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ORIGINAL RESEARCH

The market for private student loans: an analysis of credit union exposure, risk, and returns

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Abstract Beginning in 2011, credit unions in the United States have been required to report in their quarterly call reports their holdings of private student loans. Since this time, private student loans have been the fastest growing loan product among credit unions. The empirical results here indicate credit unions respond to external market forces and internal exposure to interest rate risk in their decision to hold private student loans. The effect of which, to date, has led to lower returns on their assets and no effect on overall risk. Credit unions looking to diversify their loan portfolio should do so with caution. Private student loans being in deferral reduce both delinquency and charge-off rates, which will rise over time with their seasoning and as interest rates rise.

Keywords Credit unions · Private student loans · Risk · Performance

JEL classification G21

1 Introduction

There is growing concern that the current market for student loans bears similarities to the pre-crisis mortgage market, whereby easy access to credit has led to higher tuition prices and over extended borrowers.[1] Financial institutions exposed to non-federally guaranteed student loans, hereafter referred to as private student loans (PSL), are potentially at risk. Yet despite the concern that student loan debt may be the next financial crisis, very little is

[1] Sheila Bair, former FDIC Chairman (2006–2011), has been vocal in this comparison, which is noteworthy given she warned in a September 2006 public speech of issues with relaxed underwriting standards in non-traditional loan products (see Nasiripour 2016).

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known about the market for private student loans, in large part because of the lack of publicly available data. Credit unions, unlike commercial banks, though have been required since 2011 to publicly disclose their holdings of PSL in quarterly call reports to the National Credit Union Administration (NCUA).[2] During this period, PSL has been the fastest growing asset class among credit unions, increasing from 1.03 billion dollars at the end of March 2011 to 3.53 billion dollars at yearend 2015. Credit unions' growth in this market is noteworthy as a number of major commercial banks including JP Morgan Chase, US Bancorp, Bank of America, and Citigroup have decided to leave the PSL market entirely.

It is not surprising credit unions find PSL an appealing asset, given they are subject to greater interest rate risk than commercial banks and are more dependent on net-interest margins for income.[3] Real estate loans make up 51% of the loans held by credit unions with 59% of first mortgage loans at fixed rates, 25% at a hybrid/balloon rate, and 16% at an adjustable rate (NCUA 2014a). The returns on fixed-rate mortgages remain the same when interest rates rise, whereas the expense of variable rate deposits increase, negatively affecting credit union returns. Unlike mortgage loans, PSL are typically originated with variable interest rates, thus increasing their share among loans reduces sensitivity to interest rate risk, the most significant risk the credit union industry currently faces (NCUA 2014b). Reducing interest rate risk by adding PSL to the loan portfolio might seem wise in the current low rate environment, where expectations are for rates to rise, albeit modestly, in the future.

The concern of regulators (NCUA 2013, 2014b) is whether credit unions fully understand the unique characteristics and risks associated with PSL that differ from other typical consumer loans. One such feature of PSL is that students are able to defer repayment of interest and principal while enrolled in school as interest accrues and is capitalized into the loan amount. The effect is that delinquency and charge-off rates may be lower for a portfolio of PSL, relative to another loan category, simply as a result of PSL loans being in deferral. What also remains unclear is whether credit unions benefit from the diversification of income sources by adding this new loan category.

Previous research has shown the effect of diversification on financial institution performance is not homogenous. Stiroh (2004) and DeYoung and Rice (2004) find that diversification of the loan portfolio across loan categories increases risk adjusted returns of U.S. banks. The effect though varies by loan category. Banks that diversify from real estate loans by increasing their concentration in commercial and industrial loans have lower risk adjusted returns, as do banks that increase their concentration in consumer loans, but with less of an effect (Stiroh 2004). Esho et al. (2005) examine credit unions in Australia and find that institutions with diversified sources of income face both lower returns and risk. Similarly, the effect varies by the source of income concentration. Diversifying away from consumer loans by increasing the share of income from interest on real estate loans is shown to reduce both risk and returns, whereas increasing the share of income from fees increases risk and lowers returns. Diversifying into non-traditional banking activities that generate non-interest income from fees has also been shown to reduce returns among U.S. credit unions (Goddard et al. 2008), while having a non-linear effect on the returns of

[2] As of 2011 there were 510 credit unions with PSL in their loan portfolio. Fourteen credit unions had PSL concentrations greater than 10% of loans, with the largest concentration at 34%.

[3] Commercial banks are less dependent than are credit unions on traditional intermediation activities. The mean ratio of non-interest income to operating income for credit unions is 11.68% (Goddard et al. 2008) over the period 1993–2004, whereas for commercial banks DeYoung and Rice (2004) show the ratio increases from 24.6% in 1984 to 42.2% in 2001.

international banks (Gambacorta et al. 2014).[4] The take away is that adding an asset category to the portfolio may not improve performance.

