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Cobbler, Stick to Thy Last: the Disciplining of Business Loans in Credit Unions

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Abstract: The credit union sector has grown quite significantly in recent years. Among other strategies, this growth has been achieved via expansion of the portfolio of services (mostly, the types of loans) that credit unions offer, an activity which has been heavily regulated. This regulatory emphasis seems to stem from two considerations. First, growth strategies based on expanding the range of services were thought to lead to significant increases in asset risk, since credit unions were considered to be at a special disadvantage in the selection and management of assets other than personal loans; second, the regulation tried to protect credit union member (shareholders) who probably did not recognize these risks and would not exercise explicit monitoring or disciplining on the credit union. We look at these two issues in the context of the particular example of credit union growth via expansion into member business loans. Using data from the universe of US credit unions we first provide evidence that indeed expanding the business loan portfolio increases the risk profile of the asset side of the credit union. We then show, however, that credit union members exercise significant monitoring of the credit union, in general, and of business loans, in particular. We offer both descriptive and quasi-experimental evidence which suggests that credit union members understand the risk characteristics of business loans and penalize the credit union by withdrawing deposits when business loans increase significantly. Our results have broad implications in that they suggest that risky growth strategies of even the "less sophisticated" financial institutions are subject to significant discipline mechanisms from their main stakeholders.

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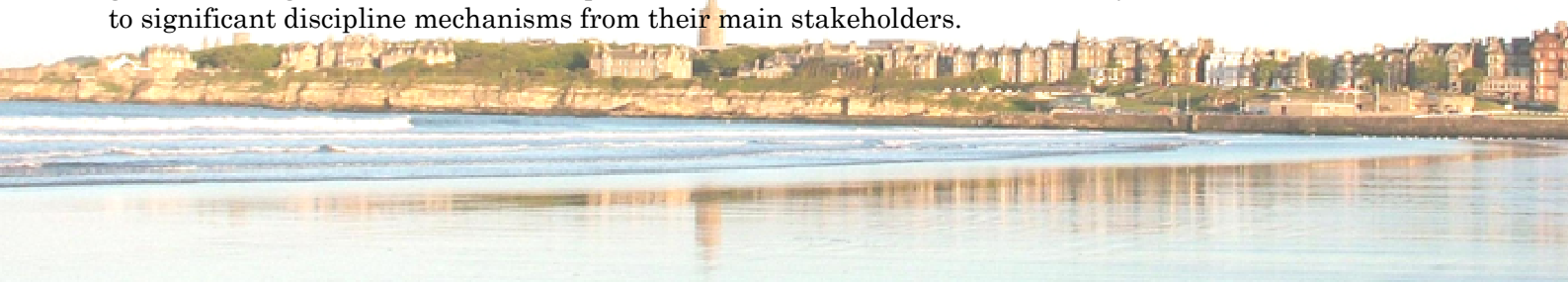

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Cobbler, stick to thy last: the disciplining of business loans in credit unions

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ABSTRACT

The credit union sector has grown quite significantly in recent years. Among other strategies, this growth has been achieved via expansion of the portfolio of services (mostly, the types of loans) that credit unions offer, an activity which has been heavily regulated. This regulatory emphasis seems to stem from two considerations. First, growth strategies based on expanding the range of services were thought to lead to significant increases in asset risk, since credit unions were considered to be at a special disadvantage in the selection and management of assets other than personal loans; second, the regulation tried to protect credit union member (shareholders) who probably did not recognize these risks and would not exercise explicit monitoring or disciplining on the credit union. We look at these two issues in the context of the particular example of credit union growth via expansion into member business loans. Using data from the universe of US credit unions we first provide evidence that indeed expanding the business loan portfolio increases the risk profile of the asset side of the credit union. We then show, however, that credit union members exercise significant monitoring of the credit union, in general, and of business loans, in particular. We offer both descriptive and quasi-experimental evidence which suggests that credit union members understand the risk characteristics of business loans and penalize the credit union by withdrawing deposits when business loans increase significantly. Our results have broad implications in that they suggest that risky growth strategies of even the "less sophisticated" financial institutions are subject to significant discipline mechanisms from their main stakeholders.

Keywords: credit unions, business loans, depositor discipline, asset risk.
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1. Introduction

The credit union sector in the US has undergone a period of continuing growth in the most recent years (Figure 1). In 1994, US credit unions (CUs) managed around $295B assets, $260B in shares and deposits, $179B in loans and had 66 million members. These figures rose to $1,290B assets, $1,030B shares and deposits, $870B loans and 107 million members in 2016.[1] Thus, CUs currently account for approximately 11.62% of the deposits and 9.53% of the loans in the financial system. A peculiar characteristic of CUs is that they are subject to a field of membership definition, which greatly restricts the potential membership and financing via deposits that the CU can attract, and to regulations which place significant constraints on the type of services (loans) that the credit union can offer to its members. Thus, growth of a credit union can be achieved mostly through three strategies: through M&As (which in the CU sector have been quite frequent: the number of CUs went from 12,138 in 1994 to 5,875 in 2016), through expansion of the field-of-membership (applying for a multiple field-of-membership) so that the CU has access to an increased number of potential members, or by managing to expand the type of services (loans, mostly) that the CU provides.[2] Wilcox (2005; also Goddard et al., 2002, Legget and Strand, 2002) suggested that the latter two reasons have been the key strategies that allowed CUs to increase their size and gain economies of scale (thus providing efficiency gains to their members/shareholders). We do not know much, however, about the consequences of these strategies and the implications they may have on CUs and on the financial system in general.

In this paper we analyze the effects of one of the growth strategies, namely the expansion of the range of services that the CU can offer. In particular, we look at growth through increases in member business loans. Credit union regulation has traditionally placed significant restrictions in the amount of business loans –relative to net worth- that credit unions could grant. These restrictions tried to control risk-taking by the credit union and were based on the assumption that business loans are a significantly riskier asset for CUs to hold than personal loans given that CUs were at a disadvantage when screening the quality of business loans.[3] Nevertheless, since 2003 the National Credit Union Administration (NCUA) has been relaxing the requirements for credit unions to expand their business loans portfolio.[4] These changes have led to a significant increase in CU business lending activity.

[1] NCUA Industry at a glance https://www.ncua.gov/analysis/Pages/industry/at-a-glance-dec-2016.pdf

[2] See Leggett and Strand (2002), Goddard et al. (2002), Goddard et al. (2008), Wilcox (2005) and Wilcox (2006) among others. Goddard et al. (2002) find that "the ability to increase business with existing members" is one of the determinants of growth of credit unions.

[3] See the report by the US Department of treasury to the US Congress in January, 2001: https://www.treasury.gov/about/organizational-structure/offices/Documents/Jan2001CreditUnionReport.pdf

[4] The latest significant change was the amendment, on February 2016, of the member business loans rule (723 of NCUA's Rules and Regulations). This change, which will be effective on January 2017, is considered to be one of the biggest shocks to the ability of CU to grant business loans in years. In particular, the new rules would imply greater flexibility

The effects of this potential increase are, however, uncertain. On the one hand, diversification into business lending may produce social benefits in terms of access to credit for small businesses (see Ely and Robinson, 2009; Walker, 2016; Wilcox, 2011). These social benefits may have a positive effect on credit union fundamentals (financing) through increased membership and deposits. On the other hand, large increases in business loans may increase significantly the risk of the credit union assets: both the reduced experience of CUs in granting business loans and an adverse selection problem (in that the pool of applicants includes lower quality applicants who did not have access to the more experienced banking system) put credit unions at a disadvantage in identifying good business loans, thus leading to riskier loan portfolios (Howell-Best, 2003).[5] If credit union members are aware of and reactive to this increased risk, they may penalize the credit union through withdrawal of deposits. This sort of market-based discipline has been a key factor that has contributed to stability of the banking system, but it seems to be less relevant for credit unions. Indeed, the strict regulation that tries to curb risk-taking by credit unions seems to stem from the consideration that credit union members are less reactive and, therefore, exercise less "automatic" discipline on the credit union.

In this paper we use the above arguments as motivation to provide an in-depth study of the consequences of growth through business loan expansion by credit unions. In particular, we provide evidence that indeed business lending activity leads to an increase in the risk of the asset side of the credit union. We then examine if credit union (CU) members understand this increased risk and exercise significant discipline to the growth strategy of granting business loans. Specifically, we are interested in answering the following questions:

- Are business loans a significantly riskier type of asset for CUs?
- Do CU members exercise discipline on credit unions with bad fundamentals or which have riskier balance-sheets?
- In particular, is the strategy of growth via business loans penalized by CU members? Are other growth strategies similarly penalized?

The answers to this set of questions have important policy implications. First, understanding the way credit union depositors react to CU strategies should help design policies aimed at controlling CU risk taking: recent regulations which have relaxed the requirements for CU expansion of business loans may affect the stable financing of the CU. Second, given the special features of CUs, which

for CU to grant business loans by changing some of the current business loans limitations by a "broad principles-based regulatory approach".

[5] Indeed, Part 723.4 requires credit unions with commercial lending programs to adopt and implement a comprehensive written commercial loan policy and establish detailed procedures for commercial lending.

differentiate them from other financial institutions, the disciplining mechanisms may work differently and, as a consequence, regulation of credit unions and banks might need to diverge further.

To carry out these ambitious objectives, we put together a large database of U.S. credit union accounting information. The sample includes all CUs with data available at the NCUA and assets larger than $50 million. Our sample period covers 1994Q1-2014Q4. This yields a maximum of 152,761 quarterly observations which correspond to 2,248 CUs. We use both regression analyses and quasi-experimental methods and deliver three main sets of results.

We first show how growth through business loans seems to be an alternative to growth through increasing the customer base via expansion of the field of membership. We show evidence that, contrary to expanding the field of membership, growth through business loans leads to significant increases in the asset risk of the CU. These results, we believe, provide a justification to the strict regulation on business loans but, also, give a motivation to the subsequent analysis of whether credit union members understand this risk and discipline the credit union by reducing their deposits.

Our second set of results shows descriptive evidence that, indeed, CU members understand the sources of risk and discipline the credit union for its risk-taking. We relate deposit growth to a set of CU fundamentals and risk indicators while controlling for idiosyncratic and macroeconomic factors: the results of these descriptive analyses show that CU members withdraw their shares and deposits when fundamentals deteriorate or the CU increases its risk-taking. We stress some results where discipline differs from previous findings for banks (such as the lack of discipline of total loans) and relate those differences to the peculiarities of credit unions. In particular, we stress the result that CU members seem to react negatively to the presence of business loans in the CU's loan portfolio.

This latter result becomes the starting point of our final analyses, where we look deeper into the disciplining of business loans: we carry out two semi-experimental studies around two "exogenous shocks" which allowed for increased risk-taking by CUs through increases in the capacity to grant business loans. Using quasi-experimental methods (matching and diff-in-diff estimators) we estimate parameters of depositor response which may be given a causal interpretation. In both cases we find significant evidence that depositors react negatively to the implementation of regulations which increase the risk-taking capacity -through expansion of business loans- of the CU relative to well-designed control groups. These final results may be especially relevant from a regulatory perspective: regulations which allow the increase of risk-taking capacity of CUs may, in fact, have unwanted consequences for stability of the financing of the CU. Alternatively, we can read these results as pointing out that CU members indeed understand the sources of risk and exercise a significant (market-based) discipline on their credit union which acts as a complement to explicit regulation.

To our knowledge, our analysis is the first to show comprehensive results of depositor (member) discipline in CUs and, also, it is the first to examine depositor discipline of a particular growth strategy of a financial institution. Thus, our paper contributes in two main areas. We show that CU members react differently than bank depositors to some of the CU fundamentals: we link these differences to the dual character of CU members as depositors and owners. Second, our results stress that particular growth strategies of financial institutions may also be penalized, if they are perceived to change (increase) the future risk profile of the asset side. Our analyses focus on a particular type of financial institution and a specific growth strategy but we believe their implications may extend to broader contexts and are, therefore, of general interest.

The remainder of the paper is organized as follows. In Section 2 we justify the context of our analysis by presenting the peculiarities of CUs and of CU business loan regulation. In Section 3 we describe our data. In Section 4 we show evidence that business loans are a risky growth strategy. This result justifies the existence of regulatory limits and provides a motivation for the disciplining of such loans. In Section 5 we show results which describe the main mechanisms of depositor discipline of business loans in CUs. In Section 6 we take advantage of two quasi-experimental settings which allow us to draw conclusions indicative of causality effects from expansion of business loans to reduced deposits (and, therefore, of member-based disciplining of the credit union). In Section 7 we offer some concluding remarks.

