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The risk implications of the business loan activity in credit unions☆

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ABSTRACT

US credit unions have been subject to a strict regulation of their commercial lending which included both requirements for enhanced organizational practices and a cap on the proportion of business loans relative to assets (imposed in 1998 by US Congress). Since 2003, however, these limitations have been steadily relaxed, a process which has resulted in an increase in credit union business lending activity. Using data from the universe of US credit unions we provide comprehensive evidence that expansion of the business loan portfolio increases the risk of the asset side of the credit union. This is the case even for credit unions which benefit from partnership with the SBA, for which we observe an initial increase in the risk of non-SBA backed loans (an *overconfidence* effect) which reverses over time (a *learning* effect). Our results suggest, furthermore, that the risk of business loans is exacerbated for credit unions which initiate their business loan activity and which do so rapidly. In the second part of our analysis we provide descriptive and quasi-experimental evidence that expansions of credit union activity into business loans are associated with lower subsequent growth rates of deposits. This result is similar to the reaction to risk indicators found in the banking literature and might give an ex-ante incentive for the CU that could work as a market-based stabilization mechanism complementary to that of explicit regulation.

1. Introduction

The credit union (CU) sector in the US has undergone a period of continuing growth in the most recent years (Fig. 1). In 1994, US credit unions (CUs) managed around $295B in assets, $260B in shares and deposits, $179B in loans and had 66 million members. These figures rose to $1,450B assets, $1,140B shares and deposits, $1,000B loans and 116 million members in 2018, when CUs accounted for around 12% of the deposits and 10% of the loans in the financial system.[1] This growth is quite significant considering the limits to growth that CUs face. Apart from the field of membership definition, which restricts the members that a CU can serve, specific CU regulations constrain the services and products that the CU can offer to its members. One of the most interesting examples of such constraints to CU expansion is the regulation on commercial lending (business loans).

The origins of cooperative banking in Europe can be traced to serving

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[1] NCUA Industry at a glance https://www.ncua.gov/files/publications/analysis/industry-at-a-glance-december-2018.pdf. The growth in the CU sector is comparable to that of the commercial banking sector and, in some measures of activity such as loans and assets, larger.

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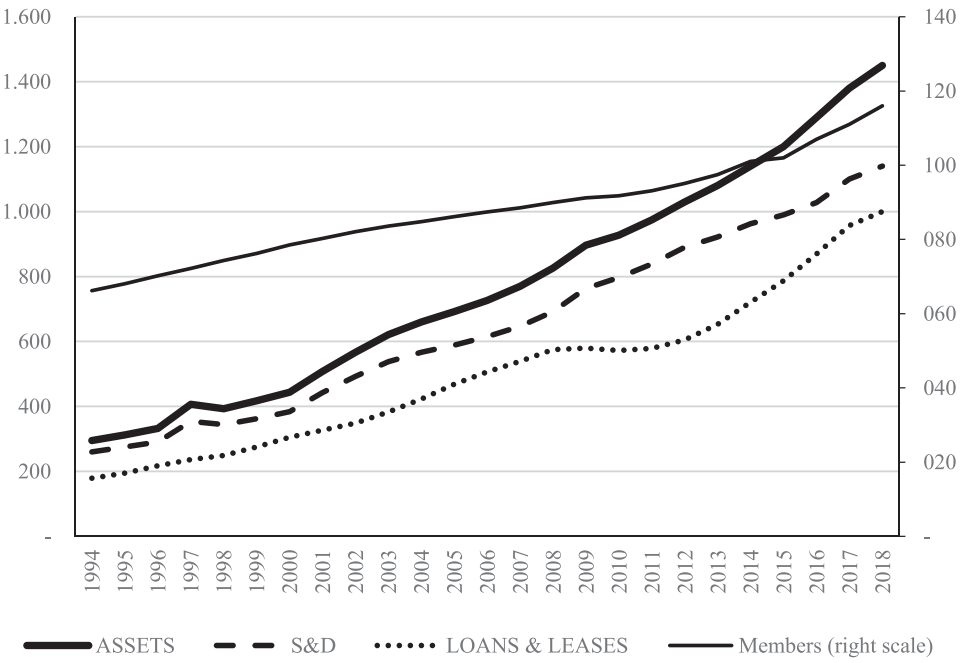


Fig. 1. Credit union growth, 1994–2018.
Source: Own calculation from the call reports extracted from NCUA (1994 – 2018). Assets, S&D and Loans and Leases (left scale) are in $billion. Members (right scale) is measured in millions of people.

the need of small businesses for affordable sources of financing.[2] In the US, however, most of the early cooperative banking movement focused on catering to the financial needs of individuals, especially via savings and consumer lending, rather than to those of small businesses (Bergengren, 1937; Clark, 1943).[3] One reason for this focus was that the market for small business loans was already serviced by commercial and community banks whereas there was a much larger need for the provision of financial services (management of deposits and the granting of affordable loans) for workers and consumers. It was not until the second half of the 1970s when a consolidation process in the US banking system opened a window of opportunity for the smaller banks and credit unions to move into commercial lending. The larger consolidated banks were not only diversifying away from lending to small businesses (Berger et al., 1998) but also the consolidation process tended to deteriorate the soft information which is crucial for such lending (Ogura and Uchida, 2014). As small banks and credit unions began to have an advantage in relational lending and access to soft information over the consolidated banks (Petersen and Rajan, 1994, 2002), the natural consequence was for CUs to start offering business loans to a now underserved market: Wilcox (2011) and Dennis (2012) suggest that, in fact, the declines in small business lending by banks were (partially) offset by the increase in CU business loans (see, also, Ely and Robinson, 2009, and Walker, 2016). However, in 1987 the National Credit Union Administration (NCUA) began imposing restrictions and organizational requirements to the business loan activity of credit unions. These restrictions, some of which we review in Section 2.1, were quantified more explicitly in the Credit Union Membership Access Act of 1998. This process was triggered by a willingness to protect the main activity of the smaller commercial (community) banks but it was favored by the consideration that business loans were potentially riskier than other types of loans in the CU portfolios (mostly, personal and real estate): throughout 1984–1986 business loans represented a disproportionate share (around 50%) of the losses of the National Credit Union Share Insurance Fund (NCUSIF) despite still constituting a small part of CU activity (Howell-Best, 2003). Hence, the limits on commercial lending worked as a protection for CU members from excessive risk-taking by the CU. We show in Fig. 2 data from the NCUA reports which show that the average delinquency rate of business loans has been higher than that of real estate loans throughout 2005–2015 (a period which includes the subprime crisis) and that of credit cards throughout 2007–2013. This higher risk of CU commercial lending potentially derives from three main sources: (i) the lack of experience of a system of CUs which was largely focused on consumer financing (Howell-Best, 2003); (ii) the lack of resources for the analysis of increasingly complex business risks, which placed CUs at a disadvantage with respect to commercial banks; and (iii) the lack of market-based mechanisms of discipline which could monitor CU risk-taking and give the proper incentives to limit the risk of the business loan portfolio.

In spite of the regulatory emphasis on CU member protection and the implications of the data, the NCUA started in 2003 a process of relaxation of the requirements for CUs to expand their business loan portfolio.[4] The successive changes implemented in the regulation effectively led to

[2] According to Clark (1943), the structure and activity of US credit unions are rooted in German cooperative banks. The German cooperative banking system evolved during the second half of the 19th century due to the difficulties that small farmers and tradesmen had in obtaining loans from commercial banks at reasonable rates and became one of the country's main providers of small business financing (Bonus and Schmidt, 1990). We thank an anonymous referee for bringing this historical perspective of the business loan activity to our attention.

[3] The first credit union in the US (St. Mary's Cooperative Credit Association, currently St. Mary's Bank) was stablished in November 1908 in Manchester, New Hampshire (officially chartered in 1909) with the specific foundational goal of catering to the financial needs of Franco-American mill workers. Several state laws were then enacted between 1909 and 1921 which allowed the credit union movement to grow. By 1921, when the Credit Union National Extension Bureau – the precursor of CUNA- was founded, there were already 199 credit unions in the US, the majority of which were focused on consumer finance.

[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, effective on January 2017, gave CUs additional flexibility to grant business loans by changing some of the current explicit limitations by a "broad principles-based regulatory approach".

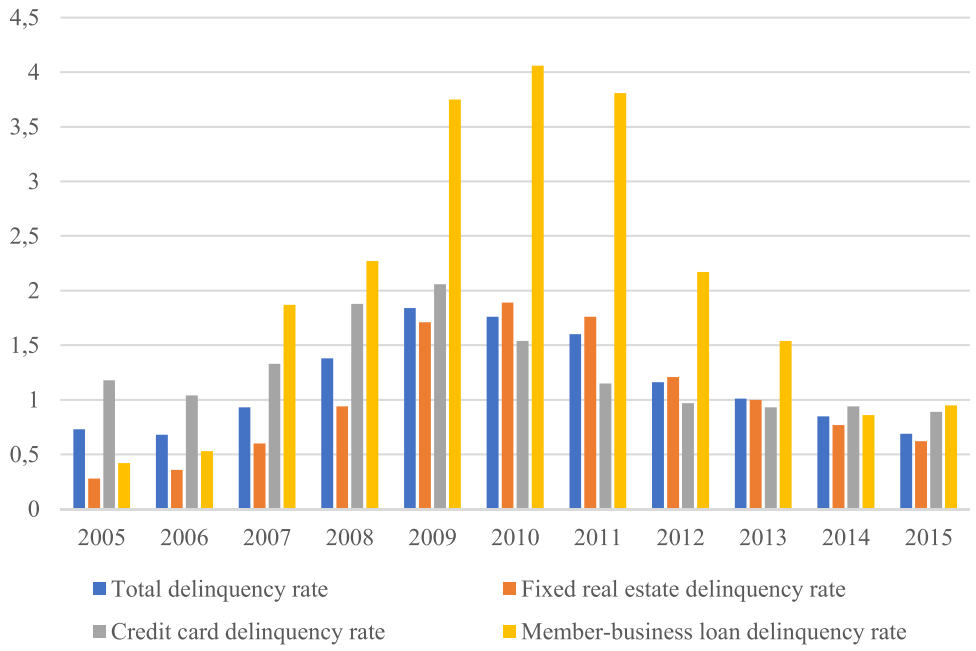


Fig. 2. Percentage of delinquent loans by type 2005–2015.
Source: own calculation from data from the NCUA accessed at https://www.ncua.gov/files/publications/analysis/PACA-Facts-2015-12.pdf.

an increase in CU business lending: in our sample data, business lending went from representing an average of around 0.9% of total CU assets in 1994 to 4.15% in 2014. This higher dependence of small businesses on CUs for access to credit (Dennis, 2012; Mills and McCarthy, 2014; Wilcox, 2011) increased the role played by the loan activity of CUs in the competitiveness, job creation and innovation of the US economy (Mills and McCarthy, 2014). The net effects of this process for the asset risk and the stability of the financing of the CU are, however, unclear. On the positive side, the relaxation of constraints on business loans has allowed CUs to expand their operations and attract further financing. On the negative side, if indeed business loans increase the medium-to-long term risk of the assets of the CU, an expansion of business loans could have destabilizing effects on CU profitability and financing. This is especially the case if market sources of financing react to the risk of the loan portfolio or to the net worth of the CU, which may deteriorate as a consequence of the increase in loan loss provisions due to the larger proportions of underperforming or non-performing business loans.[5]

We use the above discussion to frame an in-depth study of the consequences of business loan expansion in CUs and carry out, to our knowledge, the first systematic study of the risk implications of business loans in CUs. Specifically, we are interested in answering the following questions:

- Are business loans a significantly riskier type of asset for CUs?
- Do increases in business loans have negative effects on the deposit financing of the CU? In other words, is there evidence that (some) CU depositors may be aware of the risk of business loans and react to increases in such loans through lower deposit growth?

To carry out these research objectives, we put together a large database of U.S. credit union information. The sample includes all CUs with data available at the NCUA and assets larger than $50 million. Our sample period covers 1994Q1–2014Q4 and contains a maximum of 152,761 quarterly observations which correspond to a maximum of 2278 CUs. We use both regression analyses and quasi-experimental methods and deliver two main sets of results.

Our first set of results shows that increasing member business loans leads to a significant increase in the asset risk of the CU. In particular, our estimates suggest that business loans have an effect on future delinquency rates between two and three times higher than that of the other loans of the CU. This effect is robust to controlling for many observable factors, including the presence of programs that actively help CUs to grant low-risk business loans, and to controlling for the selection of CUs into business lending. We show some evidence that the impact of business loans is not only through medium-term measures of loan failure, but also through a negative association with a CU's main indicator of health, namely its net worth. The evidence of a higher risk of business lending motivates our second set of analyses, where we examine whether increases in business loans are followed by reductions in deposits in a manner consistent with monitoring or discipline of such loans. The results of descriptive analyses suggest that the levels of business loans in the CU are negatively correlated with the rates of growth of deposits and that some of this effect may go through the decrease of net worth. Hence, we finally examine whether this negative correlation may be indicative of a reaction of deposits to business loans by performing two quasi-experimental analyses. These analyses are designed around two "policy shocks" which represented exogenous increases in the capacity of CUs to grant business loans. In both settings we find evidence that, relative to well-designed control groups, growth rates of deposits are significantly lower for the CUs which experienced higher increases in their business lending.

