets, mostly composed by loans, liquidity and interest rate risk are more associated with financing decision. This risk is transmitted through the asset-liability structure because the assets returns and the costs of liabilities may be differently sensitive to interest rate changes (Tokle and Tokle [22]). Unlike banks, where various derivative market products (swaps and options) are deployed to manage interest rate risk (DeYoung and Yom [31]), credit unions are more likely to use traditional asset liability (ALM) tools to reduce the overall duration mismatch between their assets and funding. The relation between credit unions risk and return is not homogenous from the literature. Bauer [8] notes that credit unions' ROA negatively correlates with risk-taking while in commercial banks, the correlation is rather positive[10]. This is confirmed by a study (Birchall, [45]) showing that credit unions resist better to financial crises, particularly the 2007 crisis.

3. Research Objectives and Methodology

With this in mind, it seemed relevant to study the effect of the choices related to allocating assets, weights for different types of loans as well as deposits and liabilities in the case of US credit unions over the past few years. Particularly, since few studies had been carried out, to our knowledge, on the profitability of this kind of financial institution and the elements that may affect it. This, taking into consideration that their asset-liability management can be different from banks and that they are more risk averse than banks (Bauer [8]).

In our study, we analyzed the influence of the mentioned choices on credit unions' performance represented by ROA, like in the Miller and Noulas [28] study. We did this, knowing that these choices are conditioned by capital requirements, which are higher in the case of granting risky loans, as well as by the new standards for liquidity established by Basel III. Note that the weight of elements studied with respect to the total of loans or assets will be presented by ratios, as done by Miller and Noulas [28]. Our study will contribute to understanding some of the choices made by credit unions as well as the effects such choices have on their profitability. More specifically, based on our literature review, the hypotheses that we mainly wished to validate in our study are the following:

---

[10] Thus, according to Bauer (2015), credit unions' general aversion to risk is beneficial to them during the 2007 financial crisis because, with a conservative asset structure, they had fewer losses when compared with banks.

Hypothesis 1: Increasing the loan/total of assets ratio positively influences ROA.

Indeed, you would expect that loan growth increases interest revenues and the profitability of credit unions (Curi et al. [2]; Miller and Noulas [28]; Edmister and Srivastava [24]), but if the portion of non-performing loans within this loan increase is high, it can negatively influence their ROA (Messai and Jouini [46]).

Hypothesis 2: Increasing the loan/total of assets ratio contribute more to ROA than investment/total of assets.

In fact, we noted that the investment ratio (see Table 4 below) was much lower for the best-performing ones (0.251) compared with less-performing ones (0.2939). Thus, the best performing cooperatives were those with the highest average for loan/total assets ratio. Therefore, it seems pertinent to assume that loans are more profitable than investments for credit unions.

Hypothesis 3: First mortgage loans negatively contribute to ROA.

This hypothesis is drawn from Miller and Noulas [28] result concerning mortgages and the fact that increasing their ratio when compared with the total of assets negatively contributes to the ROA of the US banks that were part of their sample.

Hypothesis 4: The contribution of deposit growth on US credit unions' profitability is positive and is higher than that of loan growth.

Knowing that many credit unions have experienced more substantial growth in offering deposit services versus loans (Mckee and kagane [7]; Goddard and Wilson [9]), We put forth this hypothesis because Berger et al. [38] conclude in their study that specializing in taking deposits is associated with a high profit for Chinese banks. In addition, Miller and Noulas [28] find that the total deposits on the total of assets ratio has a positive effect on profitability (ROA) in the case of US banks. This implies that increasing deposits would enable credit unions to make more profit than loan growth.

3.1   Research Methodology

In order to verify the relevance of our hypotheses, based on Miller and Noulas [28], our research methodology consisted of statistical analyses and panel regressions with a fixed effect on time and kind of financial institutions considered, by considering ROA (net income/asset average) as the dependant variable. This enabled us to observe the effect on the latter of various independent variables we selected for our study, that is, the ratios of asset components and some liability elements, and to verify the significance of coefficients associated with these variables. ROA is acknowledged by many authors as a relevant performance

measure for credit unions and other financial institutions (Isshaq, Aoah and Appiah-Gyamerah [40]; Chazi Kallaf and Zantout [41]; Akbar and Akbar [42]; Kristianti and Yovin [43]; Goddard et al. [17]; Kashian and Tao [44]). Note, however, that this measure is based on accounting components, which could be considered as a limit because we did not use the market values of some variables, such as real estate investments and assets. And yet, given the difficulty in collecting these values, the ROA remains a reliable performance measure (Goddard et al. [17]; Miller and Noulas [28]).

On the other hand, a proper assessment of the research questions requires that we tackle some methodology issues. Firstly, and most important one is the endogeneity of credit unions share of mortgage loan holding. Credit union may have been motivated by successive increase in this portfolio and then have continued ballooning on its. It could also be that the relation between performance and mortgage loan holding of stable funding structure is mostly explained by common fixed effect attributed to credit unions specific factors of macroeconomic condition and that the effect is not causal. Secondly, we should care about the effect of local market demand on credit union performance independent of their allocation toward a specific asset or liability structure. To deal with this, we employed a matching strategy where we match credit unions based on their geographical location and business model. This allows us to measure the effect of the holding of mortgage and stable funding on the difference between the performance documented for different credit unions.