2. Risky assets and market discipline: business loans in credit unions

Credit unions are financial intermediaries which have several differentiating features. First, they are cooperative associations which serve a limited group of members according to a defined "field of membership" (Black and Dugger, 1981; Ely, 2014; Frame et al., 2003; Goddard et al., 2008). The National Credit Union Administration (NCUA) defines three forms of membership: community, occupation (including being employees of a specific employer) and association. Credit unions may be chartered by the federal government or by their state government. Federally chartered credit unions may serve a single bond membership or several groups (multiple bond of membership) whereas for state-chartered credit unions the possibility of serving more than one field of membership depends upon state regulations. This field of membership definition effectively restricts the scope of a CU's operations and strategies and the CU's capacity to grow. Second, CUs have a unique structure, compared with other financial intermediaries such as banks, in that CU members play a dual role as both owners and depositors (Leggett and Stewart, 1999; Smith et al., 1981; Smith, 1984): member shares are treated as deposits for which members receive a dividend rate. CU members receive both shares and deposits protection by the National Credit Union Share Insurance Fund (NCUSIF), which

provides deposit insurance to federally chartered credit unions and to most state-chartered credit unions. Finally, CUs are much more saver/borrower oriented than other financial institutions: CUs provide, in general, higher rates on deposits (as pointed above, this constitutes a way to remunerate CU members/shareholders: Bauer, 2008; Leggett and Stewart, 1999; Smith et al., 1981; Smith, 1984) and/or lower rates on loans, which typically lead to larger percentages of consumer and personal loans than in other financial institutions and makes CUs competitors of the banking industry in the area of consumer financing (Feinberg, 2001; Hannan, 2003; Tokle and Tokle, 2000). This consumer orientation has heavily influenced CU regulation, which has limited the risk-taking of CUs by constraining the type of services (loans) that credit unions can provide to their members. The objective of this regulation is the protection of credit union members, which typically are considered to be less sophisticated than investors/depositors of other financial institutions and, therefore, less reactive and more exposed to potential risk-taking by the credit union.

A relevant example of this regulatory emphasis refers to the limits set on the expansion of the credit union's loan portfolio via business loans. Member business loans, as defined by Part 723 of the NCUA Rules and Regulations, generally include any loan, line of credit, or letter of credit (including unfunded commitments) where the borrower uses the proceeds for commercial, corporate, or other business investment property or venture, or for agricultural purposes.[6] These loans have been considered a risky asset for CUs for two main reasons. First, CUs have less experience in screening and granting business loans, given their typical focus on consumer loans and their less sophisticated risk analysis facilities. Second, credit unions face a significant adverse selection problem in that the pool of applicants for business loans includes lower quality applicants who did not have access to the more experienced banking system. The above reasons put credit unions at a significant disadvantage in the process of granting business loans and, as a consequence, credit unions that are heavily invested in such loans are expected to present riskier loan portfolios. Hence, the US Congress imposed in 1998 a ceiling on the amount of business loans CUs could grant. This limit, in its current wording, prevents a CU from making any member business loan that would result in a total amount of such loans outstanding equal to more than the lesser of 1.75 times the actual net worth of the credit union or 1.75 times the minimum net worth required for a credit union to be well capitalized (7% of total assets). Thus, the regulation imposes in practice a cap of business loans at 12.25% of total assets.[7]

[6] The most recent update (81 FR 13530 of March 14. 2016, applicable from January 1, 2017) of regulation 12CFR Chapter VII Part 723 of NCUA regulations introduces the definition of a commercial loan, mostly equivalent to a member business loan (though there are exceptions to the equivalence): statutory limits on commercial lending are set on member business loans so we will generally use the term "business loans" hereafter.

[7] This limit does not apply to CUs chartered for the explicit purpose of making business loans or to CUs with a low-income designation or which are community development financial institutions: we take advantage of one of these exceptions in our analyses below.

Despite the fact that the presence of this limit suggests that business loans are a risky way of expanding the CU assets, the NCUA has been steadily introducing changes in business loan regulations in order to soften or eliminate some of the restrictions in place. A first major change was introduced in 2003 with regulation 68 FR 56552, which eliminated some of the restrictions on business loans although it maintained the cap of 12.25% of CU assets.[8] As a consequence, there was a significant increase in credit union business lending, which continued through almost seven years (see figure 3). More minor changes in business loan regulations were introduced in 2005 and 2013 and, finally, in 2016 the NCUA implemented the latest modification (723 of NCUA's Rules and Regulations). The amendments introduced, which were effective at the beginning of 2017, again gave greater flexibility for CUs to grant business loans, although still the limits as percentage of total assets are applicable.

These regulatory restrictions to business loans have the objective of protecting credit union members (depositors) from the increased risk coming from the credit union moving into "less known territory". Implicitly, the limits rest on the consideration that credit union members (who are also shareholders of the credit union) may not be sufficiently aware of the risks involved in business loan expansion and, thus, may not exercise effective monitoring and discipline on the credit union. Market-based discipline of financial institutions has been considered a key factor which reinforces and supports the effects of explicit regulation and supervision: financial markets have the ability to monitor bank performance and influence risk-taking by punishing banks who take excessive risks or whose fundamentals deteriorate. This disciplining process, which works through reduced access to financing or through an increase of interest rates on deposits, gives banks incentives to limit risk or to take corrective actions which, in turn, lead to increased stability of the financial system (see, e.g., Nier and Baumann, 2006). Besides the disciplining effect that equity markets may exercise, deposit markets have been shown to be a major source of discipline for financial institutions which rely on deposit financing: when fundamentals deteriorate, depositors react by leaving or by demanding higher interest rates. There is by now abundant empirical evidence of depositor discipline both in domestic and international contexts (see Berger and Turk-Ariss, 2015; Calomiris and Powell, 2001; Cook and Spellman, 1994; Macey and Garret, 1988; Martinez Peria and Schmukler, 2001; Park and Peristiani, 1998, among others). This literature, however, is still lacking in some areas. First, it has

[8] The specific changes included: "reducing construction and development loans equity requirements"; allowing regulatory flexible credit unions to ask or not for personal guarantees; "allowing well-capitalized credit unions to make unsecured member BLs (MBL) within certain limits"; "providing that purchases of nonmember loans and nonmember participation interests do not count against a credit union's aggregate MBL limit, subject to an application and approval process"; "allowing 100% financing on certain business purpose loans secured by vehicles"; "providing that loans to credit unions and credit union service organizations (CUSOs) are not MBLs for purposes of the rule"; "simplifying MBL documentation requirements"; simplifying and removing unnecessary provisions for MBL and allowing CUSO to "originate business loans" (see Federal Register /Vol. 68, No. 190 /Wednesday, October 1, 2003 /Rules and Regulations)

mostly focused on bank depositors. The evidence regarding discipline in other financial institutions is scarce and we lack systematic studies on the existence of depositor discipline, for example, in credit unions, and on how the peculiarities of these other institutions may affect how discipline works.[9] Second, most of the discipline literature has focused on depositor reaction to bottomline fundamentals (earnings, capital, volatility) but analyses which have looked at depositor discipline of bank strategies like growth or diversification are quite scarce.[10]

Our analysis in this paper contributes to filling these two gaps by looking at the reaction of credit union members to the business loan activity of the credit union. We develop our analysis in three steps. We first build on the assumption that business loans are heavily regulated because such loans imply a departure from the "natural" operations of the CU and represented a shift toward riskier asset portfolios. Thus, we start by offering evidence that increases in business loans lead to a riskier loan portfolio of the CU. We then link this increased risk to the issue of member discipline of the credit union. In particular, we first show some baseline descriptive analyses where we link deposit growth with CU fundamentals. These regressions show that indeed credit union members understand the sources of credit union risk and discipline the credit union by withdrawing deposits when fundamentals deteriorate. These results represent a contribution on their own since we show significant differences in how this discipline works relative to the traditional results of bank depositors. We argue that these differences are reflective of the peculiarities of credit unions and credit union members. Finally, we focus our attention on the disciplining of business loans. We show that credit union members understand the higher risk of such loans and discipline the credit union, thus providing market-based discipline which complements that given by regulation. In particular, we take advantage of changes in the regulation on business loans and use two regulatory shocks to design quasi-experimental analyses which show causal evidence that CU members discipline the CU for increasing its business loan activity.

3. Data

In order to examine depositor reaction to business loans, we collected quarterly data from the CU call reports available from the NCUA. These call reports contain detailed financial information for each CU that operates in the United States. We selected credit unions with assets greater than 50

[9] There is some scattered evidence of discipline in credit unions in international settings: Arnold et al. (2016) or Murata and Hori (2006).

[10] One example is Bertay et al. (2013), who show that big systemic banks are subject to higher market discipline. Indeed, size is generally assumed by default to have a potential impact on bank risk and returns (see, e.g., Berger and Mester, 1997, Demsetz and Strahan,1997, Deng et al. 2007) and therefore most of the literature on depositor discipline has used size or asset growth as a control (see Arnold et al., 2016; Barajas and Steiner, 2000; Berger and Turk-Ariss, 2015; Maechler and McDill, 2006, Goldberg and Hudgins, 2002, among others) but without attempting to go further in the analysis of whether indeed depositors actively discipline the strategies followed by banks in order to grow.

million dollars (peer groups 4, 5 and 6). This subsampling strategy is based on data availability, since before 2002Q3 only CUs in these groups reported quarterly financial statements, while smaller CUs reported semiannually. Our sample period covers 1994Q1-2014Q4, yielding a maximum of 152,761 quarterly observations which correspond to 2,248 CUs. The list of variables we collect is shown in Appendix A. Our main dependent variables of interest throughout most of the analyses are the growth rates of shares and of total shares and deposits, the distinction being that "total shares and deposits" includes also non-member deposits, which some CUs are allowed to accept.[11] The other variables we use are CU balance-sheet and income statement characteristics which describe the investment strategies and performance of the CU. We describe these variables as we include them in our analyses. In order to avoid problems with outliers, CU variables which are continuous are winsorized at the 0.5% level in each tail. Given that several mergers and acquisitions occurred during our sample period, and the accounting numbers are affected by these transactions, we exclude the CU-quarter observations which correspond to the quarter in which a merger or acquisition took place. This reduces our sample to 141,276 CU-quarter observations. In addition to CU-specific variables, we collect information on macroeconomic variables that may affect deposit growth (Arnold et al., 2016; Barajas and Steiner, 2000; Maechler and McDill, 2006). Considering that most CUs concentrate their operations in one state, we use macroeconomic data at the state level: information on state-level personal income and unemployment was obtained from the Federal Reserve of Saint Louis (FRED). For inflation, we collected inflation rates at the regional level extracted from the Bureau of Labor Statistics.

Additional information that we collect or process for specific analyses is:

- Data on location of CU branches (available from the NCUA since 2010). This information is used to establish a proxy for the CUs that operate in more than one state.
- Information on CU field of membership and whether the CU has the low-income designation. These two characteristics allow us to control for the possibility of expansion through multiple field of membership and to design our LIDI experiment analyses.

Table 1 shows descriptive statistics and correlations of the main variables used in our analyses. We do not comment on these statistics, which are mostly self-explanatory.

4. Business loans as a risky growth strategy

[11] Note that under the generic name "shares" the following items are included: share drafts, regular shares, money market shares, share certificates, IRA/KEOGH accounts and all other shares contributed by CU members.

The first step in our analysis requires us to show evidence that indeed business loans are a type of asset which increases the risk profile of the credit union's loan portfolio. Given that expanding into business loans is part of the growth process of the credit union, we first show that business loans are a growth strategy which tends to be a substitute to other strategies (mostly, to expanding the field of membership, which gives access to the CU to a larger pool of members). We then show that expansion of business loan activity leads to higher overall risk of the loan portfolio.

4.1 Business loans versus multiple field of membership as alternatives to growth

If we want to understand whether growth through business loans lead to higher loan risk of the credit union, we want to control for other sources of growth which can also contribute to increasing the risk profile of the credit union. Given that the potential customers (members) of the CU are limited by the definition of the field of membership, an alternative strategy that leads to future growth is the expansion of the pool of potential members by requesting a multiple field of membership. We first show whether these two strategies are complements or substitutes –our evidence seems to indicate that they are substitutes- and we leave for Section 4.2 the analysis of whether the two strategies imply significant increases in the credit risk of the CU (so discipline is justified).

We first collect some basic statistics on business loan activity, so we can better understand how business loans are related to growth. Table 2 panel A shows the mean value of several CU characteristics for portfolios of CUs formed on the basis of the proportion of business loans over total loans. Some interesting results arise. First, note that the proportion of CUs with a low income designation (LID) is higher the larger the percentile. This is to be expected, given the increased flexibility of LID CUs to grant business loans. Second, size is also increasing through the portfolios, suggesting that the focus on business loans is indeed positively related to size. Interestingly, the standard deviation of ROA is also increasing in the proportion of business loans, giving us a first hint that *BL*s may correlate with higher performance risk. Finally, and more importantly, note that as the percentage of *BL* increases, the proportion of CUs with a *MFOM* decreases quite noticeably. This suggests that expansion of field of membership may be a substitute of (or an alternative to) growth through business loans. We formalize the results of Panel A by estimating a selection model where we first setup a selection equation for *HASBL* (i.e., we look at the factors which influence the decision to grant business loans) and, subsequently, we analyze the determinants of the amount of *BL* granted. The results of this model are tabulated in Panel B. Note that larger CUs are significantly more likely to grant business loans and to grant larger amounts of such loans. On the other hand, the coefficients of *MFOM* quite clearly suggest that there is a negative relationship between business loans and being a multiple field of membership CU: note the negative and significant coefficients both in the selection

equation (-0.323, t-stat of -35.83) and the observation equation (-0.005, t-stat of -4.90). Thus, CUs with a multiple field of membership are both less likely to have moved into business loan activity and, if they have, they offer significantly lower amounts than similar but single FOM CUs. Given the regulation of LID CUs, the effects of having a LID are aligned with our expectations, and provide us with a motivation for our analysis in Section 6.1.