The results in our paper contribute to the literature on credit unions by providing the first comprehensive evidence of the increased risk of business loans and of some of its mitigating factors, but also by showing evidence suggestive of a negative relationship between deposits and business loans. We also contribute to the literature on regulation of financial institutions. Our results suggest that the regulation of business loans, while allowing the CU to expand an activity that is one of the *raisons d'être* of cooperative lending, may also lead to a significant increase in risk which, in turn, may have an impact on the deposit financing of the CU. This impact has a negative effect on the stability of the CU financing but may work as an ex-ante incentive (discipline) for the risk to be contained. The potential existence of indirect

[5] Apart from the ratios on delinquency loans provided by the NCUA, which we show in Figure 2, there is, to our knowledge, no systematic evidence of the higher risk of business lending.

consequences of regulatory actions gives increased importance to the analysis in this paper, both for regulators and supervisors. An implication of our results is that, given the peculiar features of CUs, market-based disciplining mechanisms seem to work differently and, hence, regulation of CUs and of other depository institutions, especially banks, might need to diverge further. We finally contribute to the literature on relationship banking by analyzing the implications of risky investment strategies in a context where the relationship of the financial institution with its members is especially close.

The remainder of the paper is organized as follows. In Section 2 we justify our analysis by linking CU business loan regulation to risk and presenting arguments against and in favor of a reaction of CU deposits to fundamentals and risk indicators. 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 analysis of depositor reaction. In Section 5 we first show descriptive evidence of deposit reaction to business loans and, second, we take advantage of two settings which allow us to draw conclusions more indicative of causality from expansion of business loans to lower deposit growth rates. In Section 6 we offer some concluding remarks.

2. Business loans in credit unions: regulation and depositor reaction

Credit unions are not-for-profit financial intermediaries which serve a limited group of member-shareholders defined by a "field of membership" (Black and Dugger, 1981; Ely, 2014; Frame et al., 2003; Goddard et al., 2008).[6] The field of membership definition guarantees that the CU is focused on serving a specific target set of members. As not-for-profit depository institutions, CUs are more saver/borrower oriented than other financial institutions: CUs provide, in general, high interest rates on deposits (this constitutes the standard way to remunerate CU shareholders, whose shares in the CU take the form of deposits: Bauer, 2008; Leggett and Stewart, 1999; Smith et al., 1981; Smith, 1984), low rates on loans and improved access to consumer finance services. CU regulation has, therefore, developed with the objective of protecting CU members and preserving the not-for-profit consumer orientation of the CU. In this paper we focus on the restrictions and limits imposed on the business loan activity of CUs. We examine two underlying assumptions of this regulation: (i) business loans are an expansion of the CU into riskier assets and (ii) market-based mechanisms which keep this risk under control may not work in CUs.

2.1. The limits to CU business loan activity

The regulation of CU business loans is developed in Part 723 of the NCUA Rules and Regulations (National Credit Union Administration, 2010). Member business loans 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.[7] Part 723 includes detailed informational and organizational requirements for a CU to engage in business lending activity and, more importantly, it places restrictions on the amount of such loans a CU can grant. In particular, business loans are subject to a limit established by US Congress in the Credit Union Membership Access Act of 1998. In its current wording, this limit 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). This sets an effective cap on business loans at 12.25% of assets. This limit does not apply to three particular types of CUs[8]: (i) CUs with a low-income designation; (ii) CUs which participate in the Community Development Financial Institutions (CDFI) program; (iii) CUs which are chartered for the explicit purpose of making business loans or which as the date of enactment of the Credit Union Membership Access Act of 1998 had a history of primarily making commercial loans. Underlying the strict regulation of CU commercial lending there seems to be a key assumption: CUs are at a disadvantage in terms of risk assessment of business loans and, therefore, such loans are likely to significantly increase the asset risk of the CU. The reasons for this increased risk rest both on the hypothesis that some monitoring mechanisms which incentivize other financial institutions to keep their risk strategies in check may not work effectively in CUs (we review this argument in Section 2.2) and on the existence of informational and relational disadvantages of the CU. Given the traditional focus on consumer loans, CUs are considered to have less experience in screening and granting business loans compared to their natural competition (commercial banks). Typically, this lack of time series data and operational experience is accentuated by the lack of the sophisticated resources and facilities needed for modern business risk analysis.[9] Furthermore, CUs may face an adverse selection issue caused by a potential underestimation of business loan credit risk parameters due to the relational link that the CU has with its members, a consequence of the field-of-membership restriction and the owner character of CU members.[10]

All the above implied that, through the 1980s and 1990s, the amounts of business loans in most CU portfolios were relatively low or zero: in 1994, 61% of the CUs in our sample did not have any loan categorized as a business loan. This, however, changed throughout the 2000′s and early 2010′s and in 2014 only 27% of our sample CUs did not have any loan categorized as a business loan.[11] The reasons behind this increase in the number of CUs involved in commercial lending are fourfold. First, the NCUA has been steadily relaxing the regulatory requirements for business loan activity. A first major change was introduced in 2003 with regulation 68 FR 56552, which eliminated some of the restrictions on business loans while maintaining the cap of 12.25% of

[6] The National Credit Union Administration (NCUA) defines three forms of membership: community, occupation (including being employees of a specific employer) and association. CUs which are chartered by the federal government may serve a single or multiple field of membership (if the CU is constituted under or applies for a multiple field of membership). For CUs which are chartered by their state the possibility of serving more than one field of membership depends upon state regulations.

[7] 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.

[8] NCUA regulation § 723.8 Aggregate member business loans limit; exclusions and exceptions: (d) Statutory exemptions.

[9] Part 723.4 explicitly requires CUs with commercial lending programs to adopt and implement a comprehensive written commercial loan policy and establish detailed procedures for commercial lending.

[10] It could be argued, on the other hand, that the closer relationship of CUs with their members provides them with more of the soft information required to reduce the informational asymmetries when lending to small businesses (Ogura and Uchida, 2014) or with a form of social capital which would tend to reduce the default of any type of member loan (Clark et al., 2021). Hence, the CUs may, in fact, have some advantages in assessing member business risk when compared to the large banks.

[11] The CUs in our sample are those with assets larger than $50 million. For the universe of CUs, the percentages of CUs without business loans went from 87% (1994) to 64% (in 2014).

CU assets.[12] Additional changes were introduced in 2005, 2013 and, more significantly, in 2016. Second, the number of CUs exempted from the cap on business loans has increased significantly, among other things as a consequence of explicit regulatory actions aimed at community development such as the Low Income Designation Initiative.[13] Third, the number of CUs which are partners of the Small Business Administration (SBA) has also increased[14]: within our sample of NCUA data, the proportion of CUs which had SBA-backed loans went from 2.6% in 2004Q1, the first period for which we have systematic SBA data, to 16% in 2014Q4. Even though the total amount of SBA-backed loans is still small (these loans represent, on average, 0.76% of the loans granted by the CUs with SBA-backed loans) and SBA-backed loans in CUs are not categorized as business loans for the purpose of the limit, being a partner of the SBA signals that the CU has a specific interest in understanding and granting small business loans. Indeed, untabulated tests computed from our data suggest that CUs with SBA-backed loans have significantly higher proportions of non-SBA business loans than CUs which are not SBA partners. Fourth, the process of consolidation of commercial banks meant that these banks diversified away from their commercial lending activity (Berger et al., 1998) and led to a reduction of the relative informational disadvantage (Petersen and Rajan, 1994, 2002) and to an increase of the relative relational advantage (Bonus and Schmidt, 1990) of CUs. This process resulted in the shifting of a share of the commercial lending market from the larger consolidated commercial banks to CUs (Wilcox, 2011; Dennis, 2012).

2.2. CU deposit reaction to CU fundamentals and business loans

Given that informational disadvantages suggest that business loans may be a significantly riskier asset for CUs, the question arises of whether, apart from the explicit regulation in Part 723 and the supervision of the NCUA, additional mechanisms are available that limit the risk coming from such loans. A common theme in the literature of financial institution risk-taking is the complementarity of regulatory and market-based mechanisms in controlling risk. Financial markets have the ability to monitor bank performance and influence risk-taking by punishing banks which take excessive risks. This "disciplining" process works through a potential reduced access to financing which gives banks ex-ante incentives to limit risk-taking or to take corrective actions if risk increases significantly or the bank fundamentals deteriorate (see, e.g., Nier and Baumann, 2006). In the case of depository institutions, besides the disciplining effect that equity markets exercise on public banks, deposit markets have been shown to play a similar role. There is abundant empirical evidence that public and private bank depositors react to bad bank fundamentals and to the bank's risk-taking indicators (see Berger and Turk-Ariss, 2015; Calomiris and Powell, 2001; Cook and Spellman, 1994; Macey and Garrett, 1988; Martinez Peria and Schmukler, 2001; Park and Peristiani, 1998, among others). There is, however, little evidence of such mechanisms in CUs. As mentioned in Section 2.1, one of the reasons for the regulatory emphasis on controlling CU risk-taking may be the expectation that such market (deposit)-based mechanisms may not be present in a CU. There are, at least, four arguments that support this position. First, CU members play the dual role of owners and depositors (Leggett and Stewart, 1999; Smith et al., 1981; Smith, 1984): member (owner) shares are treated as deposits which receive a dividend (interest) rate and protection from the NCUSIF.[15] Second, CU members have a closer link with the CU due to the field of membership restriction. Both the increased sense of ownership and the closer relational link of members with their CU are likely to reduce the willingness to monitor or discipline the CU. Third, CU members tend to be composed of unsophisticated depositors whose main objectives are to hold (remunerated) deposits and to have access to (low-interest) loans and high-quality miscellaneous consumer finance services. It is expected that such depositors do not react to indicators of the financial health and risk-taking of the CU or, even, that they are not aware of such information. Fourth, most CU members have their deposits (up to $250,000) secured by the NCUSIF which significantly reduces the incentives for active monitoring. Given that most CU members are small depositors, this argument would suggest that the vast majority of CU deposits should be relatively unresponsive to CU fundamentals.

There are, on the other hand, several arguments in favor of the existence of active monitoring exercised by CU members and of the possibility that, at least, some CU deposits react in a manner consistent with discipline.[16] First, the net worth of a CU includes the present value of time and resources contributed by members and sponsors, who have the incentive to monitor conflicts of interest and risk-taking activities undertaken by managers. This suggests that net worth may be the most important indicator of interest for CU members, but other risk indicators may also be monitored, especially if related to net worth. Second, CUs have a certain amount of "sophisticated" depositors/members: depositors with amounts beyond the insured limit, member and non-member government deposits, brokered deposits, business share accounts and deposits by other CUs. These deposits represent a small fraction of the total but they are likely to be more actively engaged in monitoring the CU and more reactive to information, especially if their investments in risky or failing CUs are sizable.[17] In the presence of this type of sophisticated depositors, there is evidence that small and less sophisticated depositors act as followers: when sophisticated depositors

[12] 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 CUs 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 CUSOs to "originate business loans" (see Federal Register /Vol. 68, No. 190 /Wednesday, October 1, 2003 /Rules and Regulations).

[13] In the NCUA database (our sample) there were in 1994 only 322 (19) credit unions exempted from the 12.25% limit, which correspond to 3.64% (1.61%) of the total number of CUs. These numbers rose to 2304 (761) in 2014Q4 (the end of our sample period), which correspond to 36% (34%) of the total. Note that NCUA and CDFI Fund data can unambiguously identify the CUs with the low-income designation or which are CDFIs. CUs in the third category can only be identified indirectly if their proportion of business loans exceeds the 12.25% cap so we actually have a lower bound on the number of such CUs. We use low-income designated CUs explicitly in some of our analyses in Section 5 and perform some robustness tests with data for all three categories.

[14] The SBA is a government agency dedicated to giving support to small businesses and entrepreneurs across the US. Among other activities, the SBA provides guarantees of repayment on the commercial loans of partner institutions (such as credit unions or banks) which satisfy some eligibility standards.

[15] Hereafter, we use the terms "member deposits" and "total deposits" to denote deposits/shares from CU members and total deposits (including non-member deposits), respectively.

[16] This discussion draws from Kane and Hendershott (1996) and from the available evidence of depositor discipline in cooperative banks and CUs (Murata and Hori, 2006, for Japan, Arnold et al., 2016, for Germany and Gomez-Biscarri et al., 2020, for the US).

[17] In our sample, non-insured, government, brokered and business share deposits represent 5.63%, 0.22%, 0.5% and 1.85% of total deposits, respectively. An indirect calculation (based on data from the asset side) suggests that deposits of other CUs represent on average 1.4% of total deposits.

react to a depository institution information, the less sophisticated depositors react similarly although with smaller reaction coefficients and, typically, with a lag (Davenport and McDill, 2006; Park and Peristiani, 1998).[18] In distress times, unsophisticated depositor reaction may take the form of outflows, especially if the outflow of other types of deposits is significant (see Supplemental Appendix B for anecdotal evidence along these lines). In non-distress times the reaction of unsophisticated or insured deposits may be more in the form of a lower growth of future deposits rather than explicit deposit withdrawal, but the empirical implications of such reaction (lower subsequent deposit growth for the CU) would be similar to those of a direct outflow (Davenport and McDill, 2006; Gomez-Biscarri et al., 2020; Park and Peristiani, 1998).[19] Other CUs may be a particularly relevant example of such sophisticated depositors with ex-ante incentives for monitoring a CU. Even though CUs rely on the NCUA (or the state supervisor) as the main active monitor of other CUs, NCUSIF-insured credit unions act as coinsurers of one another: all institutions insured by NCUSIF are responsible for curing any shortage the fund might develop (Kane and Hendershott, 1996). This co-responsibility, which expands the effective size of the NCUSIF fund, strengthens the incentives for CUs to cross-monitor one another.[20] Third, and probably more important, even though most CU members are likely not aware of or interested in the formal financial information of the CU, they are still exposed to channels where the financial and economic situation of the CU is described. These informal channels may be the print media (newspapers and business magazines), broadcast news through local radio and television, online newspapers, or, even, direct communication with local or business peers or CU employees. There is evidence that the information that flows through these informal channels (even "rumors": see Chernykh and Mityakov, 2019) is correlated with deposit growth (Accornero and Moscatelli, 2018). The importance of these alternative informational channels is likely to be larger in the case of CUs, given the tighter links generated by the field of membership and by the largely local scope of the operations of most CUs.[21]

Focusing more specifically on business loans, it may be argued that the small amounts of such loans in CUs –due to the regulatory limits and the traditional focus on consumer lending- make it unlikely that depositors, even though informed and reactive to other key fundamentals (most notably, net worth), may pay attention to the CU's business loan activity. However, the larger default rates of business loans make their impact on a CU's net worth potentially much larger and faster than that of personal loans or mortgages: business loans could be indicators correlated with more likely subsequent decreases in net worth through the larger increases in loan loss provisions related to underperforming and non-performing loans and through the reduction of interest income associated to non-performing loans (the latter effect is reinforced by the fact that weak net interest income is of particular concern for the long term viability of the CU). While it may be the case that business loan levels were low at the beginning of our sample, the business loan activity of CUs has steadily become relevant enough to warrant our study. As mentioned above, a significant proportion of CUs (more than 30% of them) is not subject to the regulatory cap and, at the end of our sample period 6% of all CUs have amounts of business loans in excess of the 12.25% limit (a proportion which is likely to increase in the future given the trends we show in Fig. 4). In addition, the average net worth to assets ratio of CUs in our sample is 10.8%, which is smaller than the regulatory cap on business loans. This means that for many CUs, not only those exempt from the limit, the levels of business loans may be larger than the CU's net worth: in our sample, on average 6.3% of the CUs have amounts of business loans higher than the net worth, a proportion which reached 10.5% at the end of our sample (2014Q4). In these cases, a sharp deterioration of the business loan portfolio could place these CUs in significant insolvency risk.[22] These numbers are large enough to suggest the potential for business loans to be a relevant variable in the information set of some depositors. In light of the arguments both against and in favor, whether indeed this is the case and depositors significantly react to business loan levels is, ultimately, an empirical question.