This paper contributes to the literature in three ways. First, we explore the factors that affect credit union involvement and concentration of the loan portfolio in private student loans. Tripp and Smith (1993) conducted a similar analysis where their focus was on identifying the factors influencing credit unions becoming involved in the mortgage market following regulatory changes in the late 1970s and early 1980 s. To our knowledge there have been no studies that have examined credit unions, or other depository institutions, to determine the forces driving involvement and concentration in PSL. Our findings indicate internal exposure to interest rate risk is a deciding factor, yet more important is having what we refer to as a comparative advantage in PSL. These are credit unions that have an education field of membership or are in close proximity to a college campus. Having an education field of membership, increases the probability of holding PSL by 3.8 percentage points, whereas proximity to campus increases the probability by 2.3 percentage points—both are rather large effects given 13% of credit unions hold PSL in 2015. If PSL poses a risk to the industry, then the NCUA should concentrate their oversight on this subset of credit unions.

Second, the literature has shown that increasing concentration in a particular asset may either positively or negatively affect the performance of depository institutions, depending on the asset, yet to date there has been no consideration of the effects of PSL on performance. Our findings indicate PSL concentration did not affect risk at credit unions for the period 2011–2015, but returns on assets are shown to be reduced by 1.6 basis points for each 1% increase in PSL concentration. The explanation for the latter finding is that by entering the private student loan market credit unions have had to add staff and resources to support the origination and servicing of a new loan class, which resulted in higher non-interest expenses that lowered returns. Third, we provide details as to why there should be concern in the long-run regarding the unique features of private student loans—PSL portfolios of credit unions are shown to have lower delinquency and charge-off rates than other loans only because of PSL being in deferral. If PSL were not in deferral, charge-off rates would nearly double.

The format of the paper is organized as follows. Section 2 provides a discussion of private student loans. In Sect. 3, we describe our data and estimate an empirical model to understand credit union involvement and concentration in PSL, with Sect. 4 examining the effect this had on overall performance. Section 5 provides a comparative analysis of delinquency and charge-off rates across PSL portfolios, and Sect. 6 concludes.

2 Private student loans

The market for PSL came to life in the mid-1990s, nourished by rapidly rising tuition prices and minimal real growth in family income, the origination of PSL grew by more than a factor of ten over the next decade.[5] Private student loans provided an alternative for

[4] Returns and risk adjusted returns rise with the increase in the share of non-interest income to income up to 30% and then risk and return begin to decrease. The average assets of the international banks in Gambacorta et al. (2014) sample is 439 billion, compared to 57 million dollars for the credit unions in Goddard et al. (2008).

[5] Private student loans originated in academic year 1995–1996 were 1.7 billion dollars and in 2005–2006 were 19 billion. (College Board 2014). Between 1990 and 2010 the real price of college (tuition, fee, and room and board) at a 4-year public institution grew by 83%, whereas real median household income grew by

students whose financial need was increasing by more than the fixed amount they were able to borrow from federal loan programs. Entrance into the market was a natural extension for many depository institutions, as they were already actively engaged in marketing, funding, and originating federally guaranteed student loans.[6] Securitization also played a key role in the mid-2000s by providing liquidity and non-interest income to lenders through the creation of student loan asset backed securities (SLABS). The collapse of the securitized asset market during the financial crisis led to the reduction of PSL originations by 50% in academic year 2008–2009 relative to the year prior. Another blow to the market came in 2010 when the Department of Education took over as the sole originator of federal student loans. No longer able to originate federal loans and quick profits having evaporated with the market for SLABS, a number of large banks decided to exit the student loan market entirely. While the origination of PSL has increased each of the last 4 years, it has done so at a much slower rate than pre-crisis, and remains less than one-half the size at its peak.

As several large banks unwind their positions in PSL, credit unions are entering into the market and rapidly expanding their holdings of PSL by largely originating their own loans and in some cases via participation loans. Of concern to National Credit Union Administration regulators (NCUA 2013) is whether credit unions fully understand how the risks of PSL differ from federal student loans and other consumer loans. Private student loans differ from most consumer loans as they offer long repayment periods of between 15 and 20 years, and unlike federal student loans are issued at variable interest rates that are risk priced. To price risk requires a borrower to have a credit history, which for most students means having a co-signer on PSL. Repayment of PSL therefore depends heavily on speculation of degree completion and future employment of the primary borrower (student) along with their cosigner's ability to repay the debt if necessary.

The default behavior of PSL are quite unique. Using loan level data of PSL originated between 2005 and 2009, the Consumer Financial Protection Bureau CFPB (2012) show there is a seasoning effect of PSL that default.[7] Default rates remain below 3% following the first 2 years after origination, regardless of the year of origination. Default rates though rise significantly over time, with more than 10% of PSL originated in 2005 in default as of 2011, and default varying across vintages of loans over longer periods. It is difficult to know how these loans will perform if interest rates were to rise substantially.