In Table 3 we look more explicitly at the relationship between multiple field of membership and business loans with size. Panel A shows descriptive statistics of *BL*, *BL/loansta* and *loansta* for the groups of CUs determined by *MFOM*. The panel also includes a significance test for the difference, although given our sample sizes all these tests reject the null. The results show that the average of business loans is between 64% and 71% higher for CUs with a single field of membership (columns *BL* and *BL/loansta*), when in fact these CUs only have around 0.5% more loans in their balance sheets (column of *loansta*). In order to show that this negative relationship with *MFOM* is not a consequence of size, we take another indicator of growth, namely *Mstate*. This variable (which we can only compute from 2010 on) is a one for CUs which operate in more than one state, and therefore it also proxies for size and expansionary strategies of the CU. Contrary to *MFOM*, CUs which operate in more than one state indeed tend to have significantly higher proportions of business loans (around 20% more than single state CUs), a result which contrasts with the fact that the amount of total loans is only higher by 0.4%. In other words, CUs that grow in size seem to offer higher proportions of business loans, except if they follow a MFOM strategy. We further formalize these results and show in Panel B of Table 3 the results of regression models where we use *BL* as dependent variable and focus only on the sample of CUs with *HASBL* = 1. As regressors, apart from our specific set of controls (see table caption) we include *MFOM* and its interaction with *size* in columns 1-2 (the columns differ in the inclusion of controls) and, for comparison, we include the alternative proxy for growth *Mstate* and its interaction with *size* in columns 3-4. The results in columns 1-2 suggest that when *MFOM* credit unions grow, the importance of *BL* in their loan portfolios goes down (note the negative and significant coefficient of the interaction in both columns, -0.003 with t-stats of -4.12 and -8.14). Given the minimum value of *size* in our sample (50 million in assets) the results also can be taken to mean that *MFOM* credit unions have lower levels of *BL* to begin with. These results contrast with those in columns 3-4, where we find the opposite result (although less clearly, given our relatively smaller sample) for the alternative proxy for growth *Mstate*.

Even though descriptive, the results we have just shown are highly suggestive that growth in CUs is achieved through expanding membership via a MFOM or through expanding the range of services (business loans), but these two strategies seem to be somewhat substitutes. The fact that in Section 5

below we find significant differences in how members react to (discipline) both strategies seems to suggest that their implications for the risk profile of the CU are different. We show evidence along those lines in the next subsection.

4.2 Business loans, MFOM and the credit risk of the loan portfolio.

We examine now whether the strategy of growing through business loans significantly increases the credit risk of the CU. Given that CUs are heavily specialized in loan activity, we construct a measure of risk of the loan portfolio by constructing two variables *CRISK3Y* and *CRISK5Y* which measure the quality of the loan portfolio of the CU three and five years into the future. In particular, the two credit risk indicators measure the average proportion of quarterly non-performing loans and of charge-offs over total loans (so, in our notation, the sum of our variables *NPL* and *ch-offs*) three and five years into the future.[12] We use these two indicators as dependent variables in predictive models where the explanatory variables are the current levels of business loans as well as two additional variables we construct:

(1) *BLG* is a dummy equal to one when business loan growth is positive and higher than the growth rate of total loans for a specific quarter, zero otherwise. This variable is capturing CUs which are expanding their business loans faster than their other types of loans.

(2) *LOWBL* is a dummy equal to 1 when the value of *BL* is lower than the median of the sample in the quarter prior to that in which growth is measured. This variable captures CUs which start from low levels of business loans, so that they are "in the process of expanding into business loan activity".

As controls in the predictive regressions we include our regular set of controls (in particular, note that we are controlling for *loansta*) and whether the CU has an MFOM denomination. The results in the two panels of Table 4 are pretty straightforward. The baseline models (column 1 in both panels) show significant evidence that the level of *BL* is positively related to future risk measures. Note that the regression already controls for the level of loans of the CU, so the coefficient on *BL* refers to the additional effect of having a high proportion of business loans: indeed, business loans seem to have three to four times larger rates of failure (as measured by the sum of both *NPL* and charge offs) than regular loans: compare the estimated coefficients of *loansta*, 0.010 in Panel A and 0.012 in Panel B, with those of *BL*, 0.043 in column 1. There is, on the other hand, little evidence that having a multiple

[12] Alternatively, we computed *CRISK3Y* and *CRISK5Y* by subtracting from *NPL+ch-offs* the amounts of loans recovered. This did not change the results at all, but since it leads to a measure of risk less parallel to our analyses in Section 5 we offer these results upon request. Note that our measure is the average risk over all future quarters, so in our regressions we need to adjust the standard errors for this overlap: we use Driscoll-Kraay (1998) standard errors with lag length equal to the horizon of the risk measure.

field of membership increases significantly the risk of the assets (although some of the coefficient estimates at the five year horizon are significant at the 10% level: see columns 2 and 4 in Panel B). The specifications in columns 2-4 show models which include *BLG*, *LOWBL* and interactions of the two variables and with *BL*. We run these models to see whether the increased future risk stems from CUs where business loans grow too fast or which start from low business loan levels and, therefore, are "expanding via business loans". The results suggest, mainly, that business loans lead to an additional increase of future risk for CUs which start their expansion into business loans and do so very fast: note that the results in columns 2 and 3 seem to suggest that fast *BL* growth (column 2) or starting from a low level of *BL* (column 3) do not add significantly to the future credit risk. However, the estimates in column 4 do show a significant increase in risk for CUs which both start from a low level of *BL* and grow very fast. The coefficient of the triple interaction $BL_{t-1} \times BLG_{t-1} \times LOWBL_{t-1}$ in panel B implies that the level of business loan risk in the longer run increases by approximately threefold for CUs which start with low levels of business loans and increase the importance of business loans as a proportion of total loans. This result comes from the sum of the baseline coefficient of *BL*, 0.034, the coefficient of the two interactions -0.003 and -0.080 and the coefficient of the triple interaction, 0.143: the net effect is a coefficient of 0.094 on *BL* for CUs which start expanding into business loans and grow very fast (as a proportion of total loans) this part of their loan portfolio.

All in all, the results in Table 4 support the conclusion that business loans increase significantly the credit risk of the loan portfolio of the CU, especially for those CUs that start their business loan activity and increase such activity significantly. This result is in line with the concerns that CUs are less experienced in the analysis of business loans: a desire to grow the business loan activity fast may lead to both lower quality thresholds for the granting of these loans, to lower capacity of discriminating good from bad applicants and, indirectly, to a lower overall quality of the pool of applicants (a "lemon" problem). In any case, these results motivate our analysis on discipline in Sections 5-6. The results of these analyses will suggest that CU members are aware of this relative disadvantage of the CU (compared to other financial intermediaries) and act accordingly by disciplining the CU.

5. A descriptive look at discipline in credit unions

We have shown evidence that business loans significantly increase the risk of the loan portfolio of the credit union. Given this evidence, we now attempt to answer our second question: are credit union members aware of this risk and do they discipline the credit union for significant increases in business loan levels? The answer to this question has important implications for the interplay of market-based

discipline and regulation-based discipline of the credit union. We proceed in two steps. First, we show some baseline results –parallel to those in the depositor discipline literature- on the reaction of CU deposits to business loans and to other CU fundamentals which reflect the performance and risk taking of the CU. Second, we look at the effect of some proxies of asymmetric information on the intensity of member discipline. These descriptive results are, to our knowledge, new and serve to motivate our subsequent causal analyses and to offer some comments on potential differences in the behavior of depositors in CUs relative to banks.

5.1 The relationship between CU deposits and fundamentals: initial evidence of discipline and reaction to business loans

Evidence of market discipline in the US banking system suggests that depositors react to bad bank fundamentals and to the bank's risk-taking indicators. Since the CU financial statements are publicly available and easy to obtain, a similar reaction should be expected of CU members, especially given two factors which reduce even more the potential asymmetry of information: a) the closeness of members to their CU (stemming from field of membership restrictions); b) the unique character of CUs, where depositors are also shareholders. However, the regulation of credit unions, especially that which is aimed at limiting risk-taking, seems to be based on the assumption that CU members are less responsive to risk and, therefore, need to be further protected. In order to give a first descriptive look at whether there is significant member discipline in CUs and, if so, how this discipline works, we use regressions similar to those in the literature (see, e.g., Maechler and McDill, 2006; Martinez Peria and Schmukler, 2001) and relate growth in CU shares and deposits to CU fundamentals (including business loans) which reflect the risk-taking and performance of the CU. One of our main regressors of interest is the amount of business loans over total assets (*BL*): given our results in Section 4, significant increases in such loans can be interpreted as the CU attempting to grow by expanding the loan portfolio into riskier assets. We also include in the regression a set of additional risk indicators, some of which have been previously used in the literature of discipline in banks (Barajas and Steiner, 2000; Berger and Turk-Ariss, 2015; Calomiris and Powell, 2001; Martinez Peria and Schmukler, 2001) and some of which are specific to credit unions (Bauer et al., 2009; Frame et al. 2003). These indicators are: net worth over assets of the CU (*NWA*), non-performing loans (*NPL*), charge-offs over loans (*ch-offs*), loans over assets (*loansta*), net interest margin (*NIM*), return on assets (*ROA*) and the standard deviation of past ROAs (*sdROA*), a measure of past losses (*PL*) and its interaction with *sdROA* and, lastly, disposable reserves (*DRES*).[13] We also

[13] The NCUA rules and regulations allow CUs to use undivided earnings to pay dividends. However, if this account is depleted a well-capitalized CU may use regular reserves as long as the amount of dividends paid does not cause the net worth classification to fall below the "adequately capitalized" category (*NWA* between 6% and 6.99%; see: 702.403

include a measure of size (*size*, natural log of assets). In order to account for CU reaction to shocks (i.e., the "tools" the CU may implement to prevent depositor flight) we include two final variables: first, we control for interest rates on deposits (*intrates*), measured as the average interest rate that the credit union paid on shares and deposits (Maechler and McDill, 2006);[14] second, we include the (lagged) quarter-on-quarter growth of average salaries paid by the CU, *chsalary*: this variable controls for alternative adjustment mechanisms available to owners which may affect the strength of deposit-based discipline.[15] In order to ameliorate problems of endogeneity, in our regressions we use one-quarter lagged values of the risk indicators.[16] Appendix A describes all our variables in more detail. Our baseline regression is as follows:

$$\Delta S\&D_{it} = \beta_1 BL_{it-1} + \beta_2' RISK_{it-1} + \beta_3' tools_{it-1} + \beta_4' ST_{it} + u_i + d_t + \varepsilon_{it,} \quad (1)$$

where $\Delta S\&D$ is the quarter-on-quarter growth in total shares and deposits (in some specifications, only total shares or subsets that include only those CUs that grant business loans), *BL* is the amount of business loans over total assets, *RISK* is the vector which collects other fundamentals and risk indicators and *tools* is the vector which contains *chsalary* and *intrates*, the two variables which may be used by the CU as a reaction to shocks. ST_{it} is a vector which contains macroeconomic variables of the state or region in which credit union *i* operates. Finally, u_i and d_t are CU and time (quarter) effects, respectively.

Results from our regression model are reported in Table 5 along with our predicted signs for the response coefficients. Panel A contains the baseline results for both shares growth (*Δshares*, columns 1-2) and total shares and deposits growth (*ΔS&D*, columns 3-4). The results for both dependent variables are pretty similar, so we comment on them jointly. Columns 1 and 3 estimate the baseline model with the full sample. The results show that shares and total shares and deposits react positively to indicators of financial health: note the positive and significant coefficients of *ROA*, *NWA*, *NIM* and *DRES*. Interestingly, note the much larger magnitude of the coefficient on *NWA* compared to that of *DRES*: CU members give much more importance to the minimum required levels of net worth than to disposable reserves. Estimates of the coefficients on "bad fundamentals" are also consistent

Payment of Dividends). Hence, given that total reserves (undivided earnings + regular reserves + other reserves) is part of Net Worth, we calculate *DRES* as the amount of total reserves that exceeds the 6% of the Net Worth over assets ratio (scaled by total assets). We subtract this amount from the NW/assets ratio and measure *NWA* = NW/assets – *DRES*.

[14] Interest rates on shares and deposits = (ACCT_380 (Dividends on shares) + ACCT_381 (Interest on deposits)) / ACCT_018 (Total shares and deposits). See Bauer (2008).

[15] Pencavel and Craig (1994) showed that the owner-worker duality in cooperatives makes them more inclined to respond to shocks by adjusting wages. This adjustment could be seen as a fitting response to bad fundamentals and, therefore, could lead to reduced discipline from owner-depositors.