3. Data

We collected quarterly data from the CU call reports available from the NCUA. These call reports contain detailed financial information for all CUs that operate in the United States. We selected credit unions with assets greater than 50 million dollars (peer groups 4, 5 and 6). This subsampling strategy is based on data availability, since before 2002Q3 these were the CUs which reported quarterly financial statements, while smaller CUs reported semiannually. Our sample period covers 1994Q1–2014Q4, yielding a maximum of 152,761 quarterly observations corresponding to 2248 CUs.[23] The list of variables we collect is shown in Appendix A.

We use the discussion in Section 2 to structure our analyses in the remainder of the paper: we examine, first, whether business loans increase the risk of CU assets (Section 4) and, second, whether expansion of business loans is negatively correlated with deposit growth (Section 5). The main dependent variables of interest in Section 4 are measures of future risk of the CU loan portfolio. The main dependent variables of interest in Section 5 are the growth rates of member deposits and of total deposits, the distinction being that "total deposits" includes also non-member deposits, which some CUs are allowed to accept.[24] The main control variables we use throughout the analyses are CU balance-sheet and income statement items which describe the net worth, investment strategies and performance of the CU. We describe these variables as we review our results. 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,

[18] The anecdotal evidence in Figures B1-B3 and Table B2 of Supplemental Appendix B aligns with this "follower" role of insured deposits: in that Appendix we review three cases of CU distress induced by business loans and in all cases there is evidence of flight of insured deposits before the time of distress, though with a lag with respect to the uninsured deposits.

[19] Gomez-Biscarri et al. (2020) find evidence of depositor discipline of both insured and uninsured deposits, Park and Peristiani (1998) find evidence of depositor discipline in US thrift institutions exercised by insured depositors; Davenport and McDill (2006) found, in a case analysis of a single bank, that fully insured individuals started to withdraw their deposits when the fundamentals started to deteriorate. See, also, Carlson and Rose (2019), Schoors et al. (2019) and Brown et al. (2020) for factors that make withdrawal more likely.

[20] Investments of CUs in other CUs are relatively small on average (0.9% of assets) but the distribution is highly skewed: some of the CUs in our sample have investments in other CUs that represent a significant proportion of total assets. For 2014Q4, the 90%/95%/99% percentiles of the distribution of this variable are 2.7%, 4.2% and 8.4%, respectively, and the maximum is 26%.

[21] The anecdotal evidence of Table B1 in Supplemental Appendix B suggests that this "local flow of information" may not only affect the CUs "in trouble" but may even affect, to a lesser extent, other CUs located in the vicinity (as proxied by being headquartered in the same county).

[22] In Supplemental Appendix B we review three cases of CUs which went into severe distress because of their business loan portfolio. Though anecdotal, these cases nicely exemplify the potential consequences of a sharp deterioration of business loans and provide some descriptive evidence of depositor flight in response (even before net worth measures deteriorate) to risky business loan increases. We also provide in that Appendix some examples of the "informal channels" (links to financial press articles and a public statement of a banking association) which warned of the risk of business loans.

[23] We stop the sample one year before the major regulatory change which was implemented in 2016. We do this to avoid that anticipation of this change may introduce distortions in our results.

[24] Note that under our generic name "member deposits" 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.

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. Finally, we collected information on macroeconomic variables that control for the effect of economic factors (Arnold et al., 2016; Barajas and Steiner, 2005; Maechler and McDill, 2006). Since most CUs concentrate their operations in one state, we use state-level data on personal income and unemployment rates obtained from the Federal Reserve of Saint Louis database and region-level inflation rates from the Bureau of Labor Statistics as controls for local economic conditions. We match these variables to the location of the CU headquarters.

We collect some additional information which we use in specific analyses:

- Data on location of CU branches (available from the NCUA since 2010). This information is used to establish a potentially time-varying proxy for 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 growth through multiple field of membership and to design our analysis of the Low Income Designation Initiative in Section 5.2.
- Data on Small Business Administration (SBA)-backed loans granted by the CU. This information, available starting in 2004 in the call reports, allows us to control for SBA-secured loans and to proxy for the willingness of the CU to enter the business loan activity.
- Credit unions that have been under conservatorship, liquidated or merged with NCUA assistance. This information is available on the NCUA web page and is used to build Supplemental Appendix B.

Table 1 shows descriptive statistics and correlations of our main variables. We do not comment on these descriptives now but we use some of them later to benchmark our regression results.

4. Business loans and the credit risk of the loan portfolio

We start by examining the effect of business loans on the risk of CU assets. We showed in Fig. 2 descriptive data on the higher average delinquency rates of business loans compared to real estate loans (even during the subprime crisis) and to credit card loans. To provide more formal and comprehensive evidence of a link between business lending and credit risk we construct two variables, *CRISK3Y* and *CRISK5Y*, which describe the average quality of the loan portfolio of the CU in horizons of three and five years ahead.[25] These two credit risk proxies are computed as the average of the quarterly values of *NPL+ch-offs* (over total loans) throughout the following three and five years.[26,27] We use these two indicators as dependent variables in predictive models with the following structure:

$$CRISK\#Y_{it} = \beta_1 loansta_{it-1} + \beta_2 BL_{it-1} + \beta_3 SBAvar_{it-1} + \beta_4 SBAvar_{it-1} \times BL_{it-1} + \beta_5' controls_{it-1} + u_i + d_t + \varepsilon_{it,} \quad (1)$$

where $CRISK\#Y_{it}$ are the two risk measures defined above (#= 3, 5), *loansta* is the proportion of loans over total assets of the CU and *BL* is the proportion of business loans over total assets of the CU. In order to control for the lower risk of SBA-backed loans, we include three measures of the presence of such loans (denoted *SBAvar* in model (1)) along with their interaction with *BL* in alternative specifications: (i) DBA_{it} is a dummy equal to 1 if the CU has SBA-backed loans in quarter *t* (0 if not, missing if no information is available); (ii) DBA^*_{it} is a dummy equal to 1 if the CU has SBA-backed loans at any point in time during our sample period (0 if not); (iii) $SBAL_{it}$ is the proportion of SBA-backed loans over total loans granted by the CU. The vector *controls* includes a set of CU characteristics ($MFOM_{t-1}$, $Mstate_{t-1}$, ROA_{t-1}, $NWTA_{t-1}$, NIM_{t-1}, $loansta_{t-1}$, $size_{t-1}$) and macro variables ($chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}.): all of these are defined in Appendix A. We also include CU (u_i) and time (d_t) fixed effects.

The results of model (1) are shown in Table 2 for both *CRISK3Y* (Panel A) and *CRISK5Y* (Panel B). The baseline models (column 1 in both panels) show clean-cut evidence that business loans significantly increase the risk of the CU. In particular, note that the coefficient attached to *BL* suggests that business loans have three to four times larger rates of failure than regular loans: compare the estimated coefficients of *loansta*, 0.009 in Panel A and 0.011 in Panel B (0.9% or 1.1% rates of failure), with those of *BL*, 0.043 in both panels (4.3% rate of failure).[28] This effect is consistent even when controlling for SBA-backed loans (columns 2–5). The results on the impact of partnership with the SBA (additional regressors in columns 2–5) are especially noteworthy and can be summarized in three main implications: (i) having SBA-backed loans reduces the long term risk of the loan portfolio: note the negative and significant coefficients of *DBA**(column 2) and *DBA* (column 3); (ii) having SBA-backed loans increases significantly the risk of non-SBA-backed business loans of the CU: note the positive and significant coefficients of the interactions in all columns; (iii) this latter effect is higher in the medium term (*CRISK3Y*) than in the longer term (*CRISK5Y*). These results paint an interesting story which confirm that business loans are significantly riskier than the other loans of the CU portfolio.[29] Also, partnership with the SBA –through which the CU may be signaling an interest in understanding commercial lending- reduces the delinquency of regular loans but increases that of non-SBA business loans, probably more in the short term. This suggests both a negative initial effect of partnership with SBA from an incentive for fast expansion of business loan activity (a potential *overconfidence* effect) and a positive effect over time as the CU becomes more proficient in identifying business risk (a *learning* effect).[30]

The above results suggest that we may need to control for the speed of growth in business loans. This motivates our next analysis. We perform regressions similar to model (1), but we now include in the analysis two additional variables which characterize the expansion of the business loan portfolio of the CU: (i) *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 identifies CUs which expand their business loans faster than other types of loans; (ii) *LOWBL* is a dummy equal to one when the value of *BL* is lower than the median of the sample in the quarter before growth is measured: this variable identifies CUs which start from low levels of business loans, so

[25] We also replicated the analyses using a four-year measure *CRISK4Y*. The results are indistinguishable from those obtained with *CRISK3Y*. These results, and those of all other robustness or untabulated tests mentioned throughout the paper, are available upon request.

[26] We use charge-offs in addition to NPLs because in June 2000 the FFIEC compelled financial institutions to charge-off loans with 180-day delinquency (https://www.occ.treas.gov/news-issuances/federal-register/2000/65fr36903.pdf).

[27] Alternatively, we computed *CRISK3Y* and *CRISK5Y* by subtracting from *NPL+ch-offs* the amounts of loans recovered. This did not change the results. However, since this measure of risk is less parallel to our analyses in Section 5 we offer these results upon request. Note that *CRISK3Y* and *CRISK5Y* measure the average risk over 12 and 20 future quarters, so in our regressions we adjust the standard errors for this overlap using Driscoll and Kraay (1998) standard errors with lag length equal to the horizon of the risk measure.

[28] Even considering the standard deviation of *loansta* and *BL* (reported in Table 1) the effect of *BL* is still larger than the effect of *loansta*: a one standard deviation increase in *loansta* leads to an increase in CRISK of 0.152% while a one standard deviation increase in BL leads to an increase in CRISK of 0.297%

[29] These results are robust to reestimating Table 2 splitting our measure of loans into high risk (real estate, auto and credit card) and low risk loans (all others).

[30] This is in line with Caselli et al. (2021), who show that loans are more likely to default when a bank—rather than a mutual guarantee institution —is involved in the guarantee process.

that they are "in the process of initiating business loan activity." The results of these regression models are shown in Table 3, where we run two different specifications for models which do not include the controls for SBA-backed loans (columns 1–2) and models which include those controls (columns 3–4). The results point at the fact that business loans lead to larger increases of future risk in CUs which start their expansion into business loans and do so very fast: note that the results in columns 1 and 3 suggest that fast *BL* growth coupled with starting from a low level of *BL* leads to an increase in the risk of the business loan portfolio (positive and significant coefficient of the interaction term *BLG* × *LOWBL*). The more complete models in columns 2 and 4, where we include the interaction of *BL* with both *LOWBL* and *BLG* and the triple interaction *BLG* × *LOWBL* × *BL*, show that this apparent increase in risk comes from CUs which both increase their business loans proportionally more and start with low business loans levels. In particular, the results in Panel B (the effect is not significant in Panel A, suggesting that the increase in risk takes time to materialize) imply that the risk of business loans increases by two or threefold for CUs which start with low levels of business loans and where business loans grow proportionally more than regular loans: the risk coefficients of *BL* go from 0.035 to 0.084 (column 2) and from 0.048 to 0.073 (column 4).[31] These estimates imply that the rates of default of business loans in these CUs go up to 8.4% or 7.3%, that is, seven to eight times higher than those of regular loans.