While it seems natural for credit unions to mitigate the interest rate risk associated with fixed rate mortgages by adding PSL, credit unions may also be pursuing higher returns. Persistently low interest rates following the 2001 recession led depository institutions to pursue new assets offering higher returns. Commercial banks, for example, increased their exposure prior to the financial crisis to "seemingly" riskless mortgage backed securities, higher yield mortgages, and derivatives all in an attempt to earn higher returns. Credit unions, were not actively engaged in such activities, but their entrance into the PSL market may mimic the behavior of their counterparts by pursuing higher returns under the perception of minimal risk.

Footnote 5 continued
1.8% over the entire period. Calculations using Digest of Education Statistics 2013 and Federal Reserve data.

[6] In academic year 2005–2006 67 billion dollars of loans were made under the federal Stafford and Parent Plus loan programs (College Board 2014). These were loans originated by depository institutions, yet guaranteed by the federal government.

[7] The CFPB (2012) report Private Student Loans was mandated pursuant to Section 1077 of The Dodd–Frank Wall Street Reform and Consumer Protection Act. The sample of loan level PSL data was obtained from nine large lenders, which did not include any credit unions.

Private student loan borrowers in 2011 were offered on average an initial variable rate of 7.8%, with a maximum rate of 19% (CFPB 2012). For comparison, data from NCUA (2011) shows the average 30-year fixed-rate mortgage rate offered by credit unions was 4.15% in 2011, with 5-year new car loans averaging 3.43%, and 3-year unsecured credit averaging a 10.22% fixed rate. While PSL are unsecured, they seem to offer a distinct advantage to lenders over credit cards and other unsecured loans, which is that they are only dischargeable in rare cases of extreme hardship under current bankruptcy laws. This feature though does not eliminate credit risk as historically PSL have had significantly higher default rates than other consumer loans. In addition the percentage of outstanding PSL that are under bankruptcy status has risen from 0.4% in 2007 to 1.3% in 2011 (CFPB 2012). It should be clear that higher interest rates on PSL come potentially with substantial risk.

3 Empirical model of PSL involvement and concentration

3.1 Model specification

The empirical analysis in this section examines the factors that influence a credit union's involvement with and their loan concentration in private student loans. Between 2011 and 2015 the percentage of credit unions with PSL in their loan portfolio has risen from 9 to 13%. Table 1 displays the yearly transition between credit unions that enter and leave the market for private student loans. The number of new entrants has slowed over time from 91 in 2012 to 37 in 2015 (column 2), with the number leaving the market each year remaining relatively constant (column 4). Concentration in PSL, among those holding PSL, also increased from 1.5% of total loans to 2.6% during the period. We believe the decision by credit unions to not hold PSL in their loan portfolio differs from those with a low, yet non-zero concentration. For this reason, we estimate a two-part model that allows our controls to have a different influence on PSL involvement, i.e. participation in the market, and loan concentration. The same set of controls are used to model both involvement and participation. Lacking an appropriate exclusion restriction, we choose to use a two-part model over a sample selection model due to the high collinearity between the inverse Mills ratio and our covariates (Madden 2008).[8]

A credit union's share of their loans in PSL necessarily takes on values between 0 and 1. One could estimate a fractional response model (see Papke and Wooldridge 1996, 2008) to account for the limited range in PSL concentration. This though assumes concentration values of 0 and an arbitrarily low values are a result of randomness and not due to distinct factors that distinguish the outcomes. As noted, the vast majority of loan portfolios do not consist of PSL, which would suggest there may be distinct processes that influence zero and non-zero outcomes. In such a case, failure to account for this would produce serious misspecification (Ramalho and da Silva 2009). The two-part model used here is adapted from Wooldridge (2002) to account for this structure and has been used to model financial leverage (Ramalho and da Silva 2009) pension plan participation (Oberhofer and

[8] The r-squared from regressing the inverse Mills ratio on our covariates is 0.9977. The corresponding variance inflation factor for the inverse Mills ratio is 435, which indicates (Madden 2008) problems with a selection model. These estimates are available upon request.

Table 1 Annual transition between private student loan involvement

	(1) PSL(t + 1) = 0 PSL(t) = 0	(2) PSL(t + 1) = 1 PSL(t) = 0	(3) PSL(t) = 0	(4) PSL(t + 1) = 0 PSL(t) = 1	(5) PSL(t + 1) = 1 PSL(t) = 1	(6) PSL(t) = 1
2011	4850	91	4941	12	471	483
	(0.982)	(0.018)		(0.025)	(0.975)	
2012	4791	76	4867	15	547	562
	(0.984)	(0.016)		(0.027)	(0.973)	
2013	4722	61	4783	10	613	623
	(0.987)	(0.013)		(0.016)	(0.984)	
2014	4682	37	4719	13	660	673
	(0.992)	(0.008)		(0.019)	(0.981)	

Column (1) represents the number (percentage) of credit unions not involved with PSL in year t that remain out of the market the following period. Column (2) indicates those credit unions that transition into involvement. Column (3) indicates the number of credit unions in year t that do not hold PSL. Column (4) indicates those credit union that had PSL and leave the market the following year, whereas column (5) indicates those that remain. Column (6) indicates the number of credit unions in year t with PSL. The 4695 credit unions without PSL in year 2015 is given by the sum of columns (1, 4) using the data for 2014, whereas the 697 with PSL is given by the sum of (2, 5)