[16] Our analyses in this section use "precedence in time" to uncover the reaction of depositors to fundamentals. In Section 6, however, we use quasi-experimental methods and try to isolate exogenous variation in the determinants of depositor behavior.

with depositor discipline: the estimated coefficients on both delinquent loans and charge-offs are negative and significant. This suggests that when CU members observe signs of negative performance, they withdraw (or increase at a lower rate) their shares and deposits. For the standard deviation of ROA (*sdROA*) we expected a negative coefficient but obtain a non-significant positive coefficient. However, the coefficient on the interaction of *sdROA* with past losses (*PL*) is indeed negative and significant: depositors penalize (discipline) the volatility which comes from bad news, a result which makes intuitive sense. Regarding the *tools* variables, the results are consistent with our expectations: first, higher interest rates lead to higher deposit growth; second, wage changes are negatively related to depositor discipline. This latter result suggests that, indeed, wage adjustment reduces the strength of depositor discipline.[17] Large CUs have lower share growth rates: possible interpretations of this negative coefficient are that larger CUs have a harder time growing (as they are limited in their growth strategies by field of membership and business loan restrictions: see our results in Section 4) or that growth is penalized by depositors. The results for *BL* are noteworthy: we find a negative and significant coefficient (-0.010, -0.007, -0.009,-0.007, t-stats of -2.06, -1.89, -1.84, -1.73), which suggests, as hinted above, that business loans are considered by depositors as a risk-taking growth strategy. It is interesting to note that, while reacting negatively to business loans, members and depositors react positively to loans (*loansta)* in all the specifications (coefficients of 0.036, 0.034, 0.038 and 0.037 with t-stats of 13.55, 12.99, 14.57 and 14.25). Our expectation (and findings in the prior literature for banks: see Barajas and Steiner, 2000; Calomiris and Powell, 2001) was to find a negative coefficient. The result, however, is consistent with theoretical studies on CUs. Given that CU members benefit directly from loans granted by the CU, it is reasonable to expect that they do not punish the CU for the amount of loans granted. On the contrary, they expect an active behavior by CU managers in terms of granting loans without taking too much risk (thus the penalization of business loans and of bad loan indicators). The positive estimated coefficient of *loansta* may stem from this borrower orientation preference by CU members.[18] The negative coefficients of *NPL* and *ch-offs* show that, although high levels of loans are viewed positively, members still expect that the CU has the ability to select and monitor the loans granted. The results in columns 2 and 4 of Panel A correspond to re-estimation of the baseline regressions using only the sample of CUs with positive business loans (condition *HASBL* = 1). Note that the size of the sample is reduced by almost 40%, since many CUs do not offer business loans. Most of the estimates are

[17] An alternative explanation for this result would suggest that wage increases are penalized by depositors. Given the owner-depositor character of CU members, we believe the explanation is not conceptually different.
[18] This terminology comes from Smith (1984) and Smith et al. (1981).

similar, except that the reaction to *BL* seems somewhat diminished (the estimated reaction coefficients go down slightly, as do the t-stats).

In order to understand why this may be the case, we go one step further and in Panel B we estimate a selection model where we first explain the decision to offer business loans as a function of some of the CU fundamentals including two indicators of whether the CU has a multiple FOM and the low income designation (low income-designated CUs are not subject to the 12.25% limit on business loans). The observation equations we estimate relate shares and shares and deposit growth to the CU fundamentals used in Panel A. The results on the selection equation are all reasonable: size, volatility, a low net worth and a bad loan portfolio (*NPL*) are all positive determinants of the decision to grant business loans. Also, having a low income designation increases significantly the probability of granting business loans. Note that multiple FOM CUs are less likely to grant business loans, a result we uncovered in Section 4. Once we account for selection, the results on share reaction to business loans are again significant and negative, and of higher magnitude than in the baseline regressions of Panel A. Thus, business loans seem to be penalized by CU members even (or, better, especially) after accounting for the determinants of the expansion of CU activities to business loans.[19]

5.2 Some drivers of the intensity of depositor behavior

In this section we complement our previous results and examine some factors which might affect the intensity of depositor (member) discipline of business loans. These results have independent interest but also allow us to develop some of our subsequent analyses. Specifically, we look at variables which are related to the capacity of the CU to grow and diversify (see Goddard et al., 2002; Leggett and Strand, 2002) but also at variables which represent an increase in the asymmetry of information between CU managers and members regarding the CU's risk-taking. We construct several variables which are potential determinants of the strength of depositor discipline:

(1) *MFOM* (multiple field of membership) is the dummy which takes value one if the CU has a multiple field of membership. Frame et al. (2003) suggest two effects of adopting a MFOM, both of which may lead to a reduction of the disciplining of the CU (and of its business loan activity). First, expansion of the field of membership represents a growth strategy which may be seen as reducing concentration risk (we also used this implication in Section 4). Second, adopting a MFOM may lead to lower informational advantages stemming from a common bond.

[19] Note that the coefficient on the Mills ratio suggests that CUs who grant business loans tend to have lower deposit growth rates.

(2) *com* (community) identifies CUs that operate in a "geographically well-defined local community or neighborhood" or in a rural district.[20] Community CUs are geographically less dispersed. This physical proximity leads to potential informal links between members and managers (who are probably also residents) which may reduce the asymmetry of information and lead to higher discipline.

(3) Finally, given the importance of informational issues, we expect that more sophisticated investors will exercise higher levels of discipline.[21] We proxy for financial sophistication using two alternative measures of personal income.[22] *pcincome* is a weighted average of the percentile of the income of the states where the CU operates; *hi* (high income) is a dummy which takes value one if the state where the CU is located is above the median in terms of personal income, zero otherwise.

We introduce each of these variables and their interaction with *BL* separately in our baseline regressions. The results are shown in Table 6, where for simplicity we omit the coefficients on the rest of controls. Panel A shows the results of regressions which use the full sample whereas Panel B uses only the set of CUs with positive business loans and accounts for the selection implicit by using a sample selection correction: the results are, in any case, quite comparable. The evidence in Table 6 is in line with our predictions. The estimates in column 1 (*MFOM*) show that when a CU has a multiple field of membership the discipline of business loans is significantly reduced or eliminated (the sum of the coefficients on *BL* and on the interaction is not significantly different from zero in either of the two panels). The results in column 2 (*com*), on the other hand, suggest that the disciplining of business loans is much larger in community CUs (note the negative and significant coefficient on the interaction $com \times BL_{t-1}$). Regarding the two proxies for financial sophistication, the estimates in columns 3 and 4 suggest that CUs which operate in higher income states are subject to higher depositor (member) discipline: note the negative and significant coefficients on the interactions between *pincome* and *BL* (-0.045 and -0.080, t-stats of -3.26 and -2.64) and, less robust, between *hi* and *BL* (-0.011 and -0.007, t-stats of -2.20 and -0.59).

All in all, the results in Sections 5.1 and 5.2 have shown evidence that CU members react negatively to business loans, a result which is suggestive of discipline. We interpret the specific results on

[20] https://www.ncua.gov/Legal/Documents/Regulations/FIR20100617FOM.pdf.

[21] The literature has shown that higher financial literacy increases the ability of people to make sound financial decisions (Campbell, 2006; Lusardi and Mitchell, 2011; Klapper et al. 2013; Van Rooij et al. 2011). Also, Davenport and McDill (2006) found that more sophisticated depositors (those with uninsured deposits) react more intensely and faster to signals of bank failure. Widdowson and Hailwood (2007) suggest that financial literacy reduces risk-taking in the financial system since people with higher financial knowledge exercise higher depositor discipline.

[22] Dhar and Zhu (2006) find a relation between income level and financial decisions; specifically, they show that high-income individuals display a lower disposition effect. This result, along with the evidence in Davenport and McDill (2006), suggests that income might be used as a proxy for financial literacy.

business loans as implying that members perceive that the risk profile of the assets of the CU increases when the CU engages in growth through business loans. The analyses in Tables 5 and 6 are descriptive in nature: the correlations we show between CU fundamentals (especially the levels of business loans) and depositor behavior are only suggestive of depositor (member) discipline. It is true that some of these correlations (in particular, the negative coefficient on *BL*) are difficult to justify as being purely mechanical or the result of the automatic effect of a common factor which generates a correlation between the fundamental and deposit growth. However, if we want to provide convincing evidence of causality (from business loans to depositor behavior) we need an alternative empirical analysis where we can isolate variation in business loans that may be exogenous to depositor behavior. We do that in the next section, where we take advantage of two regulatory "shocks" to the capacity of CUs to grant business loans which credibly are unrelated to depositor behavior.

6. Do CU deposits really react to increased levels of business loans? Looking for causal links

In Section 5 we have shown evidence that CU members react to CU fundamentals, and to business loans in particular, in manners suggestive of discipline: not only the baseline analyis in Table 5 but also the qualifications from Table 6 are in line with disciplining mechanisms and some of the correlations we show (especially related to our main interest, namely, the disciplining of business loans) do not necessarily arise as mechanical relationships stemming from the effect of common factors. However, these analyses are correlational in nature and our only control for endogeneity was to use a time lag between risk indicators and depositor behavior. In this section we attempt to show that our results are suggestive of a causal mechanism from risky growth of the loan portfolio of the CU (i.e. initiation or expansion of the business loan activity) to lower deposit growth. In order to do that, we carry out two semi-experimental analyses around two "exogenous regulatory shocks" in the US credit union sector which led to higher capacity of CUs to move into riskier loan strategies by granting larger levels of business loans. The first of these shocks increased significantly the number of CUs subject to the exemption of the business loan limits; the second corresponds to an explicit regulatory change which significantly relaxed the requirements and conditions for granting business loans. We believe both shocks provide us with valid contexts in which to uncover whether growth by riskier loan portfolios leads to a negative response of deposit growth which signals discipline by credit union members.

6.1. The LIDI "experiment"

Our first "shock" corresponds to the Low Income Designation Initiative (LIDI) carried out by the NCUA in the third quarter of 2012.[23] This initiative consisted in expediting and pre-approving the low-income designation for eligible credit unions and contacting CUs which were eligible but had not applied for the designation in order to inform them of this approval.[24] This initiative led to a sharp increase in the number of low-income CUs in the quarter of implementation: within our sample, the number of low-income CUs rose from 218 at the end of June 2012 to 425 at the end of September 2012 (Figure 2). As mentioned above, the low-income designation gives greater flexibility to CUs and, among other measures, it exempts CUs from the statutory limits to grant business loans and allows them to accept nonmember deposits. This provides us with a unique exogenous shock to the ability of those CUs to increase the size (and risk) of the business loan portfolio. We estimate the effects of the LIDI shock[25] using two alternative empirical strategies.

We first construct a quasi-matching estimator where we define our treatment group as the CUs that, as a consequence of the LIDI, adopted the low-income designation between June and September 2012 (207 CUs) and as control groups we use those CUs that already had the low-income designation and maintained it for some time (specifically, CUs that had the designation in March 2011 and kept it at least until December 2013: this corresponds to a total of 194 CUs). This design gives treatment and control groups that are similar in size and that, in fact, are directly comparable: note that the CUs that adopted the designation because of the LIDI were already eligible and, therefore, should be similar in their fundamentals to those that had the designation. Given this definition of treatment and control groups, we use simple t-tests and compare the differences in total shares and deposits growth between the treatment and the control group around the moment of the change in designation. First, however, since the low income designation implies more flexibility to grant business loans, we test that indeed the CUs who changed their designation because of the LIDI took advantage of this flexibility and increased their business lending. To that end, we conduct tests of the difference in *BL* growth between the treatment and control groups at the periods around the designation change. In particular, we examine *BL* growth in t, t+1, t+2, t+3 and t+4, where *t* is the LIDI quarter. We also look at cumulative growth between quarters t and t+1 to t+4. The results are reported in Table 7, panel A, and, indeed, they suggest that CUs affected by LIDI reacted to the new condition and

[23]http://news.cuna.org/articles/NCUA:_More_than_2,100_CUs_designated_as_low-income

[24] NCUA regulation states that "a credit union serving predominantly low-income members *may* be designated as a low-income credit union." (Section 701.34 of NCUA's Rules and Regulations.).

[25] The LIDI was an unpredictable shock for those members of CUs that were eligible and indeed accept the low income designation because for many CUs to establish if more than 50% of their members accomplish the low income definition was problematic (See https://www.ncua.gov/newsroom/Pages/NW20130807LowIncome.aspx) then it would be difficult for a member to know that their CU already meet the requirements for been low income and that the CU was going to accept the designation.

increased business lending faster than the control group. Note that the coefficients are positive and significant for t and t+2 as well as for 0 and 2 to 4 cumulative quarters.[26] Given this evidence that LIDI led to significant increases in business loans for the CUs affected by the initiative, we examine next the difference in deposit growth between the treatment and control groups. Table 7, panel B, reports the results. As expected, total shares and deposits growth around LIDI is significantly lower in the treatment group with respect to the control group (despite the fact that the LID in principle should lead to higher deposit growth, given that, among other things, it allows the CU to receive nonmember deposits). We find a significant negative difference in deposit growth in t+1 (-0.0038, p-value of 0.046). We also find significant negative differences in the cumulative growth at quarters t+1 and t+2 (-0.0054 and -0.0061, p-values of 0.046 and 0.082).[27] These results suggest that CU members react negatively (the effect is estimated at around 0.4%-0.6% lower growth of deposits) to the adoption of the low-income designation at the moment of the change compared to what could be considered the most similar control group of CUs.