3.2   Variable Descriptions

The main variables for assets considered in our study, and whose allocation can considerably influence the profitability of a credit unions (Curi et al. [2]; Miller and Noulas [28]; Edmister and Srivastava [24]), are the following:

- The cash/cash equivalence ratio compared with total assets (CASH_ASSET)
- The investment/total assets ratio (INV_ASSET)
- The loan/total assets ratio (LOAN_ASSET)

Additionally, the main variables for elements of liability and equity taken into consideration, and for which the weight can condition credit unions' profitability (Curi et al. [2]; Miller and Noulas [28]), are the following:

- The clients' total deposits and shares/total assets ratio (SHAREDEP_ASSET)
- The equity/total assets ratio (EQUITY_ASSET)
- The debt/assets ratio (TOTLIAB_ASSET)

In order to give more reliability to our regressions and statistical analysis, and more significance to our main variables' coefficients, we considered several control variables that can also influence the profitability of credit unions. Among these variables, there are those directly tied to these institutions and their characteristics:

- The normal logarithm of the assets' size (SIZE) and its square (SIZE2) because, according to Jokipii and Milne [47] and Miller and Noulas [28], size considerably influences the profitability of financial institutions. Indeed, an economy of scale can make these institutions more efficient in the region where they operate and play an important role in growing their profit.
- The growth of the normal logarithm for the size of assets (A_g) and this growth's square (A_g2). As highlighted by Goddard et al. [17] this increase would be positively tied to profitability for credit unions.
- The non-performing loan (NPL)/total assets ratio, given that this type of loan refers to loans for which clients have not paid their interests. This ratio is representative of risk that credit unions take and would considerably influence in a negative way their assets' return and their profitability (Messai and Jouini [46]).
- The ratio of revenues other than interests' revenues (NIntInc_TInc) as well as the ratio of expenses other than interests' expenses (NIntExp_TInc). These two ratios had to be included in our regressions because the profitability of the credit unions studied is also influenced by revenues and expenses other than interests (Elsas et al., [32]; Edmister Srivastava, [24]). On the one hand, an efficient management of expenses other than interests improves profitability and, on the other hand, the diversification of revenues other than interests, which has increasingly become more frequent among credit unions, as pointed out by Elsa et al. [32], would generally boost this profitability.

Other macroeconomic control variables were considered in our study, either linked to our sample's financial institutions' country of residence (the United States), or linked to the State where each credit union operated. These variables are the following:

- Growth of the United States' GDP (GDP_GROWTH). In the case where it is high enough, it can considerably influence the profitability of credit unions in a positive way, as is the case for several businesses in different fields. In this case, the level of unemployment would be low and that of household consumption would be high, which would increase the number and size of loans granted by these institutions as well as their revenues.
- Standard & Poor's 500 (SP500) - the US stock market index. As for the variable (GDP_GROWTH), an increase in this index would be a sign of a healthy economy and would positively influence financial institutions' ROA.
- The volatility of the US financial market (VIX), which represents investment risk in this market, would negatively influence the profitability of credit unions.
- The effective federal funds rate (EFFR). This represents a reference rate used by banks and credit unions to lend or borrow from other financial institutions. In general, the US Federal Bank determines a target rate according to its macroeconomic objectives and tries to reach this rate by using different monetary strategies. Its objective with these strategies is to make the effective

rate reach the target rate. When the latter increases so does the financial market's interest rate, which can influence interest revenues and expenses for credit unions. This, in turn, can affect the ROA, either lowering or increasing it.

- The unemployment rate (UemplR) in each American State, which is crucial for taking into consideration the economic situation that prevail there. As mentioned by Smith and Woodbury [48], these circumstances can affect the supply and demand for loans.
- The dummy variable (SINGLE_BOND), which takes on the value of 1 if the credit union's purpose is based on a single characteristic to become a member. As a matter of fact, members of this kind of financial institutions are normally linked by a common trait that can be geography, employment, or affiliation to an organization, like a church. The advantage of a single common trait is that union members in this case know one another and have more information about one another's credibility, which reduces the risk involved in granting loans (Ely [49]; Goddard et al. [17]).
- Membership growth potential (POT_CURR_MEMB). It is related to individuals who can become but are not yet members of a credit union. This variable is considered to control the growth of granting loans by relying on these individuals and not on existing members (Goddard et al. [17]).
- A dummy variable (PCA) to control the influence of the formal introduction of a law (in 2000) on the minimum capital/assets ratio within the credit union system. This law was applied under the *Prompt Corrective Action*, which was a federal law in the United States. Since these financial institutions cannot increase their equity by using, like banks, other sources than profit, it would be reasonable to believe that they must adapt by reducing their assets to respect the minimum requirements. The (PCA) variable took on the value of 1 from 2000 to 2015.