Pfaffermayr 2012), investment portfolio choices (Stavrunova and Yerokhin 2012), and firm level exports (Egger and Kesina 2014).[9]

The first part of the latent variable model specifies whether a credit union is involved with PSL, a binary outcome y*, where:

$$y^* = \begin{cases} 0 & \text{if } y = 0 \\ 1 & \text{if } 0 < y \leq 1 \end{cases}$$

We assume $P(y* = 1|x) = G(x\gamma)$ with G denoting the cumulative density function of the logistic distribution and γ the coefficient estimates from the logistic regression of credit union involvement with PSL on the covariates given by x. The second part of the specification uses the sample of non-zero observations to estimate loan concentration with the fractional response model of Papke and Wooldridge (1996, 2008). That is to say one applies their Quasi Maximum Likelihood Estimator (QMLE) to find $E(y|x, y* = 1) = G(x\beta)$, where β represents the QMLE coefficient estimates, and G again is the logistic cumulative density.[10] One can then find the conditional expectation of a credit union's level of PSL concentration given the two sets of estimates and covariates.

$$\begin{aligned} E(y|x) &= P(y* = 0|x) \cdot (y|x, y* = 0) + P(y* = 1|x) \cdot (y|x, y* = 1) \\ &= G(x\gamma) \cdot G(x\beta) \end{aligned}$$

The marginal effects of the covariates on PSL concentration can be decomposed into two parts—the effect on the probability of a non-PSL holder becoming involved in the market, and the change in concentration of those already involved.

$$\begin{aligned} \frac{\partial E(y|x)}{\partial x_j} &= \frac{\partial P(y* = 1|x)}{\partial x_j} \cdot E(y|x, y* = 1) + P(y* = 1|x) \cdot \frac{\partial E(y|x, y* = 1)}{\partial x_j} \\ &= \gamma_j \cdot g(x\gamma) \cdot G(x\beta) + \beta_j \cdot g(x\beta) \cdot G(x\gamma), \end{aligned}$$

$\partial P(y* = 1|x)/\partial x_j$ and $\partial E(y|x, y* = 1)/\partial x_j$ represent the marginal effects estimated from the logistic and generalized linear models. Functions $g(x\gamma)$ and $g(x\beta)$ are the logistic probability density function evaluated using the coefficients from the two models. Due to the complexity of $\partial E(y|x)/\partial x_j$, which contains estimates from two models, we use bootstrapping to find the standard errors in order to test the statistical significance of this marginal effect. One can think of $\partial E(y|x)/\partial x_j$ as measuring the marginal effect on concentration within the credit union system, whereas $\partial E(y|x, y* = 1)/\partial x_j$ captures the effect on credit unions already exposed to PSL.

[9] Another alternative would be to use a zero inflated model, which is another two part model. In the second part a beta distribution is used in place of the generalized linear model used here. Readers may be more familiar with other two part models, such as the bivariate probit model (Cotei and Farhat 2011) which has a binary outcome in each stage.

[10] QMLE are found using Stata's GLM command with the logit link and binomial family specified, in addition to heteroscedasticity robust standard errors.

3.2 The sample and control variables

Our two-part model uses the same set of covariates to model both credit union involvement and concentration in PSL.[11] Of particular interest is to identify the effects that market forces and risk exposure have had on the growth of private student loans among credit unions. We posit that credit unions with a comparative advantage in this market segment are driving much of this activity. A unique feature of credit unions, relative to banks, is that a credit union's depositors and borrowers must share a common bond based on employment, association, or geographic area (see Ely 2014 or Emmons and Schmid 1999 for additional discussion). It is believed these bonds provide credit unions additional insight into lending decisions from information that may have otherwise been private (Kane and Hendershott 1996). For federally chartered credit unions these bonds are more narrowly defined by a field of membership, which includes a bond that is "primarily educational". If credit unions that primarily serve educators have a better ability to monitor and assess risks associated with loans used for education purposes, then we would expect this subset to play an important role in providing student loans. In addition, strong ties to educators and schools may create strong demand by members for education loans.

We also believe that close proximity to students may provide an added opportunity for credit unions to expand their marketing of new loan products to members in their area. A proxy variable for proximity to a college campus is used, which is an indicator variable that equals 1 if a branch of the credit union is within 1 km of a 2- or 4-year college of more than 5000 students.[12] Both our measures of comparative advantage are for all intents and purposes time invariant throughout the period.