As an alternative empirical strategy, we control for the effect of possible differences in CU characteristics by using diff-in-diffs estimators. We use the same definition of treatment and control groups as before, but estimate regressions that control for our baseline risk indicators while including a treatment dummy *TA* (defined as one for the CUs which change designation at the LIDI), a "post" treatment dummy (*pt*) defined as a one for the quarters after the LIDI initiative and the interaction of *TA* with *pt*, which is intended to capture the treatment effect. We show in Table 8, panel A, the results using three different windows around the treatment period: column (1) uses only the quarters 2012Q3 (so *pt*=1 for 2012Q4); column (2) uses quarters 2012Q2-2012Q3 (so *pt*= 1 for 2012Q4-2013Q1); column (3) uses quarters 2012Q1-2012Q3 (so *pt*=1 for 2012Q4-2013Q2). The results of these regressions, which control for CU characteristics, are consistent with those of the matched t-tests: we find a negative coefficient for the interaction terms in all three regressions, although the coefficient is only significant for the sample which includes the two quarters after the treatment (coefficient -0.004, representing an effect of -0.4% on deposit growth, and t-stat -1.74). In Panel B, we build on our evidence in Section 5.2 and qualify the results in Panel A by including the possibility that the income level of the state may affect the treatment effect: as seen in Table 6, higher income members exercise more intense discipline. We use our proxies for financial sophistication *pcincome* and *hi* and interact these variables with the *TA* and *pt* dummies. Our coefficients of interest are now those of the

[26] The other major implication of the LID is the capacity to accept nonmember deposits. We replicated the analyses in Table 7 Panel A using nonmember deposit growth as dependent variable but did not obtain any significant results: note that the CUs which adopted the LID at the time of the LIDI started with zero nonmember deposits, so growth measures on the quarter of impact of the regulation are statistically very poorly behaved.

[27] For the cumulative quarters in t+3 and t+4 we obtain negative but not significant coefficients.

interactions *TA* × *pt*, *TA* × *pt* × *pcincome* and *TA* × *pt* × *hi*, where the two triple interactions measure the difference in treatment effect in high-income states. When we use *pcincome* as a proxy for state income the effect is only clear in column 2 and marginally significant (panel B). However, when we split the states by median income (Panel C) the effect of the adoption of a low-income designation is much more noticeable and significant in high-income states. The effect amounts to a decrease in deposits of CUs in high income states around 1.4% larger than in low income states, where we find no significant effect (see the coefficients in columns 1 and 2). This evidence suggest that the effects found in Tables 7, panel B, and Table 8, Panel A, stem mostly from the high-income states, a result in line with asymmetric information (or member sophistication) arguments.

6.2 The relaxation of business loan requirements

We use a second regulatory change as additional evidence of a negative reaction of depositors to CU risky growth of loan portfolios into higher amounts of business loans. In particular, we focus on the introduction of regulation 68 FR 56552 by the NCUA in October 1st 2003. This was the first major change in business loan regulation, and made it easier for federal CUs to grant business loans. The new rules generated a sustained increase in the business loans to assets ratio of federal CUs, a trend which lasted until the onset of the financial crisis around 2008Q3 (see Figure 3).[28]

In order to test for the effects of this regulatory change, we need to define a treatment and a control group which can be adequately compared. We do these in two ways. First, we devise a matching estimator where we take as treatment group the 10% CUs which experienced a higher increase in business loans in 2003Q4 and 2004Q1 (i.e. in the two quarters after the regulatory change). For the control group we use nearest-neighbor matching where we extract the nearest neighbor from the rest of federal credit unions. In the matching process we require exact matches for the state and field of membership and closest matches based on the same quarter value of *BL*, *size*, *ROA*, *NWA*, *DRES*, *NPL*, *ch-off*s, *loansta*, *chsalary* and *intrates*. In order to control for differences in the matched groups we use the bias-adjusted estimator of Abadie and Imbens (2011). We look at significant differences in the growth in total shares and deposits in t+1 to t+4 as well as for 1, 2, 3 and 4 cumulative quarters after the regulatory change. The results from these matching estimators are reported in Table 9. These results show evidence that total shares and deposits growth is significantly lower for the treatment group in the quarter after the "shock"[29] (1% lower deposit growth) and cumulatively for one, two and three quarters (1%, 1.2% and 1.6% lower deposit growth, respectively).

[28] The other major change to the requirements for business loans (81 FR 13530 of March 14. 2016, applicable from January 1, 2017 on) is too recent to allow for a meaningful analysis.

[29] In this particular shock we are aware that a change in regulation is not unexpected. However, the shock is exogenous to the change in deposits. The purpose of the regulation was not to change the shares and deposits amounts of the CUs.

Second, we use a diff-in-diffs regression where we take the treatment group (*TB*=1) to be the same used in the previous analysis, namely the 10% CUs which had higher increases in business loans. For the control groups (*TB*=0), we use two alternatives. Panel A of Table 10 shows the results of using all other federal CUs (i.e. those below the 10% highest increase in business loans). Panel B of Table 10 shows the results of using as control group the federal CUs with changes in business loans below the 10% lowest, i.e., the CUs which least increased their business loans over the same period. We use four different sampling periods: results in column (1) use a window of one quarter around the change, so *pt*=0 for 2003Q3 and *pt*=1 for 2003Q4; results in column (2) use a window of two quarters, so *pt*=0 for 2003Q2-2003Q3 and *pt*=1 for 2003Q4-2004Q1; results in column (3) use a window of three quarters, so *pt*=0 for 2003Q1-2003Q3 and *pt*=1 for 2003Q4-2004Q2; results in column (4) use *pt*=0 for 2002Q4-2003Q3 and *pt*=1 for 2003Q4-2004Q3. In both panels we find that the treatment effect (estimated coefficient on the interaction between *TB* and *pt*) is negative and statistically significant in columns 3 and 4. This suggests that indeed there is a negative effect on deposit growth which appears in the two-three quarters after the change in regulation. The magnitude of the effect fluctuates between a 0.4% and a 1.6% decrease in deposits, depending on the horizon and control group chosen.

We believe the takeout from these two experimental settings is that indeed the increase in business loans by CUs has a direct effect on depositor behavior: CU members react to CUs increasing their business loan activity by withdrawing their deposits or by favoring other CUs (or other financial institutions) as a destination for their deposits. This result is similar in spirit to the traditional results on depositor discipline, but in this case CU members seem to be penalizing the explicit decision to increase the levels of a type of assets which is perceived to be riskier or where the CU has less of a comparative advantage.

The results in Sections 5 and 6 are, in our view, indicative that credit union members are aware of the risks involved in the activities of the credit union and actively discipline the credit union by withdrawing their funding (or increasing it at lower rates) via deposits. Our analyses have focused on the specific example of business loans, which we have shown significantly increase the risk implicit in the balance sheet's assets. This example is especially relevant not only because of the strict regulatory limits to which they have traditionally been subject but also because the recent evolution is toward more lenient regulation. The finding that credit union members exercise active

It is also no clear that CUs members could anticipate if their CU was going to increase their business loans as a result of the change in regulation, indeed some CUs increase business lending but some others not.

discipline of these loans is of high relevance and suggests that there exist market-based mechanisms, alternative to regulation, which contribute to keeping risk-taking of credit unions in check.

7. Concluding remarks

In this paper we have focused on examining two questions which are quite relevant to our understanding of the interplay between regulation and financial stability. We have examined the consequences of regulatory business loan limits on credit unions. We posit that both the consideration that CUs are at a disadvantage in the granting of business loans and that credit union members might not understand this risk and exercise discipline over the credit union were implicit in this regulation. In view of these arguments, we first offer evidence that business loans are indeed an asset which significantly increases the credit risk of the loan portfolio of the CU. This result provides a justification for the regulatory limits, but it also motivates the second part of our analysis, where we explore whether credit union members actively monitor such loans and penalize the credit union for expanding the business loan portfolio. We provide the first analysis we are aware of which links business loans to depositor behavior. More importantly, our use of two regulatory changes which occurred in 2003 and 2012 allows us to show results suggestive of causality: CU members indeed react negatively to an expansion of the CU's activity into business loans.

We believe our paper significantly contributes to the literature on credit union regulation, by suggesting that credit union members are sufficiently aware of the risk of the credit union operations, and exercise a disciplining mechanism which is complementary to regulation and supervision. Also, we contribute to the broader literature on depositor discipline by, first, giving the first broad description of the mechanisms through which this discipline works in CUs and, second, by placing the focus on a particular aspect of discipline, namely, the penalization of risky strategies suc as the expansion of business loans.

Apart from the contribution to the literature, out results have important policy implications. Knowing the channels through which market discipline works is key for regulators, given that higher levels of discipline act as stabilizers of the financial system and lead to a reduced probability of systemic episodes. Our results show that different financial institutions are likely to be subject to different discipline mechanisms, depending on the type of stakeholders (depositors) and their relationship with the depository institution. Also, we show evidence that even the apparently less sophisticated depositors seem to understand the potential risks of expansionary strategies and actively discipline these strategies. These two sets of results have immediate positive implications for the stability of the financial system, since they point at the presence of strong and sophisticated automatic stabilizers,

but also have quite far reaching implications for regulation design. First, regulation of different depository institutions may have to diverge significantly and adapt to the differences in depositor behavior and sophistication. Second, some regulations intended to expand the range of services offered by financial institutions may have negative risk implications. Depositors, however, seem to be able to understand the risk implications of these expansions and behave in a manner that reduces such negative externalities.

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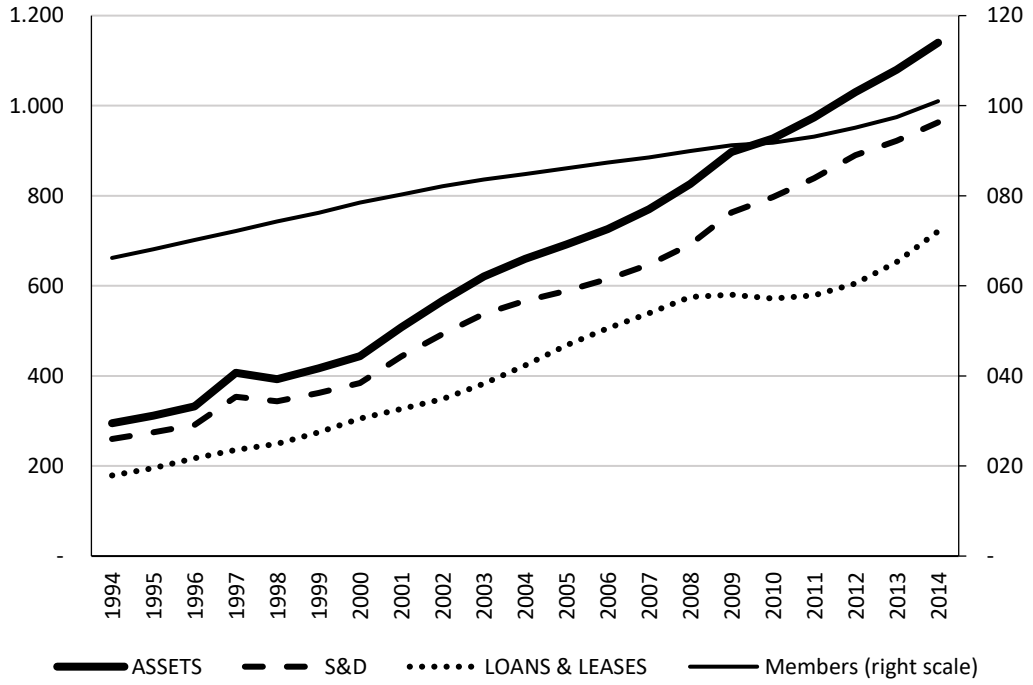
Appendix A: Variable Definitions