Thus, the main model on which we based our statistical analysis to verify the relevance of our hypotheses was the following:

$$
\begin{aligned}
ROA = \ &CONST + \beta_1 CASH\_ASSET + \beta_2 INV\_ASSET + \beta_3 LOAN\_ASSET \\
&+ \theta_1 SHAREDEP\_ASSET + \theta_2 EQUITY\_ASSET \\
&+ \theta_3 TOTLIAB\_ASSET + \rho_1 SIZE + \rho_2 SIZE2 + \rho_3 A\_g \\
&+ \rho_4 A\_g2 + \rho_5 NPL + \rho_6 NIntInc\_TInc \\
&+ \rho_7 NIntExp\_TInc + \delta_1 GDP\_GROWTH + \delta_2 SP500 \\
&+ \delta_3 VIX + \delta_4 EFFR + \delta_5 UNEMPLR + \delta_6 SINGLE\_BOND \\
&+ \delta_7 POT\_CURR\_MEMB + \delta_8 PCA
\end{aligned}
$$

CONST represents the constant; β_1, β_2, and β_3 represent the coefficients of the variables inherent to assets; θ_1, θ_2, and θ_3 represent the coefficients of the variables related to elements of liability and equity; ρ_1, ρ_2, ρ_3, ρ_4, ρ_5, ρ_6, and ρ_7 represent the coefficients of endogenous variables linked to financial

cooperatives' characteristics; and δ_1, δ_2, δ_3, δ_4, δ_5, δ_6, δ_7, δ_8, and represent the coefficients of macroeconomic variables.

3.3   Data and Descriptive Analysis

The data in our study came from biannual financial reports (call reports) of US credit unions, from 1994 to 2015. Our sample consisted in 12,574 of these institutions. Thus, we noted that the period of 22 years covered was long enough for our analysis not to suffer the influence of some aspects that can characterize a short period, such as political or economic aspects. In addition, our sample included a large number of institutions residing in different American States, which makes our statistical analysis more reliable.

By carrying out a descriptive analysis of the variables (see annexed Tables A1, A2, A3, and A4), we noted that the NPL variable progressively decreased starting in 2009, from 0.0214 to a very low 0.01330. For its part, the ROA decreased from 1994 (0.0054) to 2015 (0.0014), while it was negative in 2009 and 2010 because of the financial crisis. We also noted that the cash/cash equivalence ratio when compared with the assets considerably increased from 1998 (0.0367) to 2003 (0.1428), which can be linked to the fact that regulatory requirements at the beginning of 2000, with respect to risky assets, pushed credit unions to maintain more liquidity. This ratio stabilized between 0.10 and 0.12. For its part, the first mortgage loan ratio considerably increased from 1994 (0.087) to 2015 (0.225), which means that credit unions granted more secure loans than unsecured, as shown particularly by the reduction of the OTHUNSEC_LOAN variable. In addition, while we noted a considerable decrease in the new vehicle loans ratio from 0.269 to 0.152, used vehicle loans increased. This could be due to the fact that clients finance the purchase of new vehicles in different ways. For the categories of deposits and shares, we particularly noted that credit unions attract more deposits with maturities of 1+ year (more than one year).

4. Results Analysis and Interpretation

We carried out a first panel regression to verify, firstly, the effect of the financial ratios of the main asset categories and elements of liability and equity on credit unions' profitability shown by the ROA. And yet, we also analyzed the influence of certain parameters, used as control variables, on this profitability. Secondly, we introduced the ratios of different types of loans (relative to total of loans) into the regression in order to verify how each type contributes to the profitability of these financial institutions. Thirdly, we included the ratios of different categories of deposits based on their maturity in order to note the influence of each category on their ROA. We have to emphasise that the ROA is used with a lead lag effect to take into consideration that the influence of the changes in independent variables doesn't have in general an instantaneous effect on the financial institutions return. Fourthly, we analyzed the weights allocated by the most performing credit unions (5th quintile based on ROA) to different types of assets, and elements of liability and equity, in

order to note the allocation strategies that were the most successful during the period studied.

In the first regression (see regression 1 below), the first noteworthy observation regarding assets is that the loans/assets ratio positively influenced the ROA in a very significant way at 1% (column 1). This finding validates our first hypothesis. Also, we have to note that the coefficient of loans/assets ratio (0.0063994) is considerably higher than the one of investment/assets ratio (0.0045017), whish confirm our second hypothesis and the fact that loans contribute more than investment to the credit unions return.

Table 1: Regression 1

Lead_ROA_d	Coef	Std Err	t
SIZE	-0.0048712***	(0.0009954)	-4.89
SIZE2	0.0001804***	(0.0000247)	7.29
A_g	0.0041104***	0.0004435	9.27
A_g2	-0.0003405***	0.0000701	-4.86
CASH_ASSET	0.0010903**	0.0005508	1.98
INV_ASSET	0.0045017***	0.0004105	10.97
LOAN_ASSET	0.0063994***	0.0004969	12.88
EQUITY_ASSET	-0.0028693	0.0023543	-1.22
SHAREDEP_ASSET	0.0077584***	0.0016836	4.61
NONINTERESTINC_TOTALINC	-0.0009287	0.0006564	-1.41
NONINTERESTEXP_TOTALINC	-0.0015382	0.0010388	-1.48
NPL	-0.0535554***	0.0041759	-12.83
GDP_GROWTH	0.0078435***	0.0010968	7.15
SP500	0.0070279***	0.0017469	4.02
VIX	0.0000196	0.0000136	1.43
EFR	0.0001332***	0.000042	3.17
SINGLE_BOND	-0.0001438***	0.0000543	-2.65
POT_CURR_MEMB	3.87e-07	4.27e-07	0.91
PCA	0.0045244***	0.0006489	6.97
Control for the type of credit union	Yes		
Control for the year	Yes		
Control for the state	Yes		
Constant	-0.102***	0.0352	
Observations	332,523		
R-squared	0.111		
Number of cu_number	12,574		