As an additional test of the risk effect of business loans, we carry out a set of analyses based on matching estimators (Table 4). In these, we find matched pairs of CUs where the "treatment" units are CUs with high proportions of business loans and the "control" units are similar CUs (based on matching on several observables) but with lower proportions of business loans. In all four cases we require exact matches for the state, field of membership, charter of the CU (state or federal) and quarter of observation and nearest-neighbor matching on five variables: *size*, *ROA*, *NWTA, NIM* and *loansta*. We then use the bias-adjusted estimator of Abadie and Imbens (2011) and test for differences in the average credit risk (*NPL*+*charge-offs* over total loans) for horizons of 1–5 years between the "treatment" and "control" groups. Our four analyses differ in the definition of treatment and control groups. In the first (Panel A), we define our "treatment" group as the CUs with business loans proportions (over total loans) above the 90% percentile of the quarter-by-quarter distribution. The "control" group are observable-matched CUs selected from the group of CUs with proportions of business loans below the 10% percentile of the quarter-by-quarter distribution. In the second analysis (Panel B) we further control for the presence of high-risk loans (defined as the sum of real estate, auto and credit card loans). We define our "treatment" group as the CUs with proportions of business loans above the 90% percentile of the quarter-by-quarter distribution and with proportions of high-risk loans below the median of the quarter-by-quarter distribution. The control group are observable-matched CUs selected from the group of CUs with proportions of high-risk loans below the 10% percentile of the quarter-by quarter distribution and with proportions of real estate loans above the median of the quarter-by-quarter distribution. In Panel C we control for the influence of partnership with the SBA by performing a matching similar to that of Panel A but only within the sample of CUs with no SBA-backed loans. Finally, in Panel D we control for SBA-backed loans in a different way and define our "treatment" group as the CUs with more business loans (above the 90% percentile) and which have the most SBA-backed loans (above the 90% percentile). The control group are observable-matched CUs extracted from the group of CUs with more business loans (above the 90% percentile) but without SBA-backed loans.

The results of these matching estimators are aligned with the descriptive results in Table 2. In the first three panels we find significant results at all horizons which suggest that, on average, CUs with a higher proportion of business loans have between 0.3% and 0.5% higher proportions of (NPLs +charge offs) over total loans. This effect tends to be stronger in the short run. The results in Panel D are a final check to the results of the effect of SBA partnership in Table 2. Here, we see that for CUs with high business loans, but which are SBA partners (so they have SBA-backed loans) the shorter-term estimates (1 or 2 years) suggest that the risk is higher than that of non-SBA partners. This effect, however, reverses in the longer term (5 years), where we find a significant but negative effect on risk. This reversal of the sign of the risk estimate is consistent with the effects that we termed *overconfidence* and *learning* in our comments to the results of Table 2.

All in all, the results in Tables 2–4 support the hypothesis that business loans increase the asset risk of the CU –measured as a lower quality of the loan portfolio-, especially for CUs that initiate their business loan activity and increase such activity rapidly. This is in line with the concerns that CUs are less experienced in granting business loans: a desire for fast growth of the business loan activity may lead to lower quality thresholds for the granting of these loans or to lower capacity of discriminating good from bad applicants. The effects of SBA partnership are quite intuitive, in that initially this partnership leads to higher risk of non-SBA-backed loans, but this effect tends to reverse in the long term.

Even though net worth is not a credit risk indicator, it is the main indicator of the capacity of the CU to absorb unexpected losses. We provide in Table 5 some evidence of a negative relationship of business loans with the net worth of the CU. These results are interesting on their own but also serve to motivate some of our findings in Section 5, in that the reaction of deposits to business loans may be partly explained by the negative relationship of business loans with net worth. Table 5 summarizes the results of three different analyses. In Panel A we offer a basic comparison of the average level of net worth (over assets) *NWTA* for CUs in terms of their business loans holdings. Column 1 compares *NWTA* for CUs with and without business loans and column 2 compares *NWTA* for the CUs with largest proportions of business loans (quartile 4 of the distribution of positive *BL*) with those with lowest proportions (quartile 1). In both cases, the tests reveal a significantly lower level of *NWTA* for the CUs with business loans (column 1) or with higher levels of business loans (column 2). In Panel B we go a step ahead and estimate regression models where we regress *NWTA* in quarters t, t + 1 and t + 2 on a set of controls –similar to those of model (1): see table caption– and on (quarter t-1) *BL*. The results suggest a negative relationship between business loans and the subsequent net worth of the CU. Finally, in Panel C we examine whether increases in business loans (we use a dummy variable $D(\Delta BL_{t-1}>0)$, which is one when the business loans of the CU increased in quarter t-1) are related with subsequent decreases of net worth (identified with the dummy variables $D(\Delta NWTA_t<0)$, $D(\Delta NWTA_{t+1}<0)$, $D(\Delta NWTA_{t+2}<0)$). Again, the results suggest that increases in business loans significantly increase the probability that net worth will decrease in the three subsequent quarters. The coefficients of Panels B and C are not large in magnitude but show that, even for the low levels of business loans that CUs have on average, such loans are related with lower levels of net worth.

5. Depositor reaction to business loans in credit unions

We now examine whether there is evidence that CU deposits react to increases in business loans. We show, first, the results of descriptive analyses which relate deposit growth rates to business loans while controling for other characteristics of the CU. These results motivate two subsequent analyses focused on exogenous shocks to business loans.

5.1. Descriptive evidence of CU depositor reaction to business loans

We first estimate regressions -similar to those in the depositor discipline literature for banks- which relate growth in CU deposits to the

[31] These results come from the sum of the baseline coefficient of BL (0.035 in column 2, 0.048 in column 4) with the coefficient of the two interactions (−0.003 and −0.100 in column 2, −0.002 and −0.050 in column 4) and the coefficient of the triple interaction (0.152 in column 2, 0.077 in column 4).

proportion of business loans over total assets (*BL*). In these regressions we control for the level of loans, *loansta*, for net worth of the CU, *NWTA,* which we consider to be the most prominent indicator of financial health of the CU, and for the SBA variables included also in Table 2 (*DSBA, SBAL* and the interaction of *SBAL* with *BL*). We also include a set of controls for other CU fundamentals and risk indicators. Some of these controls have been used in the literature of discipline in banks (Barajas and Steiner, 2005; Berger and Turk-Ariss, 2015; Calomiris and Powell, 2001; Martinez Peria and Schmukler, 2001) and some are specific to CUs (Bauer et al., 2009; Frame et al., 2003). Specifically, we control for: non-performing loans over total loans (*NPL*), charge-offs over total loans (*ch-offs*), net interest margin (*NIM*), return on assets (*ROA*), the standard deviation of past ROAs (*sdROA*), a measure of past losses (*PL*) and its interaction with *sdROA*. We also include a measure of size (*size*, natural log of assets). In order to account for CU reaction to shocks we include two variables which proxy for "tools" that the CU may utilize to prevent depositor flight: first, we control for interest rates on deposits (*intrates*), measured as the average interest rate that the credit union paid on deposits (Maechler and McDill, 2006)[32]; second, we include the (lagged) quarter-on-quarter growth of average salaries paid by the CU, *chsalary*. This variable has been shown to be used as an adjustment mechanism available to the CU.[33] In order to ameliorate problems of endogeneity, in our regressions we use one-quarter lagged values of the risk indicators.[34] Appendix A describes all our variables in more detail. Our baseline model is:

$$\Delta dep_{it} = \beta_1 loansta_{it-1} + \beta_2 BL_{it-1} + \beta_3 DBA_{it-1} + \beta_4 SBAL_{it-1} + \beta_5 SBAL_{it-1} \times BL_{it-1} + \beta_6 NWTA_{it-1} + \beta_7' controls_{it-1} + u_i + d_t + \varepsilon_{it,} \quad (2)$$

where Δ*dep* is the quarter-on-quarter growth in a measure of deposits (either member deposits Δ*mem_dep* or total deposits Δ*tot_dep*) and *controls* is a vector which collects the fundamentals and risk indicators, *chsalary* and *intrates* and the macro variables from model (1). As in model (1) we include CU (u_i) and time (quarter) (d_t) fixed effects.[35]

The results of several versions of model (2) are reported in Table 6. Panel A contains the results of the different specifications for member deposits growth (Δ*mem_dep*) whereas Panel B contains the results for total deposits growth (Δ*tot_dep*): the results are relatively similar, so we comment on both panels together. We omit from the tables and from these comments the results on the controls[36]: our main interest is to analyze whether business loans have some explanatory power over depositor reaction, although other variables may also be correlated with deposit growth. Columns 1–3 of the panels use the full sample of CUs: in column 1 we estimate the baseline model, in column 2 we include the controls for SBA loans and in column 3 we restrict the sample to include only CUs with nonzero business loans. Throughout all specifications and subsamples we obtain large and significant positive coefficients on the net worth of the CU, *NWTA*, which aligns with the intuition that this is the single most important factor which influences depositor behavior: we offer some additional comments related to *NWTA* later on. Our main interest lies on the estimated coefficient for *BL*: we find a negative and significant coefficient across all three columns, which suggests that the levels of business loans are negatively correlated with subsequent deposit growth. Specifically, a one standard deviation increase in *BL* leads to a decrease in quarterly member deposit growth between 0.076% and 0.145% or a decrease in total deposit growth between 0.069% and 0.117%, a sizable result given a sample-wide average value of both variables (member deposit growth and total deposit growth) of 1.5%. Note that, while reacting negatively to business loans, members and depositors react positively to loans: the estimated coefficients of *loansta* (0.036 and 0.038; t-stats of 13.54 and 14.55) imply that a one standard deviation increase in *loansta* leads to an increase in Δ*mem_dep* of 0.547% and in Δ*tot_dep* of 0.578%. This result, which is in contrast with findings in the literature for banks (Barajas and Steiner, 2005; Calomiris and Powell, 2001), is consistent with the borrower orientation of CUs.,[37][38] The results in column 2, where we include the controls related to SBA loans, do not change the main story but the reaction coefficients to *BL* become significantly larger in both panels, which suggest that the presence of SBA loans may be an important factor to consider. In column 3 we include the condition that the CU has positive business loans (*D_BL* = 1). The estimates are similar but the estimated sensitivity to *BL* is diminished (the reaction coefficients go down, and so do the t-stats, to the point that we do not obtain a significant coefficient in Panel B). This suggests that the issue of "selection" into business loans is important: CUs which offer business loans may differ significantly from the CUs without business lending activity. Finally, columns 4 and 5 use the sample of CUs with no SBA loans (with and without the *D_BL*=1 condition, respectively). Again, we obtain significant and negative coefficients on *BL* for this subsample of a magnitude in the upper range of the estimates in columns 1–3.

Interestingly, the negative estimated coefficients of *BL* increase in magnitude (between 10% and 25%) when we omit *NWTA* from the regressions of Table 6. This result, though heuristic (so we do not tabulate it explicitly although it is available upon request), is aligned with the argument –for which we provided evidence in Table 5– that *BL* has a negative relationship with a CU's net worth, which is likely to be the main indicator to which depositors react. In the regressions without *NWTA*, the magnitude of the negative coefficient of *BL* is biased upwards by picking some of the indirect effect of *NWTA*. Still, *BL* keeps a significant coefficient in the complete regressions in Table 5, which suggests that, though small, there is some standalone effect of *BL* on deposit growth. In order to provide some more evidence of the effect of *BL*

[32] Interest rates on total deposits = (ACCT_380 (Dividends on member deposits) + ACCT_381 (Interest on deposits)) / ACCT_018 (Total deposits); see Bauer (2008).

[33] 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 response to bad fundamentals which could influence the reaction of owner-depositors.

[34] Our analyses in this section use "precedence in time" to uncover the reaction of depositors to fundamentals but they still raise the question of reverse causality or common factors. In Section 5.2 we use quasi-experimental methods to isolate exogenous variation in the determinants of depositor behavior.

[35] Note that our dependent variables (Δ*mem_dep* and Δ*tot_dep*) include both insured and noninsured deposits.

[36] For the controls the results are consistent with the findings in the literature. We obtain positive and significant reaction coefficients to *ROA* and *NIM*, and negative and significant coefficients on the risk indicators *NPL* and *ch-offs*. We also obtain a negative and significant coefficient on the interaction of *sdROA* with past losses (*PL*): depositors seem to react to the operational volatility which comes from bad news, a result which makes intuitive sense. Higher *intrates* lead to higher deposit growth and *chsalary* is negatively related to depositor reaction. The negative sign of *size* may be a consequence of the fact that larger CUs have a harder time achieving large rates of growth (a "scale" effect), that growth is penalized by depositors or that, as CUs grow, the mix of financing shifts in relative terms, so deposit financing grows comparatively less than other sources of financing.

[37] This result is not incompatible with the fact that all loans are predictors of future risk (as our results in Table 2 convincingly show). Depositors may understand that consumer loans are the normal activity of the CU and have a baseline default rate (which may be accounted for by the negative coefficient we obtain on non-performing loans, NPL). The negative reaction to business loans would then stem from the much larger (more than threefold) relative risk of such loans and from the potential negative effect on net worth shown in Table 5.

[38] For robustness, we reestimated Table 6 using the subsample of CUs not subject to the regulatory cap on business loans. The results were similar but, as may be expected, the estimated reaction coefficients to business loans were higher in magnitude (−0.015 and −0.014 in the specifications of columns 1 and 4).

controlling for *NWTA*, we performed an untabulated matching estimator. We used the definitions of "control" and "treatment" groups of column 2 of Table 6: we selected as treated the CUs with the highest levels of *BL* (highest quartile of the distribution of positive *BL*) and used as controls the closest matches based on *NWTA* (CUs with similar levels of net worth) and other controls within the CUs with lowest levels of positive *BL*. The estimator shows that CUs with largest levels of *BL* have significantly lower rates of deposit growth (0.12% lower quarterly growth; p-value of 0.008) when compared to the most similar CUs.