The other control variables we include are drawn from previous studies of credit union involvement with real estate loans (Tripp and Smith 1993), credit union risks and returns (Ely 2014; Goddard et al. 2008), credit union risk (Frame et al. 2002), and returns on assets (Goenner 2016). Five measures control for exposure to interest rate risk, liquidity risk, and differences in solvency. Interest rate risk is controlled for using the ratio of net long-term assets to total assets. This ratio is used by the NCUA in their financial performance reports of credit unions to evaluate exposure to interest rate risk. Three ratios control for liquidity—cash and short-term investments to total assets, saving deposits to total deposits and borrowing, and loans to deposits. Solvency is measured using the ratio of net worth to total assets. Other characteristics of the credit union and the economic environment of the credit union's home market are also included, which we discuss in more detail later on.

In Table 2 we provide summary statistics for our control variables split between credit unions involved with PSL and those that are not. For each of the covariates we find that there are statistically significant differences between the mean values for the two groups. With respect to credit unions with a comparative advantage in PSL—9% of credit unions involved with PSL have an education field of membership, as compared to 5% that are not involved and 25% of credit unions with PSL are proximate to a college campus as compared to 10% for those not involved. Comparative advantage appears to play an important role in credit unions' decisions to hold PSL.

[11] One could use different controls for each if there were strong reasons a priori to suggest why there might be factors that only influence one or the other. Ramalho and da Silva (2009) and Oberhofer and Pfaffermayr (2012) also use the same controls for each part.

[12] National Center for Educational Statistics IPEDS data is used to identify the set of schools and their latitude and longitude. The latitude and longitude of branch addresses was found using Texas A&M's free geocoding software: http://geoservices.tamu.edu/Services/Geocode/ The great-circle distance between branches and schools was determined using the haversine formula.

Table 2 Credit union summary statistics, 2011–2015

	Involved with PSL		No involvement		Difference in means
	Mean	SD	Mean	SD	
Net long term assets/total assets (%)	32.49	13.06	22.01	15.37	10.48***
Sav. dep./total dep. and borrowing (%)	36.93	16.91	52.39	24.40	−15.45***
Loans/deposits (%)	69.31	18.54	60.23	20.68	9.07***
Cash and S.T. investments/total assets (%)	16.01	9.02	23.40	12.55	−7.39***
Net worth/total assets (%)	10.69	3.11	12.64	5.17	−1.95***
State charter	0.38	0.48	0.40	0.49	−0.02**
Size	18.99	1.55	17.36	1.52	1.62***
Bank deposit concentration	0.18	0.09	0.19	0.11	−0.01***
Members who borrow (%)	53.45	23.76	44.83	20.39	8.61***
Rural	0.18	0.38	0.25	0.43	−0.07***
Unemployment rate (%)	6.61	2.03	7.03	2.21	−0.41**
Education field of membership	0.09	0.28	0.05	0.22	0.03***
Proximity to campus	0.25	0.44	0.10	0.30	0.15***
Observations	3037		23,997		

*, **, *** The difference in means is statistically significantly different from 0 at the 10, 5, and 1% level of significance, respectively

The financial data for credit unions used throughout are drawn from fourth quarter (December 31) call reports provided to the NCUA during the period (2011–2015) that data on private student loans are available.[13] Two adjustments are made to allow for comparisons of financial data over time. Nominal dollar values are all converted into real December 2015 dollars by adjusting for the relative differences in the consumer price index.[14] The second adjustment accounts for the fact that mergers between credit unions can significantly impact items on balance sheets and income statements. Similar to others (DeYoung and Roland 2001; Esho et al. 2005; Goenner 2016), our merger adjusted financial data combines data from credit unions that subsequently merge within our period of analysis. That is to say, two credit unions that merge in 2014 would have a single combined level of total assets for 2013 and years prior, which would equal their combined assets for the year.

Credit unions vary significantly in terms of their size, ranging from Navy Federal credit union with more than 73 billion dollars in assets to Socal Federal credit union with only a dollar of assets at yearend 2015. Small credit unions, run largely by volunteers, are likely to be constrained in their decisions and unable to expand into new markets like private student loans. McKee and Kagan (2016) find the incentive for small credit unions to

[13] Quarterly call report data for the period examined is publicly available for download from the National Credit Union Agency at https://www.ncua.gov/analysis/Pages/call-report-data/quarterly-data.aspx.

[14] Real financial data are required to calculate financial ratios that combine income statement and balance sheet items because these ratios use values from multiple periods. For example, the return on assets for a credit union in period (t) is equal to their net income reported on the income statement in period (t) divided by the average of their assets from the current (t) and previous period's (t − 1) balance sheets. A credit union's size is also measured in real terms and is equal to the natural log of real total assets.

expand their lending to be significantly less than large credit unions. Small credit unions they show achieve less of a gain in efficiency from an increase in assets, which McKee and Kagan attribute to an inability of small credit unions to adequately compensate staff to market, process, and monitor additional applications efficiently. Scale can also affect the adoption of technology that affects credit union profitability (Pana et al. 2015) and survivability (Goddard et al. 2016). To reduce the effects small credit unions may have on our results, we eliminate from our sample credit unions with either 100 or fewer members or those with assets of 2,000,000 or less in 2000 dollars, which is the criteria used by Ely (2014).[15]

3.3 Estimates of involvement and concentration

Our logistic model estimates of PSL involvement appear in column 1 of Table 3, where our standard errors are robust to the presence of heteroscedasticity. Column 2 contains the marginal effect on the probability of being involved with PSL $\{\partial P(y* = 1|x)/\partial x_j\}$ from either a one standard deviation change in our continuous variables or a unit change in our indicator variables, where the covariates are evaluated at their means. The results indicate comparative advantage plays a substantial role in PSL involvement. We find federal credit unions with an educational field of membership are 3.8 percentage points more likely than other federal credit unions to be involved with PSL, and proximity to a college increases involvement by 2.3 percentage points. Both effects are large in magnitude given the probability of involvement for the typical credit union is 6.8% over the period examined.