However, we noted that the contribution of shares and deposits to the profitability of US credit unions was largely higher than that of loans. In fact, the coefficient of shares and deposits/ assets ratio (0.0077584), with a significance of 1%, is higher than the one of loans/assets ratio (0.0063994). This confirms our fourth hypothesis and the fact that attracting more deposits would ensure more profitability for these credit unions. In that respect, Berger et al. [38] conclude in their study that specializing in collecting deposits is associated with high profits for Chinese banks. We also noted that asset growth had a positive influence on ROA, which was highlighted by Jokipii and Milne [47]. The squared coefficient of asset growth was negative, which meant that there existed an optimal growth that made it possible to make more profit. Note that the coefficient for non-performing loans (NPL) was negative with a high level of significance (1%), which was normal and encouraged credit unions to be more attentive when granting loans.

In the second regression, we included (see regression 2 below), the ratios of different types of loans on the total of loans, that is, mainly first mortgage loans to purchase a property (FRMORT_LOAN), those for real estate purchases excluding the latter (OTHERALLO_LOAN), those for new vehicle purchases (NEWVEH_LOAN), those for used vehicle purchases (USEDVEH_LOAN), those for credit cards (UNSECRCARD_LOAN), and finally unsecured loans other than the latter (OTHUNSEC_LOAN). Thus, we found that the first mortgage loans/total loans ratio contributed very significantly and positively to ROA (0.0021061). This contradicts Miller and Noulas [28].conclusion in their study of US banks as well as our third hypothesis.

The ratio for other types of real estate loans (OTHERALLO_LOAN) also had a positive influence, but with a slightly lower coefficient related to the increase of its ratio to total loans (0.0019738), which is due probably to the fact that these loans are generally less guaranteed than the first mortgage. Furthermore, used vehicle loans contributed positively to the profitability of credit unions, since the coefficient related to the increase of its ratio to total loans (0.0015851) is positive with a high level of significance (1%). In addition, the ratios of unsecured credit cards loans and unsecured loans other than the latter are both negatives, whish means that this kind of loans contribute negatively to credit unions returns. This is normal as these loans are unsecured and probably would suffer many acts of delinquency.

Table 2: Regression 2

Lead_ROA_d	Coef	Std Err	t
SIZE	-.0038102***	0.0009225	-4.13
SIZE2	0.0001559***	0.0000228	6.83
A_g	0.0051023***	0.0004636	11.01
A_g2	-.0004241***	0.0000793	-5.35
INV_ASSET	0.0007129***	0.0002062	3.46
FRMORT_LOAN	0.0021061***	0.0004632	4.55
OTHREALLO_LOAN	0.0019738***	0.0005028	3.93
NEWVEH_LOAN	0.0007937	0.0004996	1.59
USEDVEH_LOAN	0.0015851***	0.000502	3.16
UNSECRCARD_LOAN	-.0027772***	0.0008705	-3.19
OTHUNSEC_LOAN	-.0013551**	0.0005951	-2.28
NONINTERESTINC_TOTALINC	-.0009482	0.0007121	-1.33
NONINTERESTEXP_TOTALINC	-.0016211	0.0011275	-1.44
GDP_GROWTH	0.007524***	0.001091	6.90
SP500	0.0068612***	0.0017539	3.91
VIX	0.0000154	0.0000137	1.12
EFR	0.0001457***	0.0000435	3.35
SINGLE_BOND	-.0001284**	0.0000558	-2.30
POT_CURR_MEMB	6.75e-07	4.59e-07	1.47
PCA	0.0058256***	0.0006656	8.75
Control for the type of credit union	Yes		
Control for the year	Yes		
Control for the state	Yes		
Constant	-0.0907***	0.0336	
Observations	332,523		
R-squared	0.111		
Number of cu_number	12,574		

In the third regression (see regression 3 below), we included different ratios for the categories of clients' deposits and shares compared to the total of these categories according to their maturity, that is:

- less than one year (DEPSHARES1_ DEPSHARE)
- from one to three years (DEPSHARE13_ DEPSHARE), and
- more than 3 years (DEPSHARES3_DEPSHARES).

Note that these ratios had a very significant positive influence on the profitability of credit unions. However, the contribution to ROA of less than one-year deposits (0.0138437) was higher than that of one to three years deposits (0.0109799), and than that of more than three years deposits (0.0104536). This means that short-term

deposits should generally further increase ROA. Deposit has less contribution to profitability when its maturity is higher. This can be explained by the fact that costs relatives to deposits increase with their maturity. On the other side, these results shows that stable funding and long-term deposits still have a positive influence on the profitability of credit unions.