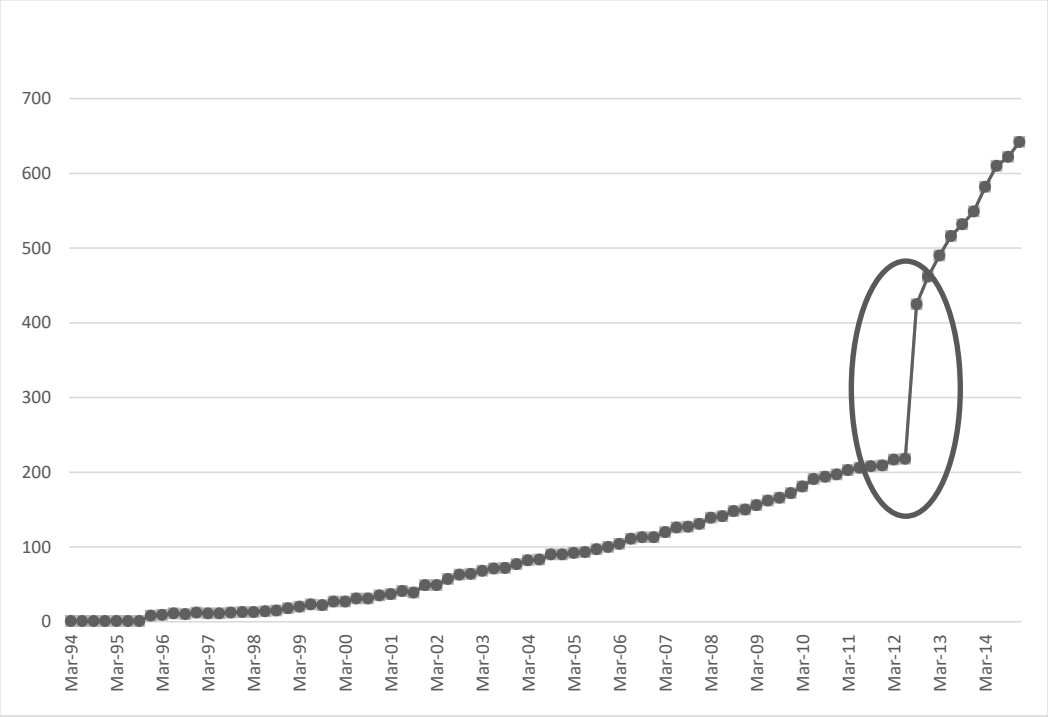
	Variable	Definition
Main dependent variables	*Δshares*	Quarter-on-quarter growth of shares of the CU.
	ΔS&D	Quarter-on-quarter growth of shares and deposits of the CU.
	CRISK	Future credit risk (3years or 5years) measured as NPL + *ch-offs*
Credit union variables: risk-taking indicators and other characteristics	*BL*	Business loans over total assets of the CU.
	loansta	Total loans and leases over total assets of the CU.
	ROA	Return on assets of the CU.
	sdROA	Standard deviation of *ROA* (calculated over 12 quarters, from t-1 to t-12).
	PL	Past losses of the CU computed as natural logarithm of 1 plus the number of quarters in which the CU obtained losses (from t-1 to t-12).
	NWA	Net worth over total assets of the CU minus *DRES*.
	NPL	Total amount of delinquent loans over total loans and leases of the CU.
	ch-offs	Charge offs over total loans and leases of the CU.
	NIM	Net interest margin of the CU.
	DRES	Reserves (regular reserves, other reserves and undivided earnings) in excess of the 6% of Net Worth over total assets of the CU.
	chsalary	Quarter-on-quarter change in average salary per employee.
	size	Natural logarithm of total assets of the CU.
	intrates	Average interest rates on total shares and deposits paid by the CU computed as (Dividends on shares + Interest on deposits)/Total shares and deposits.
	Mstate	Dummy that takes value 1 when the CU operates in more than one state, 0 otherwise.
	com	Dummy that takes value 1 when the CU is community-based, 0 otherwise.
	MFOM	Dummy that takes value 1 when the CU has a multiple field of membership, 0 if community or single field of membership, 0 otherwise.
	HASBL	Dummy that takes value 1 when the CU has positive business loans, 0 otherwise.
	BLG	Dummy that takes value 1 when business loan growth is positive and higher than loan growth for a specific quarter, 0 otherwise.
	LOWBL	Dummy that takes value 1 when BL is lower than the median of the sample in the quarter prior to that in which growth is measured by BLG, 0 otherwise.
Macro variables	*chinc_s*	Change in quarterly personal income in the state where the headquarters of the CU are located.
	unemp_s	Unemployment rate in the state where the headquarters of the CU are located.
	inf_s	Quarterly inflation rate in the census region where the headquarters of the CU are located.
	pcincome	Weighted average of the income percentile of the states where the CU operates.
	hi	Dummy that takes value 1 if the state where the CU is located is above the median in terms of personal income, 0 otherwise.

Figure 1. Credit union growth, 1994-2014



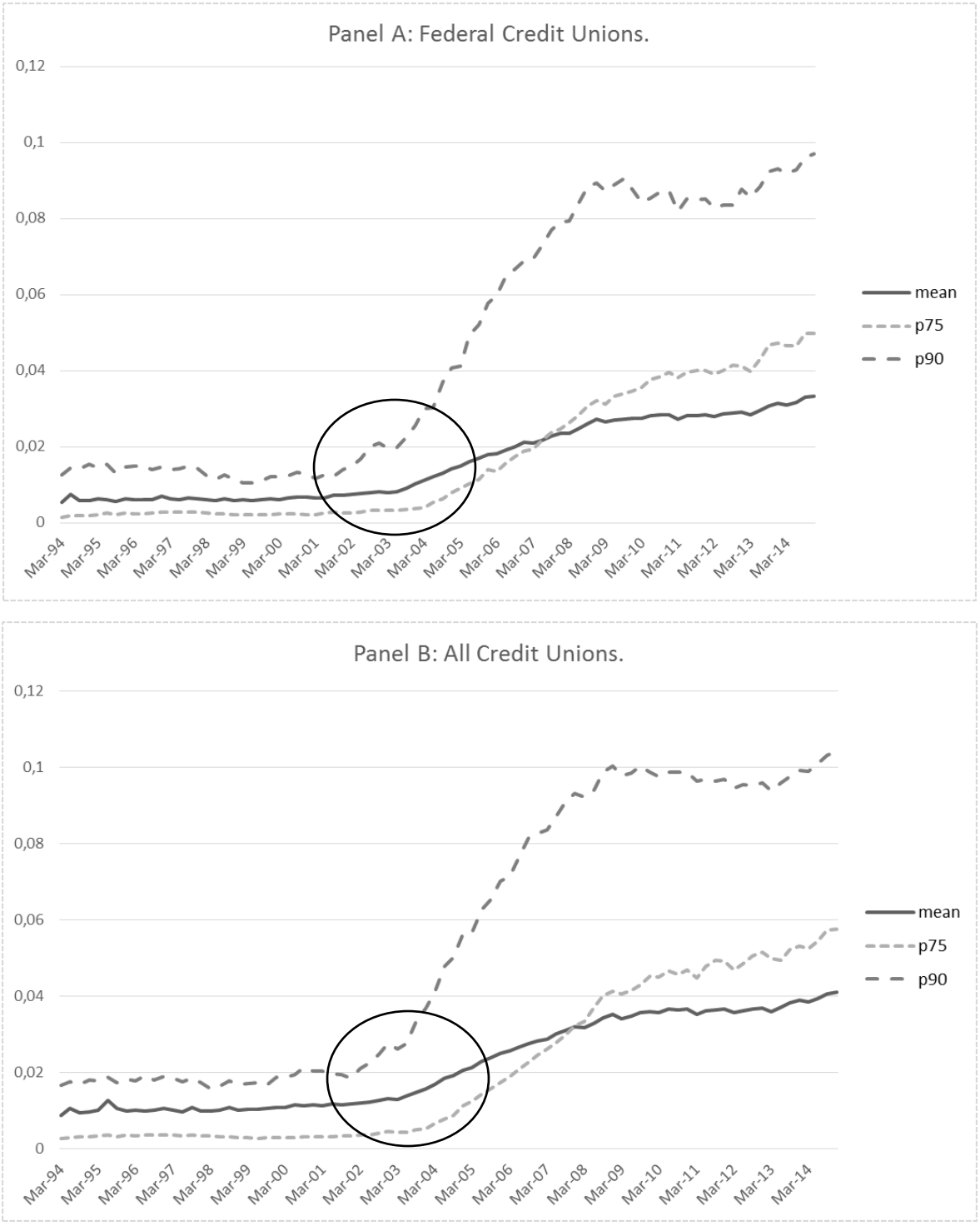
Source: Own calculation from call reports extracted from NCUA (1994 – 2014). Assets, S&D and Loans and Leases are in $billion. Members (right scale) is measured in millions of people.

Figure 2. Number of CUs with the Low-Income Designation



Source: Own calculation from call reports extracted from NCUA (1994 – 2014). The ellipse shows the impact of the LID initiative (Sept-2012).

Figure 3. Ratios of business loans over total assets



Source: Own calculation from call reports extracted from NCUA (1994 – 2014). The circles show the moment of introduction of regulation 68 FR 56552 by the NCUA (October 1st, 2003).

Table 1: Descriptive statistics

Panel A: basic descriptive statistics of the main variables				
Variables		**Mean**	**Median**	**StdDev**
Main dependent variables	*Δshares*	0.015	0.012	0.033
	ΔS&D	0.015	0.012	0.033
	CRISK3Y	0.010	0.008	0.008
	CRISK5Y	0.010	0.008	0.007
Credit union variables: risk-taking indicators and other CU characteristics	*BL*	0.024	0.001	0.069
	loansta	0.623	0.639	0.152
	sdROA	1.239	0.857	0.999
	ROA	0.002	0.002	0.005
	PL	0.482	0.000	0.664
	NWA	0.060	0.060	0.001
	NPL	0.010	0.007	0.009
	ch-offs	0.003	0.002	0.004
	NIM	0.009	0.009	0.002
	DRES	0.048	0.042	0.030
	chsalary	0.014	0.008	0.108
	size	18.896	18.660	0.953
	intrates	0.005	0.005	0.003
	Mstate	0.144	0	0.351
	com	0.192	0	0.394
	MFOM	0.550	1	0.497
	HASBL	0.556	1	0.497
	BLG	0.387	0	0.487
	LOWBL	0.532	1	0.499
Macro variables	*chinc_s*	1.101	1.130	1.188
	unemp_s	6.161	5.700	2.068
	Inf_s	0.561	0.600	0.977
	pcincome	0.563	0.580	0.259
	hi	0.593	1	0.491

Table 1 (continued):

Panel B: correlation matrix															
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
ΔS&D	1.00	-0.06	-0.08	0.03	0.01	0.01	-0.03	-0.07	0.00	-0.07	0.26	-0.10	-0.10	0.02	0.10
CRISK3Y	-0.04	1.00	0.92	0.15	0.11	-0.21	0.22	0.24	0.00	0.78	0.13	0.14	-0.02	-0.02	-0.12
CRISK5Y	-0.06	0.93	1.00	0.17	0.12	-0.21	0.20	0.22	0.00	0.66	0.11	0.10	-0.01	-0.01	-0.10
BL	0.02	0.16	0.17	1.00	0.25	-0.05	0.07	0.07	0.00	0.08	0.01	-0.11	-0.09	0.00	0.21
loansta	0.01	0.07	0.09	0.20	1.00	0.00	0.06	0.01	0.00	0.04	-0.01	0.38	-0.31	0.01	0.07
ROA	-0.03	-0.23	-0.19	0.03	-0.01	1.00	-0.15	-0.31	0.01	-0.20	-0.15	0.20	0.14	-0.06	0.07
sdROA	-0.04	0.25	0.20	0.04	0.03	-0.17	1.00	0.63	-0.01	0.24	0.08	0.10	-0.02	-0.02	-0.06
PL	-0.07	0.27	0.22	0.02	0.02	-0.31	0.66	1.00	-0.01	0.24	0.07	-0.01	-0.10	-0.02	-0.06
NWA	0.02	-0.04	-0.02	0.00	-0.03	0.05	-0.10	-0.07	1.00	0.00	0.00	-0.01	0.02	0.00	0.00
NPL	-0.06	0.77	0.65	0.11	0.01	-0.23	0.30	0.29	-0.07	1.00	0.12	0.19	-0.04	-0.01	-0.15
ch-offs	0.19	0.16	0.13	-0.01	-0.01	-0.22	0.13	0.14	-0.03	0.18	1.00	0.03	-0.05	0.00	0.01
NIM	-0.08	0.07	0.04	-0.03	0.42	0.17	0.05	0.00	-0.04	0.10	0.05	1.00	-0.13	0.02	-0.25
DRES	-0.10	0.01	0.03	0.05	-0.32	0.15	-0.03	-0.10	0.13	-0.01	-0.05	-0.10	1.00	0.00	-0.08
chsalary	0.02	-0.01	-0.01	0.00	0.00	-0.06	-0.02	-0.02	0.00	0.00	0.00	0.03	0.01	1.00	0.00
size	0.08	-0.05	-0.04	0.10	0.06	0.04	-0.05	-0.06	0.01	-0.10	0.03	-0.28	-0.10	0.00	1.00

Panel A: See Appendix A for variable definitions. Sample comprises credit unions with total assets higher than $50,000,000 observed through the period Q1 1994 to Q4 2014, excluding the quarter-CU observations in which a CU went through a merger. This yields a total of 149,363 credit union-quarter observations. Credit union variables were winsorized at the 0,5% level in each tail. MFOM information is available for federal and State CUs before 2002; since 2002 it is only available for federal CUs. Panel B: Spearman (Pearson) correlation coefficients of the variables as included in the regression models are shown above (below) the diagonal. Only correlations between CU-level variables are included. All correlations are significant at the 1% level. (1): *ΔS&D*; (2) *CRISK3Y*, (3) *CRISK5Y*, (4): *BL*; (5): *loansta*; (6): *ROA*; (7): *sdROA*; (8): *PL*; (9): *NWA*; (10): *NPL*; (11): *ch-offs*; (12): *NIM*; (13): *DRES*; (14): *chsalary* ; (15): *size*.

Table 2: Business loan activity and CU characteristics

Panel A: mean value of CU characteristics as a function of the BL percentile

BL percentile	*BL*	*LID*	*MFOM*	*com*	*Mstate*	*size*	*loansta*	*ROA*	*sdROA*	*PL*
0-50%	0	0.070	0.562	0.195	0.132	18.601	0.565	0.0013	1.340	0.616
50%-75%	0.005	0.090	0.521	0.223	0.124	18.842	0.595	0.0013	1.388	0.632
75%-90%	0.059	0.115	0.419	0.281	0.150	19.377	0.655	0.0013	1.511	0.728
>90%	0.182	0.205	0.413	0.204	0.185	19.426	0.705	0.0013	1.521	0.652

Panel B: the determinants of BL

Dependent variable	*HASBL* (*Selection equation*)		*BL* (*Observation equation*)	
	(1)		(2)	
Variables	Coefficient	z-statistic	Coefficient	z-statistic
ROA_{t-1}	5.889**	(2.41)	-0.156	(-1.57)
$sdROA_{t-1}$	0.046***	(8.37)	0.001***	(2.94)
NWA_{t-1}	-45.186***	(-5.99)	-1.798***	(-7.12)
NPL_{t-1}	11.565***	(20.17)	0.443***	(13.29)
NIM_{t-1}	17.401***	(7.33)	2.369***	(15.51)
$DRES_{t-1}$	-3.779***	(-24.47)	-0.114***	(-6.98)
$size_{t-1}$	0.416***	(76.16)	0.030***	(23.54)
LID	0.473***	(28.50)	0.017***	(13.06)
MFOM	-0.323***	(-35.83)	-0.005***	(-4.90)
$intrates_{t-1}$	-27.688***	(-17.78)		
$chinc\_s_{t-1}$	-0.025***	(-6.21)	-0.001***	(-3.81)
$unemp\_s_{t-1}$	0.001	(0.39)	-0.000	(-1.40)
inf_s_{t-1}	-0.007	(-1.56)		
Observations	87,993		46,669	

Panel A: Mean value of CU characteristics. *BL*: Business loans/Total assets. *LID*: Dummy that takes 1 when the CU has the low income designation. *MFOM*: Dummy that takes value 1 when the CU has a multiple field of membership and 0 when it has a single field of membership or when it is a community CU. *com*: Dummy that takes value 1 when the CU is a community CU, 0 otherwise. See Appendix A for other variable definitions. Panel B: Heckman-s two-step selection model. *HASBL*: Dummy that takes value 1 when the CU has business loans, 0 otherwise. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. Observation equation includes CU fixed effects and time effects.