Risk exposure also had an impact on involvement with PSL. The more long-term rate sensitive assets the credit union holds, the more likely they are to hold PSL. Increasing this ratio by one standard deviation, increases PSL involvement by 1.9 percentage points, with the result statistically significant at the 1% level. This implies the more a credit union is exposed to interest rate risk, the more likely they are to hold PSL. The evidence here suggests credit unions with greater liquidity were less likely to hold PSL. The ratio of liquid assets (cash and short-term investments to total assets) had a negative effect on PSL involvement, as did having more stable liabilities (savings deposits). Further we find credit unions with a higher share of loans to deposits, i.e. less liquidity, are more likely involved with PSL. These results suggest credit unions with idle funds tend to have less active management and are unlikely willing to offer new loan products. Examining the effect of capital adequacy, a one standard deviation increase in the capital ratio, lowers the probability of PSL involvement by 2 percentage points. If PSL are associated with higher risk, then this result would be cause for concern given less capitalized credit unions are more exposed to PSL. We investigate the effects of PSL concentration on risk in Sect. 4.

Credit union characteristics also had an influence on involvement with PSL. The average size of credit unions involved with PSL is 591 million dollars in total assets relative to 153 million for their counterparts. Size may allow larger credit unions to take advantage of economies of scale and scope by expanding into the PSL market. Tripp and Smith (1993) showed credit union size was an important factor in credit unions entering the first-mortgage market in the years following the 1977 amendment to the Federal Credit Union Act. Increasing size, the natural log of total assets, has a substantial effect and

[15] Two million dollars is the cutoff the NCUA use in their Financial Performance Reports to identify the smallest of credit union peers. This restriction results in the elimination of 800 credit unions from the sample. Goddard et al. (2008, p. 1842) apply several criteria to eliminate credit unions with "extreme" or "nonsensical" financial data values.

Table 3 Two part model of private student loan exposure, 2011–2015

	(1)	(2)	(3)	(4)	(5)
Net long term assets/total assets (%)	0.0194***	1.895	−0.0042*	−0.179	0.041***
	(0.0018)		(0.0022)		
Sav. dep./total dep. and borrowing (%)	−0.0047***	−0.718	0.0059***	0.390	0.006
	(0.0014)		(0.0021)		
Loans/deposits (%)	0.0052***	0.674	−0.0025	−0.144	0.009
	(0.0013)		(0.0021)		
Cash and S.T. investments/total assets (%)	−0.0101***	−0.789	−0.0068	−0.233	−0.038*
	(0.0030)		(0.0044)		
Net worth/total assets (%)	−0.0618***	−1.954	−0.0138	−0.190	−0.068***
	(0.0074)		(0.0127)		
State charter	−0.4100***	−2.586	0.0232	0.064	−0.069**
	(0.0452)		(0.0584)		
Size	0.3977***	4.032	−0.3368***	−1.484	0.013
	(0.0168)		(0.0208)		
Bank deposit concentration	−1.3347***	−0.913	−0.8873**	−0.264	−0.044***
	(0.2236)		(0.3538)		
Members who borrow (%)	0.0097***	1.282	0.0049***	0.284	0.055***
	(0.0014)		(0.0006)		
Rural	0.0326	0.206	−0.2949***	−0.808	−0.049
	(0.0553)		(0.0680)		
Unemployment rate (%)	−0.0671***	−0.927	−0.0230	−0.138	−0.035**
	(0.0122)		(0.0172)		
Education field of membership	0.6015***	3.793	0.1312	0.359	0.131***
	(0.0811)		(0.0912)		
Proximity to campus	0.3604***	2.273	0.3189***	0.874	0.123***
	(0.0539)		(0.0711)		
Constant	−8.8995***		2.4581***		
	(0.3820)		(0.4711)		
Observations	27,034		3037		
Pseudo R-squared and log pseudolikelihood	0.179		−249.6		