Table 3: Regression 3

Lead_ROA_d	Coef	Std Err	t
SIZE	-.004364***	0.0009887	-4.41
SIZE2	0.0001661***	0.0000244	6.81
A_g	0.004048***	0.0004441	9.11
A_g2	-.0003357***	0.0000699	-4.80
CASH_ASSET	0.001168**	0.0005527	2.11
INV_ASSET	0.004517***	0.0004111	10.99
LOAN_ASSET	0.0064575***	0.0004988	12.95
EQUITY_ASSET	-.0106583***	0.0017284	-6.17
DEPSHARES1_DEPSHARES	0.0138437***	0.0020089	6.89
DEPSHARES13_DEPSHARES	0.0109799***	0.0020463	5.37
DEPSHARES3_DEPSHARES	0.0104536***	0.0022563	4.63
NONINTERESTINC_TOTALINC	-.0009407	0.0006612	-1.42
NONINTERESTEXP_TOTALINC	-.001551	0.0010472	-1.48
NPL	-.0535308**	0.004175	-12.82
GDP_GROWTH	0.0077633***	0.0010955	7.09
SP500	0.0069082***	0.0017462	3.96
VIX	0.0000178	0.0000136	1.30
EFR	0.0001314***	0.000042	3.13
SINGLE_BOND	-.0001408***	0.0000542	-2.60
POT_CURR_MEMB	4.21e-07	4.31e-07	0.98
PCA	0.0044681***	0.0006536	6.84
Control for the type of credit union	Yes		
Control for the year	Yes		
Control for the state	Yes		
Constant	-0.0497***	0.0360	
Observations	332,523		
R-squared	0.111		
Number of cu_number	12,574		

After this series of regressions, we analyzed the weights allocated by the most performing credit unions (5th quintile based on ROA) to different types of assets, and elements of liability and equity in order to observe the allocation strategies that were the most successful during the period studied. At the same time, we noted some aspects that characterized the less successful cooperatives (1st quintile). Thus,

we noted that the best performing cooperatives (see Table 4 below) were those with the highest average for loan/total assets ratio. And yet, we also found that they are the most heavily capitalized (0.1513), as can be seen in Table 5. In fact, their high capitalization enabled them to grant more loans than other credit unions, given regulatory requirements for the capital/asset ratio. Additionally, the fifth quintile has a NPL percentage of 0.025, which is largely superior to that of other credit unions in the second, third and forth quintile of our sample (first quintile credit union has a very high percentage of NPL, which in their case is a proof of poor management quality). The most successful Credit unions took more risk, which confirmed the risk-return relationship, a fundamental theory in finance, and the importance of taking advantage of risk to make a high return. While the cash and cash equivalence ratio compared with assets was about the same for the five groups of financial cooperatives, the investment ratio was much lower for the best-performing ones (0.251) compared with less-performing ones (0.2939). Thus, with the constraint of capitalization requirements, credit unions would be encouraged to take more risk, grant more loans, and invest less in order to improve performance. We also noted that the size of the assets could considerably influence the performance of credit unions, as highlighted by Jokipii and Milne [47] and Miller and Noulas [28]. Indeed, the normal log for assets' size (SIZE) in the 1st quintile (15.5323) was smaller than in the 5th quintile (16.38825).

Table 4: Average and median of the following independent variables: SIZE, A_g, CASH_ASSET, INV_ASSET, LOAN_ASSET and NPL of five groups of credit unions classified depending on their ROA (5 quintiles). The first quintile is the one with the lowest ROA.

ROA	SIZE	A_g	CASH_A~T	INV_AS~T	LOAN_A~T	NPL
Quintile 1						
Moyenne	15.53258	-.0003701	.1029874	.2925295	.5729545	.0395419
Médiane	15.51798	-.0010815	.0726976	.2680327	.5847127	.0182706
Quintile 2						
Moyenne	16.27017	.0144696	.0922307	.2939215	.575133	.0203648
Médiane	16.25835	.0120649	.0644213	.2725244	.5856394	.0109467
Quintile 3						
Moyenne	16.67448	.0210843	.0870075	.2799861	.5929262	.0169216
Médiane	16.6531	.0190964	.0619103	.2584158	.6052303	.009322
Quintile 4						
Moyenne	16.86221	.0261143	.0852663	.2655643	.6111537	.0160952
Médiane	16.7876	.0240479	.061405	.2430995	.62596	.008648
Quintile 5						
Moyenne	16.38825	.0310834	.0905609	.2454696	.6345611	.0252372
Médiane	16.22479	.0284386	.0657353	.2169781	.6537375	.0105898

Otherwise, we noticed, as we can see in table 5, that non-interest expenses are low for the fifth quintile, which is a proof of high management quality and a good operations management, as put forth by Mckee and Kagane [7] and Miller and Noulas [28]. Also, the non-interest income is high for the best performing credit unions, meaning that the latter are diversifying their activities toward different services.