Given the evidence in Panels A and B that selection into business loans may interact with depositor reaction, we estimate in Panel C sample selection models where we first analyze the decision to offer business loans (columns 1 and 4, corresponding to the full sample and the sample of CUs without SBA loans, respectively) and then examine the behavior of the growth of member deposits (columns 2 and 5) and of total deposits (columns 3 and 6) conditional on nonzero business loans. The results for the selection equations are straightforward: CUs with SBA-backed loans are significantly more likely to be active in non-SBA backed business lending activity, as are CUs which give more loans to begin with. As expected from the results in Table 5, the CU's net worth is negatively related with the decision to offer business loans.[39] Once we account for selection, the coefficient estimates change slightly across the two samples. For the sample with SBA loans (columns 2–3), the reaction coefficients of deposit growth to business loans are not significant, but we do obtain a negative and significant coefficient on the interaction $SBAL \times BL$, and of higher magnitude than in the baseline regressions of Panel A. Thus, business loans seem to be correlated with lower deposit growth, especially for CUs with high levels of SBA-backed loans, a result suggestive that members of those CUs understand the risk effects we showed in Section 4 and react to them. For the sample restricted to CUs with no SBA loans (columns 5–6), the coefficient of *BL* is still negative and significant, of a magnitude similar to the estimates in Panels A and B, suggesting that the determinants of the decision to offer business loans do not change the negative reaction of deposits in these CUs.[40,41]

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

The descriptive results of Table 6 show a negative correlation of subsequent CU deposit growth with the business lending activity, especially in CUs with SBA backed loans. However, this negative correlation is not indicative of depositor reaction (i.e. of causality from business loans to deposit growth): note that the negative coefficient on the Mills ratio in columns 2–3 and 5–6 of Panel C suggests that CUs who grant business loans tend to have lower deposit growth rates to begin with. We now provide evidence more suggestive of a "causal" story from growth of the business loan portfolio to lower deposit growth. To do that, we use two regulatory events in the US credit union sector which led to higher capacity to grant 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 the first major regulatory change which relaxed the requirements and conditions for granting business loans for all CUs. We believe both shocks provide us with valid empirical settings to uncover whether growth of business loans leads to a negative response of deposits.

a) The LIDI "experiment"

The first shock we examine is the Low Income Designation Initiative (LIDI) carried out by the NCUA in the third quarter of 2012 (August 7, 2012).[42] This initiative consisted in unilaterally expediting and pre-approving the low-income designation (LID) for eligible CUs and contacting those CUs which were eligible but had not applied for the designation in order to inform them of this approval.[43] The LIDI led to a sharp one-off increase in the number of low-income CUs in the quarter of implementation (Fig. 3): within our sample, the number of low-income CUs rose from 218 at the end of June 2012–425 at the end of September 2012. As mentioned above, the LID gives overall greater flexibility to the operations of the CU (such as allowing the CU to accept nonmember deposits) and, more relevant to our analysis, it exempts the CU from the 12.25% cap on business loans. This provides us with a unique exogenous shock to the ability of a significant number of CUs to increase the size of the business loan portfolio.[44] There are two reasons which suggest that the LIDI shock was unexpected for the members of CUs which were eligible and accepted the LID. First, as an explicit policy initiative the LIDI was not announced until it was implemented. Second, ascertaining in advance whether a specific CU satisfies the requirements to receive the designation is not a trivial exercise that particular CU members can perform.[45] Thus, the LIDI provides a context of exogenous variation in business lending which is reasonably free of anticipation effects.

We estimate the effects of the LIDI shock on deposit growth using two alternative empirical strategies. We first construct a matching-type estimator where we define our treatment group as the 207 CUs that, as a consequence of the LIDI, adopted the LID between June and September 2012 and as control group we use those CUs that already had the LID 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 characteristics to those that had the

[39] The estimated coefficients of other controls in the selection equation align with our expectations: *size*, *ROA* volatility, and *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 whereas multiple field-of-membership CUs are less likely to grant business loans.

[40] In a second robustness analysis, we reestimated Table 6 using as dependent variables the growth rates of sophisticated deposits (the sum of the components outlined in Footnote 18). We do find negative and significant coefficients for the interaction between *SBAL* and *BL*, both in the baseline models of Panels A and B and accounting for selection in Panel C, and of much higher magnitude (this is also the case for the coefficients on other controls and, especially, for *NWTA*). This aligns with our intuition that sophisticated deposits are more reactive. We take the results of this analysis, however, with some caution, since growth rates of sophisticated deposits are very volatile given the low levels of such deposits that CUs tend to have. This is also the case if we use growth rates of uninsured deposits separately.

[41] We also reestimated Table 6 with the whole universe of CUs (i.e. including credit unions with assets lower than $50 million) for the sample period 2002–2014 (the period for which the smaller credit unions reported quarterly). In that analysis we found no evidence of a negative reaction to business loans. When, instead, we used our sample of large CUs for the 2002–2014 period, the results were similar to those in Table 6, with slightly lower t-stats due to the reduced sample size. These contrasting results reinforce the argument that a large base of members who may have large amounts deposited (wealthy and sophisticated members) are key to the existence of the negative reaction effect: this is more likely the case for the larger CUs.

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

[43] 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.).

[44] In June 2012 there were a total of 2278 CUs in our sample. Thus, the proportion of CUs in our sample with the LID doubled from 9.57% to 18.80% in a single quarter.

[45] A review of the requirements can be found in https://www.ncua.gov/newsroom/Pages/NW20130807LowIncome.aspx.

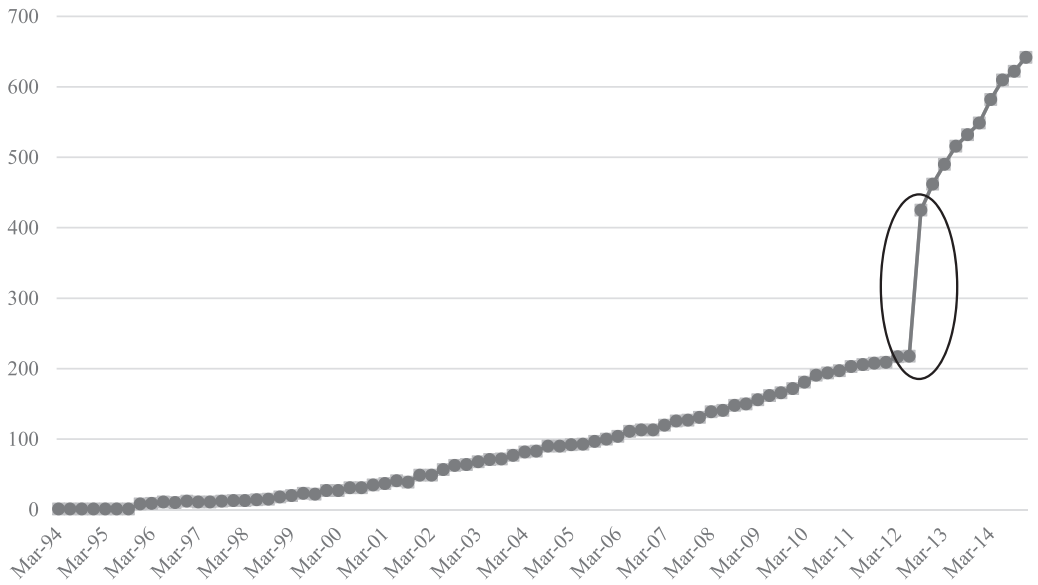


Fig. 3. Number of CUs with the low-income designation.
Source: Own calculation from the call reports extracted from NCUA (1994 – 2014). The ellipse shows the impact of the LID initiative (Sept-2012).

designation. Thus, the control group represents a correct counterfactual to the "absence of the shock", though the issue of parallel trends needs to be addressed. This control group also reduces the potential problem of the endogeneity of accepting the LID (CUs were not forced to accept it at the time of the LIDI). Given this definition of treatment and control groups, we use simple *t*-tests and compare the differences in deposit growth between the treatment and the control group around the moment of adoption of the designation. First, however, since the LID implies more flexibility to grant business loans, we test that indeed the CUs which changed their designation because of the LIDI increased their business lending comparatively more. 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 compare quarterly *BL* growth in t, t + 1, t + 2, t + 3 and t + 4, where *t* is the LIDI quarter, and the cumulative growth between quarters t and t + 1 to t + 4. The results are reported in Table 7, panel A, and suggest that CUs affected by LIDI reacted to the new condition and 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 2–4 cumulative quarters.[46] Given this evidence that the LIDI led to significant increases in business loans for the CUs affected by the initiative, we examine next the differences in deposit growth. Table 7, panel B, reports these results. We find that total deposits growth around the LIDI is significantly lower in the treatment group relative to the control group. In particular, we find a significant negative difference in deposit growth in t + 1 of − 0.38%, which is a sizable effect given the sample-wide average deposit growth of 1.5%. We also find significant negative differences in the cumulative growth at quarters t + 1 and t + 2 (the effect is estimated at around 0.4–0.6% lower growth of deposits).[47] These results suggest that CU deposits reacted negatively 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. The fact that one of the advantages of the LID is that it allows the CU to receive nonmember deposits strengthens the appeal of this result.

As an alternative empirical strategy, we use a regression-based difference-in-differences (DiD) estimator which allows us to control for observable CU characteristics. We use the same definition of treatment and control groups as before, but estimate regressions that control for risk indicators and net worth 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 and the interaction of *TA* with *pt*, which captures 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 and for pre-shock differences in deposit growth, are consistent with those of the *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 address the issue of whether members of low-income CUs are sophisticated enough to react to the low-income designation. We do that by using a measure of income level as a proxy for financial sophistication.[48] In particular, we construct the dummy variable *hi*, which takes value one if the state where the CU is located is above the median in terms of personal income and zero otherwise. We use this variable to split our sample into low-income CUs located in the wealthier states and those located in the states with lower income: we expect that the former may have a higher percentage of sophisticated (and larger) depositors. We include this variable in the DiD analysis by interacting it with *TA* and *pt*. Our coefficients of interest

[46] The other major implication of the LID is the capacity to accept nonmember deposits. We replicated the analyses in Table 8 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.

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

[48] 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.

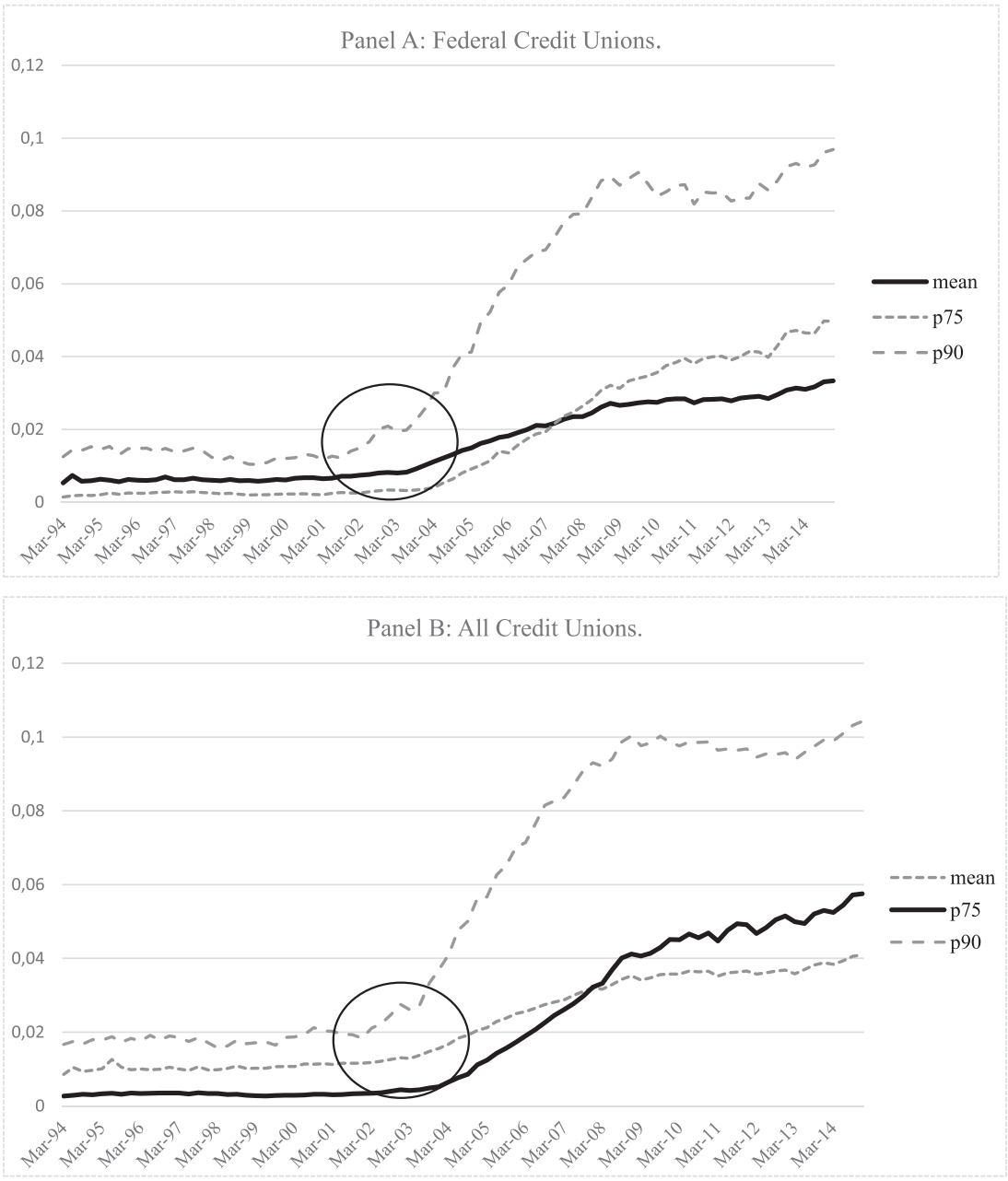


Fig. 4. Ratios of business loans over total assets.
Source: Own calculation from the call reports extracted from NCUA (1994 – 2014). The circles show the moment of introduction of regulation 68 FR 56552 by the NCUA (October 1st, 2003).

are now those of the interactions $TA \times pt$, and $TA \times pt \times hi$, where the triple interaction measures the difference in the treatment effect between the high and low income states. The results in Panel B show that the effect of the adoption of the LID is more noticeable and significant in high-income states. This 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 suggests that the results of Table 7, panel B, and Table 8, Panel A, stem mostly from the high-income states, a result consistent with negative deposit reaction to business loans likely being relevant for the more sophisticated depositors of CUs with the LID.