Estimates (1) use logistic regression on the complete sample to model the binary decision by credit unions of whether or not to be involved with PSL. Marginal effects reported (2) measure the percentage point change in the probability of being involved with PSL $\{\partial P(y* = 1|x)/\partial x_j\}$ given either a one standard deviation change in non-indicator variables and a one unit change for indicator variables (state charter, rural, education field of membership, and proximity to campus). Estimates in (3) are from a generalized linear model of PSL concentration using a logit link and binomial distribution for observations where concentration is greater than 0. The marginal effects in (4) represent the change in concentration among credit unions that hold PSL $\{\partial E(y|x, y* = 1)/\partial x_j\}$, whereas those in (5) represent the effect on all credit unions $\{\partial E(y|x)/\partial x_j\}$. Year fixed effects are included in each specification and are not reported to save space. Standard errors in parentheses are robust to heteroskedasticity

*, **, *** Statistically different from 0 at the 10, 5, and 1% level of significance

increases the probability of PSL involvement by 4 percentage points. A perception often put forward by state regulators is that state charters offer fewer restrictions and therefore allow for greater expansion into new markets. We find this is not the case with PSL, as state chartered credit unions are 2.6 percentage points less likely to be involved with PSL.

A number of variables are used to control for differences in market conditions, which may affect lending opportunities. The specification includes a measure of bank deposit concentration used by Ely (2014) to capture the competition among depository institutions found in a credit union's home market.[16] More competition, i.e. a lower ratio, is likely to motivate credit unions to seek out new lending opportunities as well as members, both of which are likely to influence involvement with new loan products such as PSL. The results show credit unions in a more competitive market are in fact more likely to be involved with PSL, which is not surprising given the number of commercial banks exiting this market. A measure of the strength of the lending market is the percentage of members utilizing loans from the credit union. Tripp and Smith (1993) suggest this measure is a proxy for loan demand in general by members, but it may also represent a need to bring in new members, or new loan products, both achieved by entering the PSL market. We find strong member demand for loans increases the probability credit unions are involved with PSL. To further control for differences in macroeconomic conditions, we include the unemployment rate of the MSA or county where the credit union is headquartered and an indicator variable for whether the credit union is located in a non-metropolitan area, i.e. a rural area. Rural areas may offer different economic opportunities, which influence PSL lending. Rural areas did not affect PSL involvement, whereas higher unemployment contributed to less PSL involvement.

The QMLE estimates from the second part of our model appear in column 3 of Table 3, with the marginal effects appearing in column 4 representing the change in PSL concentration among credit unions that hold PSL $\{\partial E(\mathrm{y}|x, y* = 1)/\partial x_j\}$. Column 5 reports the marginal effects on the change in PSL concentration among all credit unions $\{\partial E(\mathrm{y}|x)/\partial x_j\}$. We have added the statistical significance of this combined marginal effect, which was found by bootstrapping the standard errors with 500 replications. Our estimates of the two measures of comparative advantage in PSL show that among credit unions with PSL, adding an education field of membership increases concentration by 36 basis points and adding proximity to campus increases concentration by 87 basis points, though the effect is only statistically significant for proximity to campus. Among all credit unions, the marginal effects are statistically significant at the 1% level for both measures—an education field of membership and proximity to campus increase concentration by 13 and 12 basis points, respectively. These seemingly small effects are in fact quite large, given concentration among credit unions with PSL is 2.8% and is 0.19% for all credit unions. The marginal effects of this model are a non-linear function of our covariates. In Table 4 we compare the effects that a field of membership based on education and proximity to campus have on predicted concentration levels for a credit union with the mean values of the continuous variables, and having a federal charter, in a non-rural area, for year 2015. By adding an education field of membership and proximity to campus, a credit union involved with PSL increases its concentration in the market by 1.75 percentage points, relative to credit unions without a comparative advantage in this market—an increase of 54%. Among all credit unions, having both comparative advantages in the

[16] The measure uses FDIC summary of deposits data to construct a Herfindahl–Hirschman Index (HHI) of deposit concentration in the county or metropolitan statistical area, when applicable, where the credit union is headquartered. The index was scaled to range between 0 and 1, by dividing it by 10,000.

Table 4 Predicted PSL concentration by field of membership and proximity

		Proximity to campus			
		0		1	
		E(y|x)	E(y|x,y* = 1)	E(y|x)	E(y|x,y* = 1)
Education field of membership	0	0.24%	3.23%	0.46%	4.39%
	1	0.47%	3.67%	0.88%	4.98%

The predicted concentration among all credit unions $E(y|x)$ and those with PSL $E(y|x, y* = 1)$ is based on a credit union with the mean values of the continuous variables, and having a federal charter, in a non-rural area, for year 2015

market for PSL increases concentration from 0.24 to 0.88%, which is an increase of more than 250%. If the NCUA is concerned about the growth of PSL, then credit unions with branches near campuses and with education memberships should be their primary focus.