Table 5: Average and median of the following independent variables: SHAREDEP_ASSET, EQUITY_ ASSET, TOTLIAB_ ASSET, NIntInc_TIncet, NIntExp_TInc of five groups of credit unions classified depending on their ROA (5 quintiles). The first quintile is the one with the lowest ROA.

ROA	SHARED~T	EQUITY~T	TOTLIA~T	NIntInc_TInc	NIntExp_TInc
Quintile 1					
Moyenne	.8523745	.1369511	.0083433	.0917195	.870508
Médiane	.8712468	.1183432	.0024196	.0527052	.6943665
Quintile 2					
Moyenne	.8635462	.127102	.0075987	.0985285	.6224489
Médiane	.8768872	.113388	.0027187	.0713766	.604161
Quintile 3					
Moyenne	.8648443	.1249354	.0085478	.1102386	.5761627
Médiane	.8766566	.1128574	.0030635	.0861369	.5628093
Quintile 4					
Moyenne	.85988	.1290175	.0093551	.1158748	.5354972
Médiane	.8718258	.1169118	.0032379	.0915566	.5266262
Quintile 5					
Moyenne	.8367879	.1513113	.009823	.1245561	.4876132
Médiane	.8544354	.1330584	.0028676	.0797304	.4827284

5. Conclusion

In the present article, we studied the effect of the choices of allocating assets and liabilities, including weights for some types of loans and deposits, on the profit of credit unions in the United States the past few years. In fact, we analyzed the influence of the mentioned choices, represented by ratios, on the performance of the latter, represented by ROA. After, carrying out statistical analyses and panel regressions on a sample of 12,574 US credit unions and biannual data from 1994 to 2015, we made, as a theoretical contribution, many conclusions, including the ones relatives to our four hypotheses.

First of all, the loan/total assets ratio had a positive effect on the profitability of financial cooperatives, thus confirming our first hypothesis and what was concluded by other authors (Curi et al. [2]; Miller and Noulas [28]; Edmister and Srivastava [24]). Also, we have to highlight that loans contribute more than investment to the credit unions return. Second, one of the important findings that stood out from the

results was the fact that the positive contribution of increased client deposits and shares to the profitability of US credit unions was largely greater than that for loan growth. This enabled us to conclude that attracting more deposits would ensure better profitability for these cooperatives. Berger et al. [38] have already found that specialization in collecting deposits is associated with a high profit for Chinese banks. In addition, our results showed that the contribution of deposits to profitability grew as their maturity decreased. This may be explained by the fact that costs related to deposits grew as maturity increased. As regards to loan types, those linked to first mortgage loans positively contributed to ROA, which contradicted the conclusion reached by Miller and Noulas [28], who studied a US bank sample, and did not validate our third hypothesis. In addition, we have to stress out that unsecured loans contribute negatively to credit unions returns, which is due to the fact that these loans, with their unsecured characteristic, would probably suffer many acts of delinquency.

Furthermore, among the important elements which characterized best performing credit unions, were the high levels of their loan/total assets ratio and their capitalization. This is in the same vein as what was said earlier about the latter and how its growth made it possible to grant more loans as well as increased returns. In addition, this group of credit unions granted a greater number of first mortgage loans and invested less. All theses findings represent a managerial contribution that can benefit the management of credit unions and the organizations that help them. Another finding of interest is that the most successful credit unions took more risk, which confirmed the theory that stipulates that high return is generally associated with higher risk-taking.

As a contribution to the literature, we contribute to the debate around credit union stability by analysing some changes in assets allocation that could reinforce or weaken the performance of credit union portfolio. We also proved that increasing deposits would enable these financial institutions to make more profit than loan growth. This represents an interesting theorical contribution not discussed before in the case of credit unions. In this sense, our research add value to the field of financial institutions management, since most studies concern banks profitability and cannot be generalized to credit unions for various motives such as differences in ownership structure, economic objectives, and regulatory constraints.

Nevertheless, like other relevant studies, our study was subjected to research limits. Namely the use of ROA, based on accounting elements from financial results because we did not use the market values of some variables, like investments, to calculate it. In addition, the ROA (a measure of financial performance) does not take into consideration other credit unions' objectives, which are of social nature or linked to regional development (Altunbas et al. [16]; Goddard et al. [17]). However, according to Goddard et al. [17] and Miller and Noulas [28], it remains a reliable measure for performance. Another limit to consider concerning the survivors' bias with respect to our sample because some credit unions that have ceased their business or have been acquired by other credit unions were not considered in our sample. This is not a major handicap given our sample size.

Regarding research avenues, since we observed a difference in risk-taking between the best and less performing credit unions, it would be appropriate to compare the difference between this kind of financial institutions and commercial banks. Particularly given that credit unions are acknowledged as more resistant to risk than the latter Bauer [8]. Another relevant research avenue would be to study the influence of allocating assets and liabilities on the risk related to performance and asset returns, represented by ROA's standard deviation, in order to analyze how increasing some ratios like those used in our study would change the level of risk.

References

[1] Aggelopoulos, E. (2017) 'What explains changes in accounting divisional performance under liquidity shortage conditions. Evidence from the Greek Banking', Accounting and Management Information Systems, Vol. 16 No. 2, pp. 89-106.