Given that our control group is composed of the CUs that already had the LID prior to the shock, we check for parallel trends to ensure that the two groups are similar in terms of deposit growth and only differ by the shock induced by the LIDI. Fig. 5 panel A shows, for CUs located in high income states, that the long term (1 year) growth rates of total deposits were similar for the treatment and control groups (although slightly higher for the treatment CUs) before 2012Q2 (the quarter of the LIDI).[49] In 2012Q3 there is evidence of a change in the trend for the treatment group, whose growth becomes

[49] We use high-income states given that the results in Table 8 panel B suggest that it is in these states where we find significant evidence of the discipline effect.

Table 1
Descriptive statistics.

Panel A: basic descriptive statistics of the main variables

Variables		Mean	Median	StdDev
Main dependent variables	*Δmem_dep*	0.015	0.012	0.033
	Δtot_dep	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
	NWTA	0.108	0.103	0.030
	NPL	0.010	0.007	0.009
	ch-offs	0.003	0.002	0.004
	NIM	0.009	0.009	0.002
	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
	D_BL	0.556	1	0.497
	BLG	0.387	0	0.487
	LOWBL	0.532	1	0.499
	DSBA	0.104	0	0.306
	*DSBA**	0.245	0	0.430
	SBAL	0.001	0	0.003
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

Panel B: Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
Δtot_dep	1.00	-0.06	-0.08	0.03	0.01	0.01	-0.03	-0.07	-0.12	-0.07	0.26	-0.10	0.02	0.10	0.05
CRISK3Y	-0.04	1.00	0.92	0.15	0.11	-0.21	0.22	0.24	-0.08	0.78	0.13	0.14	-0.02	-0.12	0.11
CRISK5Y	-0.06	0.93	1.00	0.17	0.12	-0.21	0.20	0.22	-0.08	0.66	0.11	0.10	-0.01	-0.10	0.11
BL	0.02	0.16	0.17	1.00	0.25	-0.05	0.07	0.07	-0.18	0.08	0.01	-0.11	0.00	0.21	0.35
loansta	0.01	0.07	0.09	0.20	1.00	0.00	0.06	0.01	-0.33	0.04	-0.01	0.38	0.01	0.07	0.17
ROA	-0.03	-0.23	-0.19	0.03	-0.01	1.00	-0.15	-0.31	0.18	-0.20	-0.15	0.20	-0.06	0.07	0.00
sdROA	-0.04	0.25	0.20	0.04	0.03	-0.17	1.00	0.63	-0.12	0.24	0.08	0.10	-0.02	-0.06	0.02
PL	-0.07	0.27	0.22	0.02	0.02	-0.31	0.66	1.00	-0.19	0.24	0.07	-0.01	-0.02	-0.06	0.02
NWTA	-0.06	0.00	0.03	0.03	-0.27	0.16	-0.10	-0.15	1.00	-0.05	-0.05	-0.10	0.01	-0–09	-0.07
NPL	-0.06	0.77	0.65	0.11	0.01	-0.23	0.30	0.29	-0.06	1.00	0.12	0.19	-0.01	-0.15	0.08
ch-offs	0.19	0.16	0.13	-0.01	-0.01	-0.22	0.13	0.14	-0.08	0.18	1.00	0.03	0.00	0.01	0.03
NIM	-0.08	0.07	0.04	-0.03	0.42	0.17	0.05	0.00	-0.05	0.10	0.05	1.00	0.02	-0.25	-0.01
chsalary	0.02	-0.01	-0.01	0.00	0.00	-0.06	-0.02	-0.02	0.01	0.00	0.00	0.03	1.00	0.00	0.00
size	0.08	-0.05	-0.04	0.10	0.06	0.04	-0.05	-0.06	-0.16	-0.10	0.03	-0.28	0.00	1.00	0.23
SBAL	0.04	0.13	0.13	0.25	0.10	0.00	0.03	0.02	-0.05	0.11	0.02	0.01	0.00	0.07	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 1994Q1 to 2014Q4, excluding the quarter-CU observations in which a CU went through a merger. 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 continuous CU-level variables are included. All correlations are significant at the 1% level. (1): *Δtot_dep*; (2) *CRISK3Y,* (3) *CRISK5Y,* (4): *BL*; (5): *loansta*; (6): *ROA*; (7): *sdROA*; (8): *PL*; (9): *NWTA*; (10): *NPL*; (11): *ch-offs*; (12): *NIM*; (13): *chsalary*; (14): *size*, (15): *SBAL*.

lower than that of the control group. This change in the trend of deposit growth is consistent with the findings in Table 7 that the CUs which adopted the LID at the time of the LIDI suffered a reduction in their deposit growth rates relative to a group of CUs whose characteristics and previous deposit growth were comparable.

b) The 2003 change in business loan requirements

We use now the introduction of regulation 68 FR 56552 by the NCUA in October 1st 2003 as a second setting where we examine the reaction of deposits to the growth of business loans. This was the first major change in business loan regulation implemented after the adoption of the Credit Union Membership Access Act in 1998. Regulation 68 FR 56552 relaxed significantly the conditions necessary for federal CUs to grant business loans (see footnote 12).[50] The new rules led to a sustained increase in the business loans to assets ratio of federal CUs, a trend which lasted until the onset of the financial crisis in 2008Q3 (see Fig. 4). As it is the case with most changes in regulation, this shock is likely not unexpected: regulation takes time to be approved and, typically, preliminary proposals are circulated and comments by those affected tend to influence the final text. However, we believe it is defendable that, at

[50] The other major change in the requirements for business loans (81 FR 13530 of March 14. 2016, applicable from January 1, 2017 on) is probably too recent to allow for a meaningful analysis. In order to prevent anticipation effects of this regulation, we stopped our sample in 2014Q4.

Table 2
Business loans and credit risk.

Panel A: levels of loan risk (NPL+ch-offs) three years forward											
Dependent variable		*CRISK3Y*									
		(1)		(2)		(3)		(4)		(5)	
Variables	Pred.	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
$loansta_{t-1}$	+	0.009***	(5.93)	0.009***	(5.89)	0.011***	(7.66)	0.011***	(7.70)	0.011***	(7.85)
BL_{t-1}	+	0.043***	(4.35)	0.037***	(4.01)	0.045***	(7.00)	0.053***	(7.92)	0.051***	(8.06)
$DSBA^*_{t-1}$				-0.004*	(−1.78)					-0.000	(−0.58)
$DSBA^*_{t-1}\times BL_{t-1}$				0.014**	(2.46)						
$DSBA_{t-1}$						-0.001***	(−6.16)			-0.001	(−1.46)
$DSBA_{t-1}\times BL_{t-1}$						0.046***	(10.03)				
$SBAL_{t-1}$								-0.008	(−0.17)	-0.009	(−0.22)
$SBAL_{t-1}\times BL_{t-1}$								0.787**	(2.02)	0.798**	(2.06)
Observations		67,875		67,875		33,672		33,672		33,672	
Adj. R-squared		0.322		0.323		0.342		0.337		0.314	
Panel B: levels of loan risk (NPL+ch-offs) five years forward											
Dependent variable		*CRISK5Y*									
		(1)		(2)		(3)		(4)		(5)	
Variables	Pred.	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
$loansta_{t-1}$	+	0.011***	(6.94)	0.011***	(6.85)	0.011***	(9.03)	0.011***	(9.22)	0.011***	(9.24)
BL_{t-1}	+	0.043***	(4.21)	0.039***	(3.41)	0.046***	(5.48)	0.049***	(6.1257)	0.049***	(6.24)
$DSBA^*_{t-1}$				-0.005**	(−2.63)						
$DSBA^*_{t-1}\times BL_{t-1}$				0.009*	(1.76)						
$DSBA_{t-1}$						-0.001***	(−4.90)			-0.001	(−1.12)
$DSBA_{t-1}\times BL_{t-1}$						0.023***	(25.06)				
$SBAL_{t-1}$								0.020	(0.48)	0.018	(0.40)
$SBAL_{t-1}\times BL_{t-1}$								0.514***	(4.36)	0.527***	(4.28)
Observations		58,383		58,383		24,253		24,253		24,253	
Adj. R-squared		0.333		0.333		0.342		0.340		0.319	
CU and Time FE		YES		YES		YES		YES		YES	
CU and Macro controls		YES		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: $MFOM_{t-1}$, $Mstate_{t-1}$, ROA_{t-1}, $NWTA_{t-1}$, NIM_{t-1}, $loansta_{t-1}$, $size_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

least, this regulatory shock is exogenous to the changes in deposits, since it was not motivated by considerations related to the deposit or financing situation of the CUs but, rather, it was intended as a flexibilization of the asset side. Also, it is not clear that CU members could anticipate that their CU would be among those who would increase more their business loans as a result of the change in regulation (which is how we identify the control/treatment groups).

As in the LIDI, we first identify treatment and control groups which can be adequately compared. Given that in this context there is no clear definition of the treatment group, we follow two alternative strategies. 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). As control group we use nearest-neighbor matches extracted from the rest of federal CUs. In the matching process we require exact matches for the state, quarter of observation and field of membership and closest matches based on the same quarter value of *BL*, *size*, *ROA*, *NWTA, NPL*, *ch-offs*, *loansta*, *chsalary* and *intrates*. In order to control for differences in the matched groups, which now are potentially more relevant than in the case of the LIDI, we use the bias-adjusted estimator of Abadie and Imbens (2011). We test for significant differences in the growth in total deposits in t + 1 to t + 4 as well as for 1–4 cumulative quarters. The results from these estimators are reported in Table 9. These results show evidence that the growth in deposits is significantly lower for the treatment group in the quarter after the "shock" (1% lower deposit growth) and cumulatively for one, two and three quarters (1%, 1.2% and 1.6% lower deposit growth, respectively). Interestingly, this is so despite the fact that, per our definition, these were the CUs which expanded more significantly their business loans (asset side).

We also estimate DiD regressions where we take the treatment group (*TB*=1) to be the same as in Table 9, namely the 10% CUs which experienced higher increases in business loans. For the control groups (*TB*=0), we use two alternatives. First (Panel A of Table 10), we take all other federal CUs as controls (i.e. those below the 90% highest increase in business loans). Second (Panel B of Table 10) we take as controls 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 in each panel: 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 columns 2, 3, 4 use windows of two, three and four quarters, respectively. 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. The estimates suggest that 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 provide some evidence consistent with the parallel trend assumption for our treatment and control groups in Panel B of Fig. 5, which shows the 1-year growth in deposits for the treatment and control groups. The treatment group is defined as in Table 9 and it is composed by the 10% federal CUs with highest increase in business loans in 2003Q4 and 2004Q1. The control group is composed of the matched credit unions (nearest-neighbor matched CUs extracted from the 90% federal credit unions with lower increase in business loans). The graph shows that before 2003Q4 the treatment and control groups were

Table 3
Business loan growth 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-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
$loansta_{t-1}$	+	0.010***	(5.74)	0.010***	(5.72)	0.011***	(11.15)	0.011***	(11.16)
BL_{t-1}	+	0.033***	(3.96)	0.035***	(4.32)	0.049***	(8.82)	0.051***	(8.21)
BLG_{t-1}	+	–0.001***	(−6.26)	-0.001***	(−5.99)	-0.001***	(−4.18)	-0.001***	(−4.12)
$LOWBL_{t-1}$	–	–0.002***	(−4.79)	-0.001***	(−3.22)	-0.001***	(−7.40)	-0.001***	(−4.90)
$BLG_{t-1}\times LOWBL_{t-1}$	+	0.001***	(4.74)	0.001***	(2.74)	0.001***	(4.93)	0.001***	(3.12)
$BL_{t-1}\times BLG_{t-1}$	+			-0.004***	(−4.62)			-0.003**	(−2.22)
$BL_{t-1}\times LOWBL_{t-1}$	+			0.009	(0.10)			-0.010	(−0.17)
$BL_{t-1}\times BLG_{t-1}\times LOWBL_{t-1}$	+			0.034	(0.32)			0.051	(0.87)
Observations		33,817		33,817		19,346		19,346	
Adj. R-squared		0.340		0.341		0.360		0.361	
Panel B: levels of loan risk (NPL+ch-offs) five years forward									
Dependent variable		*CRISK5Y*							
		(1)		(2)		(3)		(4)	
Variables	Pred.	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
$loansta_{t-1}$	+	0.011***	(7.23)	0.011***	(7.24)	0.010***	(9.34)	0.010***	(9.40)
BL_{t-1}	+	0.033***	(3.22)	0.035***	(3.37)	0.047***	(7.05)	0.048***	(6.93)
BLG_{t-1}	+	-0.000***	(−3.83)	-0.000***	(−4.32)	-0.000***	(−7.70)	-0.001***	(−5.31)
$LOWBL_{t-1}$	–	-0.001**	(−2.10)	-0.001	(−1.42)	-0.001***	(−5.55)	-0.001***	(−5.02)
$BLG_{t-1}\times LOWBL_{t-1}$	+	0.001***	(4.08)	0.001*	(1.79)	0.001***	(3.91)	0.001*	(1.89)
$BL_{t-1}\times BLG_{t-1}$	+			-0.003***	(−3.04)			-0.002***	(−4.35)
$BL_{t-1}\times LOWBL_{t-1}$	+			-0.100***	(−2.90)			-0.050***	(−3.25)
$BL_{t-1}\times BLG_{t-1}\times LOWBL_{t-1}$	+			0.152***	(3.29)			0.077***	(3.24)
Observations		27,823		27,823		13,364		13,364	
Adj. R–squared		0.346		0.346		0.357		0.357	
CU and Time FE		YES		YES		YES		YES	
CU and Macro controls		YES		YES		YES		YES	
SBA controls		NO		NO		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: $MFOM_{t-1}$ $Mstate_{t-1}$, ROA_{t-1}, $NWTA_{t-1}$, NIM_{t-1}, $loansta_{t-1}$, $size_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. $DSBA_{t-1}$ and $SBAL_{t-1}$ are included as further controls when explicitly stated in the last row of the table. *BLG* is a dummy equal to 1 when *BL* growth is positive and higher than loan growth for a specific quarter, 0 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, 0 otherwise. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

relatively similar in trend, even though there was a level shift. After 2003Q4 the slope for the control group changes (from negative to positive) whereas that of the treatment group continues to be negative. This suggests that, after the new regulation, the two groups diverged and the CUs which increased their business lending after October 2003 experienced lower growth rates of deposits.