Table 3: Multiple FOM, multiple state and business loans as growth alternatives

Panel A: descriptive statistics of BL and loans of CUs								
	BL			*BL / loansta*			*loansta*	
	Mean	*P50*	*P75*	*Mean*	*P50*	*P75*	*Mean*	*P50*
MFOM = 0	0.023	0.002	0.025	0.036	0.003	0.040	0.619	0.638
MFOM = 1	0.014	0	0.007	0.021	0	0.011	0.614	0.630
t-test (p-value)	0.000			0.000			0.000	
Mstate = 0	0.023	0.001	0.020	0.035	0.002	0.032	0.622	0.638
Mstate = 1	0.028	0.001	0.027	0.042	0.001	0.044	0.626	0.637
t-test (p-value)	0.000			0.000			0.000	

Panel B: the relationship of BL with size								
Dependent variable	*BL*							
	(1)		(2)		(3)		(4)	
	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
size	0.005***	(11.69)	0.022***	(16.34)	0.006***	(11.92)	0.016***	(7.56)
MFOM	0.037***	(3.20)	0.063***	(8.63)				
size × *MFOM*	-0.003***	(-4.12)	-0.003***	(-8.14)				
Mstate					0.026	(1.06)	-0.042***	(-4.34)
size × *Mstate*					-0.001	(-0.93)	0.002***	(4.85)
Observations	47,733		46,420		28,253		27,952	
CU and Time FE	YES		YES		YES		YES	
HASBL = 1	YES		YES		YES		YES	
Macro and CUcontrols	NO		YES		NO		YES	
Adj. R-squared	0.009		0.257		0.007		0.071	

Panel A: Descriptive statistics of *BL*, *BL/loansta* and *loansta*. P50: Median; P75: Percentile 75%. MFOM: Dummy that takes value 1 when the CU has a multiple field of membership, 0 when the CU has a single field of membership or when it is a community CU. *Mstate*: Dummy that takes value 1 when the CU operates in more than one state, 0 otherwise. See Appendix A for other variable definitions. Panel B: Fixed-effects panel regressions of *BL* on indicators of growth strategies. t-statistics are based on standard errors clustered by CU and time. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. Columns 1 and 3 show the results of models with no additional control variables. Columns 2 and 4 show the results of models with the following macro and CU controls: ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, NWA_{t-1}, NPL_{t-1}, NIM_{t-1}, $DRES_{t-1}$, $chsalary_{t-1}$, $intrates_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. All columns in the table include the condition HASBL=1 (the regression is run only for CUs with BL>0).

Table 4: Business loans and credit risk

Panel A: levels of loan risk (NPL+ch-offs) three years forward									
Dependent variable		*CRISK3Y*							
		(1)		(2)		(3)		(4)	
Variables	Pred.	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
loansta	+	0.010***	(5.53)	0.010***	(5.24)	0.012***	(5.49)	0.010***	(5.29)
BL_{t-1}	+	0.043***	(4.25)	0.038***	(4.34)	0.041***	(4.20)	0.034***	(4.24)
$MFOM_{t-1}$	?	0.000	(1.26)	0.000	(1.46)	0.000	(1.25)	0.000	(1.39)
BLG_{t-1}	+			-0.001***	(-4.09)			-0.001***	(-6.09)
$LOWBL_{t-1}$	-					-0.001**	(-2.13)	-0.002***	(-3.29)
$BLG_{t-1}\times LOWBL_{t-1}$	+							0.001***	(3.19)
$BL_{t-1}\times BLG_{t-1}$	+			-0.005***	(-4.77)			-0.004***	(-4.82)
$BL_{t-1}\times LOWBL_{t-1}$	+					-0.004	(-0.30)	0.026	(0.26)
$BL_{t-1}\times BLG_{t-1}\times LOWBL_{t-1}$	+							0.017	(0.16)
Observations		67,875		33,817		67,505		33,817	
Adj. R-squared		0.319		0.338		0.323		0.341	
Panel B: levels of loan risk (NPL+ch-offs) five years forward									
Dependent variable		*CRISK5Y*							
		(1)		(2)		(3)		(4)	
Variables	Pred.	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
loansta	+	0.012***	(6.81)	0.012***	(6.75)	0.012***	(6.73)	0.012***	(6.66)
BL_{t-1}	+	0.043***	(4.10)	0.035***	(3.41)	0.042***	(4.01)	0.034***	(3.28)
$MFOM_{t-1}$	?	0.000	(1.43)	0.001*	(1.86)	0.000	(1.40)	0.001*	(1.83)
BLG_{t-1}	+			-0.001***	(-2.89)			-0.001***	(-4.63)
$LOWBL_{t-1}$	-					-0.001*	(-2.14)	-0.001	(-1.50)
$BLG_{t-1}\times LOWBL_{t-1}$	+							0.000**	(2.09)
$BL_{t-1}\times BLG_{t-1}$	+			-0.003***	(-3.10)			-0.003***	(-3.14)
$BL_{t-1}\times LOWBL_{t-1}$	+					0.011	(0.84)	-0.080*	(-1.96)
$BL_{t-1}\times BLG_{t-1}\times LOWBL_{t-1}$	+							0.143***	(2.89)
Observations		58,383		27,823		33,817		27,823	
Adj. R-squared		0.332		0.346		0.333		0.346	
CU and Time FE		YES		YES		YES		YES	
CU and Macro controls		YES		YES		YES		YES	

Fixed-effects panel regressions with Driscoll-Kraay standard errors. *CRISK3Y* is the average measure of credit risk (NPL + Charge offs) over the following 3 years. *CRISK5Y is* the average measure of credit risk over the following 5 years. Control variables in both panels: $Mstate_{t-1}$, ROA_{t-1}, NWA_{t-1}, NIM_{t-1}, $DRES_{t-1}$, $loansta_{t-1}$, $size_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. *BLG* is a dummy equal to 1 when *BL* growth is positive and higher than loan growth for a specific quarter, zero otherwise. *LOWBL* is a dummy equal to 1 when the value of *BL* is lower than the median of the sample in the prior quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

Table 5: Baseline models of member discipline: the response of shares and deposits to credit union fundamentals

Panel A: baseline specification not accounting for selection								
Dependent variable		*Δshares*				*ΔS&D*		
		(1)		(2)		(3)		(4)
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
BL_{t-1}	-	-0.010**	(-2.06)	-0.007*	(-1.89)	-0.009*	(-1.84)	-0.007*	(-1.73)
$loansta_{t-1}$	-	0.036***	(13.55)	0.034***	(12.99)	0.038***	(14.57)	0.037***	(14.25)
ROA_{t-1}	+	0.622***	(7.41)	0.675***	(7.49)	0.646***	(7.47)	0.715***	(7.58)
$sdROA_{t-1}$	-	0.001	(1.40)	0.000	(1.27)	0.001	(1.48)	0.000	(1.35)
PL_{t-1}	-	-0.000	(-0.63)	-0.001	(-1.40)	-0.000	(-0.63)	-0.001	(-1.53)
$PL_{t-1} \times sdROA_{t-1}$	-	-0.001***	(-3.99)	-0.001***	(-3.28)	-0.001***	(-4.09)	-0.001***	(-3.38)
NWA_{t-1}	+	0.974***	(5.61)	1.017***	(5.63)	0.986***	(5.52)	0.995***	(5.38)
NPL_{t-1}	-	-0.196***	(-11.77)	-0.192***	(-11.25)	-0.205***	(-12.75)	-0.203***	(-12.00)
$ch\text{-}offs_{t-1}$	-	-0.374***	(-5.19)	-0.296***	(-3.86)	-0.393***	(-5.51)	-0.313***	(-4.09)
NIM_{t-1}	+	0.449***	(2.86)	0.309**	(2.06)	0.435***	(2.69)	0.266*	(1.67)
$DRES_{t-1}$	+	0.152***	(13.03)	0.171***	(11.31)	0.157***	(13.16)	0.178***	(11.28)
$size_{t-1}$	?	-0.013***	(-12.23)	-0.002**	(-2.14)	-0.013***	(-12.10)	-0.002**	(-2.17)
$chsalary_{t-1}$	-	-0.001**	(-1.99)	-0.014***	(-11.27)	-0.001**	(-2.03)	-0.014***	(-11.00)
$intrates_{t-1}$	+	3.078***	(10.12)	2.635***	(8.05)	2.972***	(9.87)	2.449***	(7.49)
$chinc\_s_{t-1}$	+	0.001***	(3.33)	0.001***	(3.10)	0.001***	(3.29)	0.001***	(3.07)
$unemp\_s_{t-1}$	-	-0.001***	(-3.20)	-0.001***	(-3.26)	-0.001***	(-3.18)	-0.001***	(-3.26)
inf_s_{t-1}	+	-0.002	(-1.52)	-0.001	(-1.09)	-0.002	(-1.51)	-0.001	(-1.02)
Observations		141,276		80,061		141,276		80,061	
CU and Time FE		YES		YES		YES		YES	
HASBL = 1		NO		YES		NO		YES	
Adj. R-squared		0.369		0.358		0.365		0.353	

Table 5 (continued):

Panel B: accounting for selection (HASBL=1)						
Dependent variable	*HASBL* (*Selection equation)*		*Δshares* (*Observation equation)*		*ΔS&D* (*Observation equation)*	
	(1)		(2)		(3)	
Variables	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
BL_{t-1}			-0.013**	(-2.12)	-0.015**	(-2.33)
$loansta_{t-1}$			0.037***	(11.78)	0.040***	(12.71)
ROA_{t-1}	5.486*	(1.70)	0.614***	(4.79)	0.641***	(5.23)
$sdROA_{t-1}$	0.049***	(7.19)	0.001	(1.31)	0.001	(1.25)
PL_{t-1}			-0.000	(-0.84)	-0.001	(-1.01)
$PL_{t-1} \times sdROA_{t-1}$			-0.001***	(-3.19)	-0.001***	(-3.35)
NWA_{t-1}	-47.296***	(-7.73)	1.376***	(6.07)	1.372***	(5.84)
NPL_{t-1}	11.462***	(18.05)	-0.207***	(-9.24)	-0.212***	(-9.53)
$ch\text{-}offs_{t-1}$			-0.251***	(-3.05)	-0.280***	(-3.42)
NIM_{t-1}	18.349***	(3.64)	0.203	(0.93)	0.176	(0.78)
$DRES_{t-1}$	-3.792***	(-32.99)	0.168***	(9.17)	0.175***	(9.30)
$size_{t-1}$	0.418***	(32.93)	-0.019***	(-13.75)	-0.019***	(-13.42)
$chsalary_{t-1}$			-0.002*	(-1.94)	-0.002*	(-1.80)
$intrates_{t-1}$	-27.948***	(-6.36)	3.042***	(8.43)	2.886***	(8.13)
LID	0.475***	(17.42)				
MFOM	-0.323***	(-50.28)				
Lambda (Mills)			-0.0012***	(3.58)	-0.0013***	(3.28)
Observations	85,995		45,399		45,399	
Macro controls	YES		YES		YES	
CU and time FE	NO		YES		YES	

Panel A: Fixed-effects panel regressions of shares and shares and deposit growth on CU characteristics. Columns 2 and 3 include the condition that *HASBL*=1. *HASBL* is a dummy that takes value 1 when the CU has business loans, 0 otherwise (the regression is run only for CUs with BL>0). Panel B: Heckman two-step selection models. Column 1 - Selection equation: Probit model for *HASBL* as a function of *CU* characteristics. Column 2 - Observation equation for *Δshares*: Fixed-effects panel regressions of shares growth on CU characteristics accounting for selection into offering business loans. Column 3 - Observation equation for *ΔS&D*: Fixed-effects panel regressions of shares and deposits growth on CU characteristics accounting for selection into offering business loans. See Appendix A for variable definitions. *t*-statistics are based on standard errors clustered by quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