[2] Curi, C., Lozano-Vivas A. and Zelenyuk V. (2015) 'Foreign bank diversification and efficiency prior to and during the financial crisis: Does one business model fit all', Journal of Banking and Finance, Vol. 61 No. 1, pp. 22-35.

[3] Sheehan, R., G. (2013) 'Valuing core deposits', Journal of Financial Services Research, Vol. 43 No. 3, pp. 1978-220.

[4] Youngha C., Hwang S. and Satchell S. (2012) 'The optimal mortgage loan portfolio in UK regional residential real estate', The Journal of Real Estate Finance and Economics, Vol. 45 No. 3, pp. 645- 677.

[5] Lu S. L. (2012) 'Assessing the credit of bank loans using an extended Markov chain model', Journal of Applied Finance and Banking, Vol. 2 No. 1, pp. 197-223.

[6] Wilcox, J., A., (2007) 'Determinants of Credit Union and Commercial Bank Failures: Similarities and Differences, 1981–2005. Madison, WI: Filene Research Institute.

[7] McKee, G. and Kagan, A. (2016) 'Determinants of recent structural change for small asset U.S. credit unions', Review of Quantitative Finance and Accounting, Vol. 47 No. 12, pp. 775–795

[8] Bauer, K. (2015) 'The corporate credit union crisis: Does it call for reform or re-engineering?', Journal of Banking Regulation, Vol. 16 No. 2, pp. 89-105.

[9] Goddard, J. and Wilson, J.O. (2005) 'US Credit Unions: An Empirical Investigation of Size, Age, and Growth', Annals of Public and Cooperative Economics, Vol. 76 No. 3, pp. 375-406.

[10] Rubin G. M., Overstreet Jr. G. A., Beling P. and Rajaratnam K. (2013) 'A dynamic theory of the credit union', Annals of Operations Research, Vol. 205 No. 1, pp. 29-53.

[11] Smith, D. J., Cargill, T. F., and Meyer, R. A. (1981) 'Credit unions: An economic theory of a credit union', The Journal of Finance, Vol. 36 No. 2, pp. 519-528.

[12] Antoniades, A. (2016) 'Liquidity Risk and the Credit Crunch of 2007–2008: Evidence from Micro-Level Data on Mortgage Loan Applications', Journal of Financial and Quantitative Analysis, Vol. 51 No. 6, pp. 1795 – 1822.

[13] Dagher, J. and K. Kazimov (2015) 'Banks′ liability structure and mortgage lending during the financial crisis', Journal of Financial Economics, Vol. 116 No. 3, pp. 565-582.

[14] Cornett M. M., J. J. McNutt, P. E. Strahan and H. Tehranian (2011) 'Liquidity risk management and credit supply in the financial crisis', Journal of Financial Economics, Vol. 101 No. 2, pp. 297-312.

[15] Memmel, C. and Schertler (2012) 'The dependency of the banks' assets and liabilities: evidence from germany', European Financial Management, Vol. 18 No.4, pp. 602-619.

[16] Altunbas, Y., S., Carbo, E. P. M., Gardener, P. and Molyneux, P. (2007) 'Examining the relationships between capital, risk and efficiency in European banking', European Financial Management, Vol. 13 No. 1, pp. 49-70.

[17] Goddard, J., Mckillop, D. and Wilson, J.O. (2008) 'The diversification and financial performance of US credit unions', Journal of Banking and Finance, Vol. 32 No. 9, pp. 1836-1849.

[18] Ely, D. P. and K. J. Robinson (2009) 'Credit Unions and Small Business Lending', Journal of Financial Services Research, Vol. 35 No. 1, pp.   53 – 80.

[19] Kolari, J. W. and G. H. Shin (2006) 'Assessing the Profitability and Riskiness of Small Business Lenders in the Banking Industry', Journal of Entrepreneurial Finance, Vol. 11 No. 2, pp. 1-26.

[20] Bauer, K. (2008) 'Detecting abnormal credit union performance', Journal of Banking and Finance, Vol. 32 No. 4, pp. 573 - 586.

[21] Ryder, N. R. and Chambers, C. (2009) 'The credit crunch - Are credit unions able to ride out the storm?', Journal of Banking Regulation, Vol. 11 No. 1, pp. 76-86.

[22] Tokle, R., J. and Tokle, J. G. (2007) 'Asset-liability management at GEM state credit union', Journal of the International Academy for Case Studies, Vol. 13 No. 1, pp. 121-128.

[23] Kuhil, A. M. and T. Boru (2018) 'Empirical Evidence on the Impact of Bank-Specific Factors on the Commercial Banks Performance: The CAMEL Model and Case of Ethiopian Banks', Global Journal of Management and Business Research: C Finance, Vol. 18 No. 4, pp. 36-48

[24] Edmister, R. O. and Srivastava S. C. (1993) 'Loan portfolio composition and management control of bank risk: An empirical Investigation', Journal of Applied Business Research, Vol. 9 No. 1, pp. 119-131.

[25] Furfine C. (2001) 'Bank portfolio Allocation: The impact of capital requirements, Regulatory Monitoring and economic conditions', Journal of Financial Services Research, Vol. 20 No. 1, pp. 33-56.