6. Concluding remarks

In this paper we have provided two main results on the implications of the business loan activity of CUs. First, we have shown that business loans in CUs are significantly riskier than other types of loans. This result holds even for CUs which are partners of the SBA and, therefore, which arguably have more support and an explicit interest in commercial lending. Moreover, our results suggest that SBA support may have an interesting dynamic effect, in that it seems to lead to a short-term increase in risky commercial lending (which we termed *overconfidence*) which diminishes or reverses over time (*learning*). Our results also suggest that business loans may be related to subsequent lower levels or decreases of a CU's net worth. Overall, the increased risk of business loans justifies the regulatory emphasis on such loans as a means to protect CU members. Motivated by the findings of the first part of our analysis, we then explore whether expansions of the business loan portfolio are negatively correlated with subsequent growth rates of deposits. Our descriptive analyses find evidence of such negative correlation, a finding which is similar in spirit to that of the banking literature. Two final quasi-experimental analyses suggest that some of this correlation may stem from a causal reaction of deposits to business loans, a mechanism which may provide ex-ante incentives for CUs to limit their risky business lending.

We believe that the results in our paper are important for understanding the implications of the commercial lending activity of US credit unions. On the one hand, the strong evidence on the higher risk of business lending suggests that CUs still can profit both from explicit regulation –including limits to business lending and increased operational requirement- and from support programs such as the SBA partnership. On the other hand, the tentative finding that CU deposits may react negatively to these loans suggests that there exist market-based mechanisms, additional to regulation and supervision, which provide proper incentives for keeping CU risk-taking in check.

Our results open several potentially fruitful avenues of research: first, given that the limits of CU business lending were originated by the willingness to preserve the activity of commercial banks, the extent of the (local) competition by the banking system should be a mediating factor in the risk of the CU's commercial lending; second, a more in-depth look at the dynamic effect of the partnership with the SBA –or with other guarantors- may be key to our understanding of the risk of business lending; third, our anecdotal stories in Appendix B suggest that expansion of the business lending away from the local market or from the traditional field-of-membership members may be one of the main

Table 4
Matching estimators of the effect of business loans on future average credit risk.

Panel A: baseline effects of business loans on credit risk

		M= 1		**M= 2**	
Year	Prediction	Difference	p-value	Difference	p-value
t + 1	+	**0.004**	**0.000**	**0.005**	**0.000**
t + 2	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 3	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 4	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 5	+	**0.003**	**0.000**	**0.003**	**0.000**

Panel B: effects on credit risk (controlling for high–risk loans)

		M= 1		**M= 2**	
Year	Prediction	Difference	p-value	Difference	p-value
t + 1	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 2	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 3	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 4	+	**0.003**	**0.000**	**0.004**	**0.000**
t + 5	+	**0.003**	**0.000**	**0.003**	**0.000**

Panel C: effect on business loans on credit risk for CUs with no SBA–loans

		M= 1		**M= 2**	
Year	Prediction	Difference	p-value	Difference	p-value
t + 1	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 2	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 3	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 4	+	**0.004**	**0.000**	**0.004**	**0.000**
t + 5	+	**0.003**	**0.000**	**0.003**	**0.000**

Panel D: effect of business loans on credit risk for CUs with high SBA–loans

		M= 1		**M= 2**	
Year	Prediction	Difference	p-value	Difference	p-value
t + 1	+	**0.002**	**0.004**	**0.002**	**0.011**
t + 2	+	**0.001**	**0.030**	0.001	0.120
t + 3	+	0.001	0.310	0.000	0.584
t + 4	+	-0.000	0.858	-0.000	0.650
t + 5	+	**-0.001**	**0.046**	**-0.002**	**0.034**

Matching estimators of the difference in average credit risk (NPL+Charge offs over total loans) for 1, 2, 3,4 and 5 years between treatment and control groups. Panel A: Treatment group is composed of the credit unions with larger proportion of business loans over total loans (above the 10% percentile); the control group are observable-matched CUs from the 10% CUs with lower proportion of business loans over total loans. Panel B: Treatment group is composed of CUs in the upper 10% of the proportion of business loans over total loans and with proportion of high-risk loans (real estate, auto, credit card) over loans below the median; the control group are observable-matched CUs from the 10% CUs with lower proportion of business loans over total loans and proportion of high-risk loans (real estate, auto, credit card) above the median. Panel C: Similar to panel A but both groups treatment and control are composed only for credit unions without SBAs. Panel D: treatment group is composed of the credit unions with more SBAs (above the 90% percentile) and more BL (above the 90% percentile); The control group are the credit unions with more BL (above the 90% percentile) but without SBAs. Exact matching for both panels is required for State, FOM (Field of Membership), Charter (Federal or state chartered) and quarter. Estimates shown correspond to the bias-adjusted estimator of the Average Treatment Effect on the Treated of Abadie and Imbens (2011). M= 1,2 denotes the number of matches found for each observation in the treatment group.

Table 5
Evidence on the negative relationship between business loans and net worth.

Panel A: business loans and average net worth loans

	no *BL* (0) vs positive *BL* (1)		q1BL (0) vs q4BL (1)	
	(1)		(2)	
Group	N	Average *NWTA*	N	Average *NWTA*
0	67,757	0.112	21,280	0.108
1	85,004	0.105	21,280	0.104
Diff (1–0)		-0.007***		-0.004***
p-value		0.000		0.000

Panel B: regression models of net worth as a function of business loan levels

Dep. variable	$NWTA_t$		$NWTA_{t+1}$		$NWTA_{t+2}$	
	(1)		(2)		(3)	
	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
BL_{t-1}	-0.013**	(−2.50)	-0.009*	(−1.81)	-0.005	(−1.06)
N	80,278		78,078		75,964	
CU and time FE	YES		YES		YES	
CU and macro controls	YES		YES		YES	

Panel C: logit models of the effect of increases in business loans on the probability of net worth decreases

Dep. variable	$D(\Delta NWTA_t<0)$		$D(\Delta NWTA_{t+1}<0)$		$D(\Delta NWTA_{t+2}<0)$	
	(1)		(2)		(3)	
	Coeff	z-stat	Coeff	z-stat	Coeff	z-stat
$D(\Delta BL_{t-1}>0)$	0.071***	(3.30)	0.047***	(2.74)	0.033**	(2.03)
N	80,033		78,118		76,258	
CU and time FE	YES		YES		YES	
CU and macro controls	YES		YES		YES	

Panel A: tests of the difference in NWTA for CUs on the basis of business loans. Column 1 compares the average NWTA for CUs without business loans (Group 0) and with business loans (Group 1). Column 2 compares the average NWTA for CUs in the lower quartile of the distribution of positive BL (Group 0) with CUs in the upper quartile of the distribution of positive BL (Group 1). The lower rows of the table contain the value of the difference and the p-value of significance test. Panel B: regression models where the dependent variable is the level of net worth of the CU (NWTA) in quarters t (column 1), t + 1 (column 2) and t + 2 (column 3). CU and macro controls: $S\&D_{t-1}$, $loansta_{t-1}$, ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, NPL_{t-1}, $ch\text{-}offs_{t-1}$, $chsalary_{t-1}$, $size_{t-1}$ $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. See Appendix A for variable definitions. t-statistics are based on standard errors clustered by credit union and quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. Panel C: logit models where the dependent variable is a dummy equal to one if the net worth of the CU (*NWTA*) decreases in quarters t (column 1), t + 1 (column 2) and t + 2 (column 3). The main regressor $D(\Delta BL_{t-1}>0)$ is a dummy equal to one if the business loans of the CU went up in quarter t-1. CU and macro controls: $S\&D_{t-1}$, $loansta_{t-1}$, ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, NPL_{t-1}, $ch\text{-}offs_{t-1}$, NIM_{t-1}, $chsalary_{t-1}$, $size_{t-1}$, $intrates_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. The sample in Panels B and C is restricted to CUs with positive levels of *BL*. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. The logit regression in panel C uses bootstrap standard errors.

sources of the increased risk of business lending; fourth, our results on the negative relationship between deposit growth and business loans may be given further attention, especially by examining depositor (member) heterogeneity.

Finally, the results in this paper have implications regarding policy design and the stability of the financial system: (i) regulations intended to expand the services offered by financial institutions may have, beyond the main intended direct or short-term social benefit, unintended indirect or long-term risk implications which should be considered by the regulator; (ii) different types of financial institutions may differ significantly in their relative advantages, so setting limits to some components of their activity may be an effective way of reducing the overall risk of the system; (iii) market-based stabilizing mechanisms may provide effective ex-ante incentives to control risk-taking even to the more traditional depository institutions.

Table 6
Descriptive models of depositor reaction: the response of deposits to business loans.

Panel A: growth of member deposits

Dependent variable		Δ*mem_dep*									
		(1)		(2)		(3)		(4)		(5)	
	Pred	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$loansta_{t-1}$		0.036***	(13.54)	0.036***	(9.87)	0.033***	(9.22)	0.038****	(9.93)	0.036***	(9.05)
BL_{t-1}	−	-0.011**	(−2.21)	-0.018***	(−3.06)	-0.013**	(−2.00)	-0.021***	(−3.37)	-0.018***	(−2.83)
$SBAL_{t-1}$	+			0.077	(1.11)	0.077	(1.04)				
$SBAL_{t-1}\times BL_{t-1}$	−			-0.462	(−0.85)	-0.413	(−0.76)				
$NWTA_{t-1}$		0.158***	(13.61)	0.266***	(11.38)	0.280***	(10.72)	0.269***	(12.58)		
Observations		141,276		87,848		57,003		80,278		48,494	
CU and Time FE		YES		YES		YES		YES		YES	
CU and macro controls		YES		YES		YES		YES		YES	
$D\_BL = 1$		NO		NO		YES		NO		YES	
$DSBA = 0$		NO		NO		NO		YES		YES	
Adj. R-squared		0.369		0.374		0.368		0.373		0.365	

Panel B: growth of total deposits

Dependent variable		Δ*tot_dep*									
		(1)		(2)		(3)		(4)		(5)	
	Pred	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$loansta_{t-1}$		0.038***	(14.55)	0.039***	(10.76)	0.038***	(10.41)	0.041***	(10.89)	0.040***	(10.23)
BL_{t-1}	−	-0.010**	(−1.98)	-0.015**	(−2.57)	-0.011	(−1.64)	-0.017***	(−2.71)	-0.015**	(−2.25)
$SBAL_{t-1}$	+			0.076	(1.12)	0.081	(1.11)				
$SBAL_{t-1}\times BL_{t-1}$	−			-0.542	(−0.98)	-0.497	(−0.89)				
$NWTA_{t-1}$		0.164***	(13.71)	0.274***	(11.53)	0.292***	(10.75)	0.277***	(12.80)	0.301***	(12.43)
Observations		141,276		87,848		57,003		80,278		48,494	
CU and Time FE		YES		YES		YES		YES		YES	
CU and macro controls		YES		YES		YES		YES		YES	
$D\_BL = 1$		NO		NO		YES		NO		YES	
$DSBA = 0$		NO		NO		NO		YES		YES	
Adj. R-squared		0.365		0.369		0.362		0.369		0.359	

Panel C: sample selection models

	All CUs						*CUs with no SBAs*					
	Selection equation		*Observation equations*				*Selection equation*		*Observation equations*			
Dependent variable	*D_BL*		Δ*mem_dep*		Δ*tot_dep*		*D_BL*		Δ*mem_dep*		Δ*tot_dep*	
	(1)		(2)		(3)		(4)		(5)		(6)	
Variables	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat	Coeff	t-stat
$loansta_{t-1}$	1.934***	(49.95)	0.030***	(7.74)	0.034***	(8.72)	1.934***	(49.93)	0.035***	(11.20)	0.038***	(12.02)
BL_{t-1}			-0.008	(−1.04)	-0.009	(−1.13)			-0.014**	(−2.31)	-0.016**	(−2.53)
$SBAL_{t-1}$	16.041	(0.54)	0.167	(1.26)	0.182	(1.44)						
$SBAL_{t-1}\times BL_{t-1}$			-2.678**	(−2.06)	-2.738**	(−2.15)						
$NWTA_{t-1}$	-2.207***	(−14.95)	0.245***	(8.53)	0.259***	(8.85)	-1.394***	(−10.76)	0.179***	(9.69)	0.186***	(9.80)
Lambda (Mills ratio)			-0.001***	(−3.88)	-0.002**	(−4.03)			-0.002***	(−5.22)	-0.002***	(−5.34)
Observations	48,356		29,625		29,625		85,910		45,399		45,399	
CU and macro controls	YES		YES		YES		YES		YES		YES	
CU and time FE	NO		YES		YES		NO		YES		YES	
$DSBA = 0$	NO		NO		NO		YES		YES		YES	