Table 6: The response of shares and deposits to business loans

Panel A: not accounting for HASBL=1									
Dependent variable		*ΔS&D*							
CU characteristic / Income measure		*MFOM*		*com*		State income (percentile)		High-income state	
		(1)		(2)		(3)		(4)	
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
BL_{t-1}	-	-0.022***	(-3.01)	-0.006	(-1.18)	0.018*	(1.73)	-0.001	(-0.18)
$loansta_{t-1}$	+	0.044***	(13.42)	0.038**	(14.59)	0.038***	(14.30)	0.038***	(14.57)
MFOM	+	-0.001	(-1.00)						
$MFOM \times BL_{t-1}$	-	0.016*	(1.70)						
com	+			0.001**	(2.31)				
$com \times BL_{t-1}$	-			-0.018***	(-3.61)				
pcincome	+					-0.003	(-1.16)		
$pcincome \times BL_{t-1}$	-					-0.045***	(-3.26)		
hi	+							0.001	(1.53)
$hi \times BL_{t-1}$	-							-0.011**	(-2.20)
Observations		86,240		141,276		131,216		141,276	
CU and Time FE		YES		YES		YES		YES	
CU and Macro controls		YES		YES		YES		YES	
Adj. R-squared		0.375		0.365		0.370		0.365	

Table 6 (continued):

Panel B: accounting for selection into HASBL=1									
Dependent variable		*ΔS&D (Observation equation)*							
CU characteristic / Income measure		*MFOM*		*com*		State income (percentile)		High-income state	
		(1)		(2)		(3)		(4)	
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
BL_{t-1}	-	-0.023*	(-3.18)	-0.007	(-0.90)	0.032	(1.58)	-0.010	(-0.98)
$loansta_{t-1}$	-	0.040***	(12.73)	0.040***	(12.71)	0.040***	(12.79)	0.040***	(12.70)
MFOM	+	-0.001*	(-1.78)						
$MFOM \times BL_{t-1}$	-	0.019**	(2.04)						
com	+			0.002**	(2.50)				
$com \times BL_{t-1}$	-			-0.016*	(-1.87)				
pcincome	+					0.002	(0.54)		
$pcincome \times BL_{t-1}$	-					-0.080***	(-2.64)		
hi	+							0.001	(0.80)
$hi \times BL_{t-1}$	-							-0.007	(-0.59)
Observations		45,399		45,399		42,951		45,399	
CU and Time FE		YES		YES		YES		YES	
CU and Macro controls		YES		YES		YES		YES	

Panel A: Fixed-effects panel regressions of shares and shares and deposit growth on CU characteristics. Panel B: Selection models. Selection equations (not shown): Probit model for *HASBL* as a function of *CU* characteristics. *HASBL*: Dummy that takes value 1 when the CU has business loans, 0 otherwise. Columns 1-4 - Observation equation for *ΔS&D*: Fixed-effects panel regressions of shares and deposits growth on CU characteristics accounting for selection into offering business loans. *MFOM*: Dummy that takes value 1 when the CU has a multiple field of membership, and 0 when it has a single field of membership or when it is a community CU. *com*: Dummy that takes value 1 when the CU is a community CU, 0 otherwise. *pcincome* is a weighted average of the percentile of the income of the states where the CU operates. The dummy *hi* (high income) is a 1 if the state where the CU is located is above the median in terms of personal income, 0 otherwise. CU and Macro controls are the same as in Table 2. See Appendix A for variable definitions. *t*-statistics are based on standard errors clustered by quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. Results for the selection equations are similar to those obtained in table 2: they are not shown given space constraint but they are available from the authors upon request.

Table 7. The change to a low-income designation: effect on growth in business loans and total shares and deposits of the LIDI "experiment"

Panel A: growth in Business Loans						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t	+	**.0656**	**0.014**	0q	**.0656**	**0.014**
t+1	+	-.0297	0.148	1q	.0339	0.214
t+2	+	**.0821**	**0.009**	2q	**.1212**	**0.025**
t+3	+	-.0027	0.475	3q	**.1427**	**0.040**
t+4	+	-.0308	0.361	4q	**.1516**	**0.070**
Panel B: growth in Total Shares and Deposits						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t+1	-	**-.0038**	**0.046**	1q	**-.0054**	**0.046**
t+2	-	-.0005	0.422	2q	**-.0061**	**0.082**
t+3	-	.0018	0.256	3q	-.0045	0.190
t+4	-	-.0015	0.212	4q	-.0060	0.154

Panel A: t-tests of the difference in growth in business loans between treatment and control groups; Treatment group: CUs that change to low-income designation at the LIDI (June and September 2012); Control group: CUs that were low-income in 2011Q1 and continue to be low-income in 2013Q4. t: present quarter; 0q: effect on the quarter of impact. 1q, 2q, 3q, 4q cumulative effect (3 months, 6 months, 9 months, 12 months ahead). Panel B: t-tests of the difference in growth in Total Shares and Deposits between treatment and control groups; Treatment group: CUs that change to low-income designation at the LIDI (June and September 2012); Control group: CUs that were low-income in 2011Q3 and continue to be low-income in 2013Q4. t: present quarter; 1q, 2q, 3q, 4q cumulative effects (3 months, 6 months, 9 months, 12 months ahead).

Table 8: The change to a low-income designation: diff-in-diffs estimators of the impact on growth in total shares and deposits of the LIDI "experiment"

Panel A: Baseline specification							
Dependent variable		*ΔS&D*					
		(1)		(2)		(3)	
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
TA		0.000	(0.10)	0.002	(1.09)	0.001	(0.65)
pt		0.005	(1.08)	-0.011***	(-5.18)	-0.006***	(-3.74)
TA × *pt*	-	-0.001	(-0.31)	-0.004*	(-1.74)	-0.002	(-0.76)
Control variables		YES		YES		YES	
Observations		801		1,599		2,395	
Adj. R-squared		0.069		0.350		0.276	
Panel B: controlling for income level							
Dependent variable		*ΔS&D*					
		(1)		(2)		(3)	
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
TA		-0.003	(-0.66)	-0.004	(-1.06)	0.000	(0.03)
pt		0.006	(1.02)	-0.014***	(-3.53)	-0.007**	(-1.98)
pcincome		-0.004	(-0.59)	-0.011**	(-2.04)	0.002	(0.31)
TA × *pt*	-	0.007	(1.05)	0.004	(0.77)	0.001	(0.12)
TA × *pcincome*		0.008	(0.86)	0.013*	(1.79)	0.003	(0.43)
pt × *pcincome*		0.000	(0.04)	0.008	(1.09)	0.001	(0.20)
TA × *pt* × *pcincome*	-	-0.018	(-1.46)	-0.019*	(-1.88)	-0.005	(-0.62)
Control variables		YES		YES		YES	
Observations		801		1,599		2,403	
Adj. R-squared		0.072		0.352		0.276	

Table 8 (continued):

Panel C: controlling for income level (2)							
Dependent variable		*ΔS&D*					
		(1)		(2)		(3)	
Variables	Prediction	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
TA		-0.003	(-1.09)	-0.001	(-0.59)	-0.000	(-0.18)
pt		0.005	(1.05)	-0.013***	(-5.03)	-0.007***	(-3.05)
hi		-0.005	(-1.38)	-0.006**	(-2.15)	-0.000	(-0.08)
TA × *pt*	-	0.004	(0.96)	0.000	(0.07)	-0.000	(-0.11)
TA × *hi*		0.010**	(2.07)	0.010**	(2.55)	0.005	(1.60)
pt × *hi*		0.003	(0.63)	0.006	(1.48)	0.000	(0.08)
TA × *pt* × *hi*	-	-0.014**	(-2.12)	-0.014***	(-2.64)	-0.005	(-1.01)
Control variables		YES		YES		YES	
Observations		801		1,599		2,403	
Adj. R-squared		0.074		0.352		0.276	

Panel A: regressions of shares and deposit growth around the LIDI experiment. Regression specifications include only the treatment variable *TA* and "post" variable *pt*. Panel B: regressions of shares and deposit growth around the LIDI experiment the variable. The regression specification distinguishes the effect of *pcincome*, which is a weighted average of the percentile of the income of the states where the CU operates. Panel C: regressions of shares and deposit growth around the LIDI experiment the variable. The regression specification distinguishes the effect of the dummy *hi* (high income), which is a 1 if the state where the CU is located is above the median in terms of personal income, 0 otherwise. Panels A-C: TA: Treatment group, CUs that change to low-income designation at the LIDI 2012Q3); *pt*: post treatment. Column (1): *pt*=1 for 2012Q4, 0 for 2012Q3; column (2): *pt*=1 for 2012Q4-2013Q1, 0 for 2012Q2-2012Q3; column (3): *pt*=1 for 2012Q4-2013Q2, 0 for 2012Q1-2012Q3. Control variables in all panels include ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, $PL_{t-1} \times sdROA_{t-1}$, NWA_{t-1}, $DRES_{t-1}$, NPL_{t-1}, $ch\text{-}offs_{t-1}$, NIM_{t-1}, BL_{t-1}, $loansta_{t-1}$, $size_{t-1}$, $chsalary_{t-1}$, $intrates_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. See Appendix A for variable definitions*, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

Table 9. The change in business loans regulation: effect on growth in total shares and deposits

Growth in Total Shares and Deposits						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t+1	-	**-.0106**	**0.016**	1q	**-.0106**	**0.016**
t+2	-	-.0033	0.268	2q	**-.0123**	**0.038**
t+3	-	.0035	0.265	3q	**-.0159**	**0.031**
t+4	-	.0010	0.718	4q	-.0127	0.124

Matching estimators of the difference in growth in Total Shares and Deposits between treatment and control groups; Treatment group: 10 % federal credit unions with higher increase in business loans between October 1st 2003 and March 31st 2004; Control group: matched CUs from the 90% federal credit unions with lower increase in business loans between October 1st 2003 and March 31st 2004. (Number of matches = 1). t: Present quarter; 1q, 2q, 3q, 4q cumulative effects (3 months, 6 months, 9 months, 12 months ahead). Matching variables: BL_t, $size_t$, ROA_t, NWA_t, $DRES_t$, NPL_t, $ch\text{-}offs_t$, $loansta_t$, $chsalary_t$, $intrates_t$. Exact matching: State, FOM (Field of Membership). Estimates shown correspond to the bias-adjusted estimator of the Average Treatment Effect on the Treated of Abadie and Imbens (2011).

Table 10: The change in business loans regulation: diff-in-diffs estimators of the effect on growth in total shares and deposits

Panel A: control group are all federal CUs not in treatment group								
		(1)		(2)		(3)		(4)
Dependent variable		*ΔS&D*		*ΔS&D*		*ΔS&D*		*ΔS&D*
Variables	Prediction	Coefficient	t-statistic	Coefficient	Coefficient	Coefficient	t-statistic	Coefficient	t-statistic
TB		0.000	(0.17)	0.001	(0.71)	0.017***	(18.34)	0.009***	(12.48)
pt		-0.004	(-1.38)	0.005***	(5.96)	-0.002***	(-2.99)	-0.005***	(-7.34)
TB × *pt*	-	-0.000	(-0.01)	-0.002	(-0.75)	-0.016***	(-10.28)	-0.008***	(-6.08)
Controls included		YES		YES		YES		YES	
Observations		3,385		6,706		10,092		13,389	
Adj. R-squared		0.075		0.090		0.241		0.226	
Panel B: control group are the federal CUs with growth in business loans below the 10% lower								
		(1)		(2)		(3)		(4)
Dependent variable		*ΔS&D*		*ΔS&D*		*ΔS&D*		*ΔS&D*
TB10		-0.005*	(-1.80)	-0.002	(-1.25)	0.007***	(4.98)	0.004***	(3.66)
pt		-0.011*	(-1.79)	0.001	(0.59)	-0.009***	(-5.01)	-0.010***	(-6.20)
TB10 × *pt*	-	0.004	(1.11)	0.002	(0.60)	-0.006***	(-2.93)	-0.004**	(-2.14)
Controls included		YES		YES		YES		YES	
Observations		680		1,354		3,237		5,017	
Adj. R-squared		0.072		0.091		0.337		0.298	

Panel A: regressions of shares and deposit growth around the 2003 change in business loan regulation. Regression specifications include the treatment variable TB, the "post" variable *pt* and their interaction, along with a set of controls. Treatment group (*TB*=1): Federal CUs with change in business loans higher than 90% of the population. Control group (*TB*=0): Federal CUs with change in business loans in the 90% lower. Panel B: regressions of shares and deposit growth around the 2003 change in business loan regulation. Regression specifications include the treatment variable TB10, the "post" variable *pt* and their interaction, along with a set of controls. Treatment group (*TB10*=1): equal to *TB*. Control group (*TB10*=0): Federal CUs with a growth in business loans below the 10% lower. Panels A and B: *pt*: post treatment. Column (1): *pt*=1 for 2003Q4, 0 for 2003Q3; column (2): *pt*=1 for 2003Q4-2004Q1, 0 for 2003Q2-2003Q3; column (3): *pt*=1 for 2003Q4-2004Q2, 0 for 2003Q1-2003Q3; column (4): *pt*=1 for 2003Q4-2004Q3, 0 for 2002Q4-2003Q3. Control variables in both panels: ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, PL_{t-1}×$sdROA_{t-1}$, NWA_{t-1}, NPL_{t-1}, $ch\text{-}offs_{t-1}$, NIM_{t-1}, BL_{t-1}, $loansta_{t-1}$, $size_{t-1}$, $chsalary_{t-1}$, $intrates_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$, and inf_s_{t-1}. See Appendix A for variable definitions*, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

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