[26] Thakor A. V. (1996) 'Capital requirement, monetary policy and aggregate bank lending: Theory and empirical evidence', Journal of Finance, Vol. 51 No. 1, pp. 279- 324.

[27] Passmore, S., W. and Sharpe, S. A. (1994) 'Optimal bank portfolios and the credit crunch', Board of Governors of the Federal Reserve System (U.S.), Finance and Economics Discussion Series, pp. 94-19.

[28] Miller S. M. and Noulas A. (1997) 'Portfolio mix and large bank profitability in the USA', Applied Economics, Vol. 29 No. 4, pp. 505-517.

[29] Calem, P. S. and LaCour-Little, M. (2004) 'Risk-based capital requirements for mortgage loans', Journal of Banking and Finance, Vol. 28 No. 3, pp. 647-672.

[30] Esho, N., P. Kofman and I. G. Sharpe (2005) 'Diversification, Fee Income, and Credit Union Risk', Journal of Financial Services Research, Vol. 27 No. 3, pp. 259–281

[31] DeYoung. R. and Yom, C. (2008) 'On the independence of assets and liabilities: Evidence from U.S. commercial banks, 1990-2005', Journal of Financial Stability, Vol. 4 No. 3, pp. 275-303.

[32] Elsas R., Hackethal A. and Holzhauser M. (2010) 'The anatomy of bank diversification', Journal of Banking and Finance, Vol. 34 No. 6, pp. 1274-1287.

[33] Stiroh, K. J., and Rumble, A. (2006) 'The dark side of diversification: The case of US financial holding companies', Journal of Banking and Finance, Vol. 30 No. 8, pp. 2131-2161.

[34] Lepetit L., Nys E. C., Rous P. and Tarazi A. (2008) 'Bank income structure and risk: An empirical analysis of European banks', Journal of Banking and Finance, Vol. 32 No. 8, pp. 1452-1467.

[35] Acharya V., Hasan I. and Saunders A. (2006) 'Should banks be diversified? Evidence from individual bank loan portfolios', The Journal of Business, Vol. 79 No. 3, pp.1355 -1412.

[36] Rossi S. P. S., Schwaiger, M. S., and Winkler, G. (2009) 'How loan portfolio diversification affects risk, efficiency and capitalization: A managerial behaviour model for Austrian banks', Journal of Banking and Finance, Vol. 33 No.12, pp. 2218-2226.

[37] Demirguc-Kunt, A., and Huizinga H. (2010) 'Bank activity and funding strategies: The impact on risk and returns', Journal of Financial Economics, Vol. 98 No. 3, pp. 626-650.

[38] Berger, A., Hasan, I. and Zhou, M. (2010) 'The effects of focus versus diversification on bank performance: Evidence from Chinese banks', Journal of Banking and Finance, Vol. 34 No. 7, pp. 1417-1435.

[39] Goddard, J., Mckillop, D. and Wilson, J.O. (2016) 'Regulatory Change and Capital Adjustment of US Credit Unions', Journal of Financial Services Research, Vol. 50 No. 1, pp. 29–55

[40] Isshaq, Z., B. Amoah and I. Appiah-Gyamerah (2019) 'Non-interest Income, Risk and Bank Performance', Global Business Review, Vol. 20 No. 3, pp. 595–612.

[41] Chazi, A., A. Khallaf and Z. Zantout (2018) 'Corporate Governance and Bank Performance: Islamic versus Non-Islamic Banks in GCC Countries', The Journal of Developing Areas, Vol. 52 No. 2, pp. 109-126.

[42] Akbar, A. and Akbar, M. (2015) 'Approaches to improving asset structure management in commercial banks', Oeconomics of Knowledge, Vol. 7 No. 2, pp. 26-35.

[43] Kristianti, R., A. and Yovin, Y. (2016) 'Factors Affecting Bank Performance: Cases of Top 10 Biggest Government and Private Banks in Indonesia in 2004 – 2013', Review of Integrated Business Economics Research, Vol. 5 No. 4, pp. 371 – 378.

[44] Kashian R., D. and R. Tao (2014) 'Off-balance sheet activities and community bank performance', Journal of Economic Studies, Vol. 41 No. 6, pp. 789-807.

[45] Birchall J. (2013) 'The potential of co-operatives during the current recession; theorizing comparative advantage', Journal of Entrepreneurial and Organizational Diversity, Vol. 2 No. 1, pp. 1-2.

[46] Messai, A. S. and Jouini, F. (2013). Les déterminants de prêts non performants. La Revue Gestion et Organisation, 5(1), 9-15.

[47] Jokipii, T.et Milne A., (2011). Bank capital buffer and risk adjustment decisions. Journal of Financial Stability, 7(3), 165-178.

[48] Smith, D. M. and S., A. Woodbury (2010) 'Withstanding a Financial Firestorm: Credit Unions vs. Banks', Research Brief, Filene Research Institute, Madison, Wisconsin.

[49] Ely, D. (2014) 'Credit unions and risk', Journal of Regulatory Economics, Vol. 46 No. 1, pp. 80-111.