Panels A and B: Fixed-effects panel regressions of member (Panel A) and total (Panel B) deposit growth on CU characteristics. Columns 3 and 5 include the condition that $D\_BL = 1$. *D_BL* 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). Columns 4 and 5 include the condition that $DBA = 0$. *DBA* is a dummy that takes value 1 when the CU has SBA-backed loans, 0 otherwise (the regression is run only for CUs without SBA loans). Controls are: ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, $NWTA_{t-1}$, NPL_{t-1}, *ch-offs*$_{t-1}$, NIM_{t-1}, *chsalary*$_{t-1}$, *size*$_{t-1}$, *intrates*$_{t-1}$, *chinc_s*$_{t-1}$, *unemp_s*$_{t-1}$,*inf_s*$_{t-1}$ and $DSBA_{t-1}$ in columns 2 and 3. See Appendix A for variable definitions. *t*-statistics are based on standard errors clustered by credit union and quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level. Panel C: Heckman two-step selection models. Columns 1–3 estimate the selection model for the complete sample. Columns 4–6 estimate the selection model with the condition that $DSBA = 0$ (CUs without SBA loans). Selection equations (columns 1 and 4): Probit model for *D_BL* as a function of *CU* characteristics. Controls are: ROA_{t-1}, $sdROA_{t-1}$, NPL_{t-1}, NIM_{t-1}, *size*$_{t-1}$, *intrates*$_{t-1}$, *chinc_s*$_{t-1}$, *unemp_s*$_{t-1}$, *inf _s*$_{t-1}$, LID_t and $MFOM_t$. Observation equations (columns 2–3 and 5–6): Fixed-effects panel regression of member and total deposits growth on CU characteristics given selection into offering business loans. Controls in columns 2–3 and 5–6 are: ROA_{t-1}, $sdROA_{t-1}$, PL_{t-1}, *ch-offs*$_{t-1}$, NPL_{t-1}, NIM_{t-1}, *size*$_{t-1}$, *chsalary*$_{t-1}$, *intrates*$_{t-1}$, *chinc_s*$_{t-1}$, *unemp_s*$_{t-1}$,*inf_s*$_{t-1}$ and $DSBA_{t-1}$ in columns 2–3. 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 7
The change to a low-income designation: effect on growth in business loans and total deposits of the LIDI "experiment".

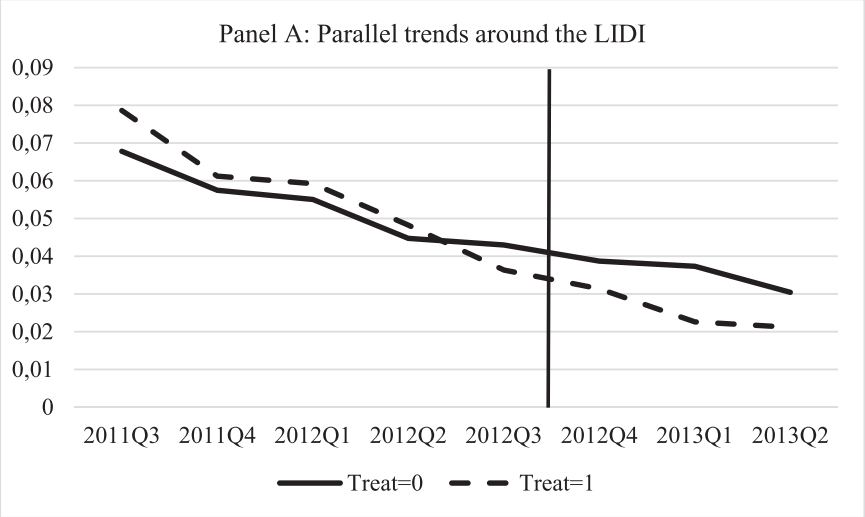
Panel A: growth in business loans						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t	+	**0.0656**	**0.014**	0q	**0.0656**	**0.014**
t + 1	+	-0.0297	0.148	1q	0.0339	0.214
t + 2	+	**0.0821**	**0.009**	2q	**0.1212**	**0.025**
t + 3	+	-0.0027	0.475	3q	**0.1427**	**0.040**
t + 4	+	-0.0308	0.361	4q	0.1516	0.070
Panel B: growth in total deposits						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t + 1	–	**-0.0038**	**0.046**	1q	**-0.0038**	**0.046**
t + 2	–	**-0.0005**	0.422	2q	**-0.0054**	**0.046**
t + 3	–	**0.0018**	0.256	3q	-0.0061	0.082
t + 4	–	**-0.0015**	0.212	4q	-0.0045	0.190

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 designated in 2011Q1 and continue to be low-income designated 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 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 designated in 2011Q3 and continue to be low-income designated 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: DiD estimators of the impact on growth in total deposits of the LIDI "experiment".

Panel A: Baseline specification							
Dependent variable				Δ*tot_dep*			
		(1)		(2)		(3)	
Variables	Prediction	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
TA		0.000	(0.10)	0.002	(1.07)	0.001	(0.70)
Pt		0.005	(1.13)	-0.011***	(−5.19)	-0.006***	(−3.68)
TA × *pt*	–	-0.000	(−0.15)	-0.005*	(−1.75)	-0.002	(−0.78)
Control variables		YES		YES		YES	
Observations		801		1599		2395	
Adj. R-squared		0.071		0.349		0.277	
Panel B: controlling for income level							
Dependent variable				Δ*tot_dep*			
		(1)		(2)		(3)	
Variables	Prediction	Coefficient	t-stat	Coefficient	t-stat	Coefficient	t-stat
TA		-0.003	(−1.09)	-0.001	(−0.62)	-0.000	(−0.22)
Pt		0.005	(1.04)	-0.013***	(−5.03)	-0.007***	(−3.02)
Hi		-0.005	(−1.42)	-0.006**	(−2.19)	-0.000	(−0.12)
TA × *pt*		0.004	(0.97)	0.000	(0.07)	-0.000	(−0.10)
TA × *hi*		0.010**	(2.10)	0.010**	(2.54)	0.005	(1.60)
pt × *hi*		0.003	(0.63)	0.006	(1.48)	0.000	(0.07)
TA × *pt* × *hi*	–	-0.014**	(−2.13)	-0.014***	(−2.64)	-0.005	(−1.02)
Control variables		YES		YES		YES	
Observations		801		1599		2403	
Adj. R-squared		0.075		0.352		0.277	

Panel A: DiD regressions of total deposit growth around the LIDI experiment. Regression specifications include only the treatment variable *TA* and "post" variable *pt*. Panel B: DiD regressions of total 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}, $PL_{t-1}\times sdROA_{t-1}$, $NWTA_{t-1}$, NPL_{t-1}, $ch\text{-}offs_{t-1}$, NIM_{t-1}, BL_{t-1}, $DSBA^{*}_{t-1}$, $SBAL_{t-1}$, $loansta_{t-1}$, $size_{t-1}$, $chsalary_{t-1}$, $intrates_{t-1}$, $chinc\_s_{t-1}$, $unemp\_s_{t-1}$ and inf_s_{t-1}. See Appendix A for variable definitions. *t*-statistics are based on standard errors clustered by credit union and quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.



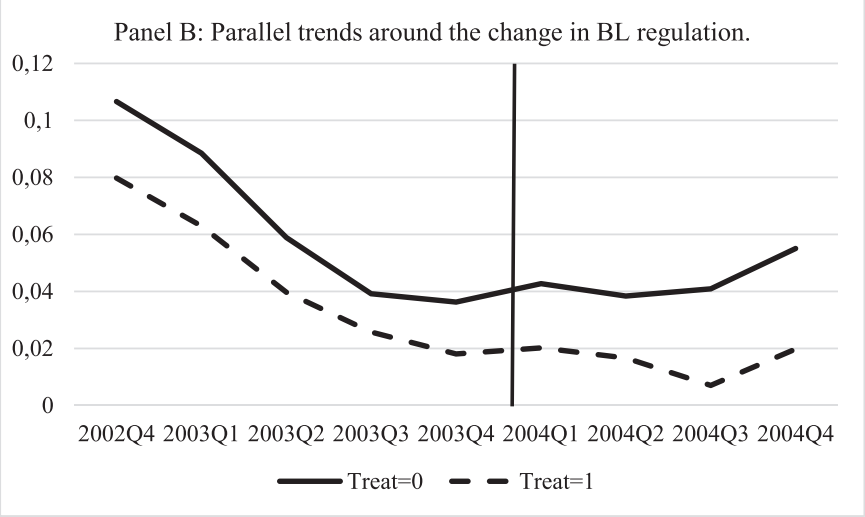


Fig. 5. Evolution of deposit growth for treatment and control groups in the two quasi-experimental analyses. Panel A: trends in long-term total deposit growth around the LIDI (Third quarter of 2012) for the identified treatment and control groups. Panel B: trends in long-term total deposit growth around the change in business loans regulation (October 1st 2003). Both panels use the long-term change in total deposits (1-year change). Panel A: For CUs located in high-income States, the treatment group is composed of the CUs that adopted the LID between 2012Q2 and 2012Q3; the control group is composed of the CUs that already had the LID before the LIDI. Panel B: the treatment group is composed of the 10% federal CUs which experienced a higher increase in business loans between 2003Q4 and 2004Q1; the control group is composed of the nearest-neighbor matches to the treated CUs extracted from the 90% federal CUs which experienced lower increase in business loans in the same period.
Source: Own calculation from the call reports extracted from NCUA (1994 – 2014).

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

Growth in total deposits						
Quarter	Prediction	Difference	p-value	Quarter	Difference	p-value
Quarter by quarter effects				Cumulative effects		
t + 1	–	**-0.0106**	**0.016**	1q	**-0.0106**	**0.016**
t + 2	–	-0.0033	0.268	2q	**-0.0123**	**0.038**
t + 3	–	0.0035	0.265	3q	**-0.0159**	**0.031**
t + 4	–	0.0010	0.718	4q	-0.0127	0.124

Matching estimators of the difference in growth in total 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, $NWTA_t$, 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: DiD estimators of the effect on growth in total deposits.

Panel A: control group are all federal CUs not in treatment group

		(1)		(2)		(3)		(4)	
Dependent variable		Δ*tot_dep*		Δ*tot_dep*		Δ*tot_dep*		Δ*tot_dep*	
Variables	Prediction	Coefficient	t-stat	Coefficient	Coefficient	Coefficient	t-stat	Coefficient	t-stat
TB		0.000	(0.14)	0.001	(0.71)	0.017***	(18.37)	0.009***	(12.51)
pt		-0.004	(−1.36)	0.005***	(5.97)	-0.002***	(−2.97)	-0.005***	(−7.27)
TB × *pt*	–	-0.000	(−0.01)	-0.002	(−0.75)	-0.016***	(−10.27)	-0.008***	(−6.11)
Controls included		YES		YES		YES		YES	
Observations		3385		6706		10,092		13,389	
Adj. R-squared		0.074		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		Δ*tot_dep*		Δ*tot_dep*		Δ*tot_dep*		Δ*tot_dep*	
TB10		-0.005*	(−1.84)	-0.003	(−1.30)	0.007***	(5.07)	0.004***	(3.73)
pt		-0.010*	(−1.70)	0.002	(0.70)	-0.009***	(−4.91)	-0.010***	(−6.07)
TB10 × *pt*	–	0.004	(1.07)	0.001	(0.54)	-0.007***	(−3.01)	-0.004**	(−2.11)
Controls included		YES		YES		YES		YES	
Observations		680		1354		3237		5017	
Adj. R-squared		0.072		0.091		0.336		0.298	

Panel A: DiD regressions of total deposits growth around the 2003 change in business loan regulation. 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: DiD regressions of total deposits growth around the 2003 change in business loan regulation. 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}×$sdROA_{t-1}$, $NWTA_{t-1}$, NPL_{t-1}, $ch\text{-}offs_{t-1}$, NIM_{t-1}, $DSBA^*_{t-1}$, 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. *t*-statistics are based on standard errors clustered by credit union and quarter. *, **, *** denote significance (based on two-tail tests) at 10%, 5% and 1% level.

Appendix A. Variable definitions

	Variable	Definition
Main dependent variables	Δ*mem_dep*	Quarter-on-quarter growth of member deposits of the CU.
	Δ*tot_dep*	Quarter-on-quarter growth of total (member and non-member) deposits of the CU.
	CRISK	Future credit risk (3years or 5years) measured as the average value of the quarterly observations of (NPL + *ch-offs*) over the following 3 or 5 years.
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	Natural logarithm of 1 plus the number of quarters in which the CU obtained losses (from t-1 to t-12).
	NWTA	Net worth over total assets
	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.
	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 deposits paid by the CU computed as (Dividends on member deposits + Interest on deposits)/Total deposits.
	Mstate	Dummy with value 1 if the CU operates in more than one state, 0 otherwise.
	com	Dummy with value 1 when the CU is community-based, 0 otherwise.
	MFOM	Dummy with value 1 when the CU has a multiple field of membership, 0 if community or single field of membership.
	SBAL	Total SBA loans in quartert t / Total loans in quarter t
	DSBA	Dummy with value 1 when the CU has SBA loans, 0 when the CU does not have SBA. Missing when there is no SBA data.
	*DSBA**	Dummy with value 1 for CUs that grant SBA loans at any moment during the sample period, 0 for CUs that do not.
	D_BL	Dummy with value 1 when the CU has *BL*> 0, 0 otherwise.
	BLG	Dummy with value 1 when business loan growth is positive and higher than loan growth for a specific quarter, 0 otherwise.
	LOWBL	Dummy with 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 of the CU headquarters.
	unemp_s	Unemployment rate in the state of the CU headquarters.
	inf_s	Inflation rate in the census region of the CU headquarters.
	hi	Dummy with value 1 if the state where the CU is located is above the median in terms of personal income, 0 otherwise.

Appendix B. Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.jfs.2021.100932.

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