The estimates also reveal the direction of our covariates' marginal effects are not necessarily the same for involvement and concentration. While exposure to interest rate risk increases the likelihood of being involved with PSL, it reduces concentration among credit unions involved with PSL. Accounting for the effect on the probability of involvement and concentration, the net effect is positive with concentration increasing by 4 basis points among all credit unions. This seems to suggest that credit unions view PSL as a means to reduce their exposure to interest rate risk, yet they remain wary of possibly higher credit risk from putting a significant portion of their loan portfolio into an un-tested asset class. The effect of size also varies—increasing size while increasing the probability of being involved with PSL reduces concentration in PSL, among credit unions that hold PSL. Regulators may have reason to be concerned with the growth of PSL, as smaller credit unions involved with PSL are less able to bear and may not understand the unique risks posed by the market. The marginal effect of size on PSL concentration within the system is not statistically significant. Other factors that were shown to reduce involvement, also reduced system wide concentration. These measures included the shares of liquid assets and net worth, state charter, deposit concentration, and the unemployment rate. Strong membership demand for loans increased both involvement and system wide concentration.

4 Empirical model of credit union performance and PSL concentration

4.1 Performance measures

As the flow of funds from credit unions to private student loans continues to grow, of interest is what effect the higher concentration in PSL has on credit union risk and returns. Adding PSL to the portfolio may assist with diversification, or it could lead to higher risks as credit unions expand into a product line where they lack experience and has historically been fraught with risk. With respect to returns, it is also unclear what impact PSL concentration may have on returns. Previous studies have examined the effects of the mix of loan shares by different category on risk (Ely 2014; Frame et al. 2002) and returns (Ely 2014) for credit unions, yet none to our knowledge has considered the specific effects of

PSL.[17] What these studies have shown is the effect of loan concentration on performance varies by the type of loan, and also can vary by time. For example, Ely (2014) found the share of auto loans in the loan portfolio increased the return on assets for the period 2008–2011, whereas the share of credit card loans reduced returns. In previous periods (2000–2003 and 2004–2007) neither share was statistically significant. Similarly, the effects on risk also varied by loan category and over time.

Credit union performance is examined here using measures of risk and returns derived from accounting data. Alternative measures based on share prices are not available as credit unions are member owned and are thus not publicly traded.[18] The measure of returns we use is the annual return on assets, which was also used by Ely (2014), Esho et al. (2005), Goddard et al. (2008), and Goenner (2016) in their analyses of credit unions. A credit union's ROA is equal to net income for the year divided by average assets, where we average over this year and last year's asset values. Average returns for credit unions in our sample were 0.425% for the period 2011–2015.

Two standard measures of risk are explored as dependent variables, which include the standard deviation in the return on assets (SDROA) and the probability of bankruptcy, i.e. the z-score. The standard deviation in the return on assets (SDROA) measures a credit union's variation in the annual return on their assets over a period of time and has been used by Ely (2014), Esho et al. (2005), Frame et al. (2002), and Goddard et al. (2008) to study credit union performance. For each credit union we calculate the standard deviation of their annual returns on their assets for the years 2011–2015, the period in which data on PSL holdings is available.[19] The second measure uses the z-score (Boyd et al. 1993) as an indicator for the probability of a credit union becoming insolvent and is equal to $z = \left(\text{ROA} + \frac{\text{NW}}{\text{TA}}\right)/\sigma_{\text{ROA}}$, where ROA indicates the credit union's mean return on assets, NW/TA is the mean capital to assets ratio, and σ_{ROA} indicates the standard deviation in returns on assets over the period 2011–2015. A larger z-score indicates it would take a larger deviation from mean returns for a credit union to become insolvent and is negatively related to the probability of bankruptcy. Ely (2014) and Esho et al. (2005) use this measure in addition to the standard deviation in the return on assets to evaluate credit union performance, while Guo et al. (2015) and Stiroh (2004) use the measure to evaluate risk at commercial banks. In our analysis, the natural logarithm of the z-score is used to eliminate its skewness (Laeven and Levine 2009).

4.2 Model specification and estimates of risk

Each of the risk measures have a single observation per credit union for the period 2011–2015, thus a single cross-section is used to estimate the model specification by ordinary least squares, where our covariates are measured at each credit union's mean values for the period. The specification includes as control variables the concentration of loans in PSL, our main variable of interest, and separate loan shares in car loans (new and used), unsecured credit, and credit cards, with the share of real estate loans omitted to

[17] Ely (2014) examines the loan shares of auto loans and the aggregate share of credit card and unsecured loans, with real estate and other loans as the omitted share, whereas Frame et al. 2002 use the share of auto loans, unsecured loans, and real estate loans, with other loans omitted.

[18] See Palia and Porter (2004)for an analysis of the performance of US bank holding companies that uses variation in stock returns and Tobin's Q.

[19] Similar to the other financial formulas, the return on assets is calculated using the NCUA formula. Due to the previous year's assets appearing in the formula, data from 2010 is used to calculate the value for 2011.

Table 5 PSL concentration and credit union risk, 2011–2015

	(1)	(2)
PSL concentration (%)	−0.0014	−0.0042
	(0.0060)	(0.0112)
Credit card loan share (%)	0.0037***	−0.0174***
	(0.0014)	(0.0023)
Unsecured credit loan share (%)	0.0062***	−0.0073***
	(0.0016)	(0.0012)
Car loan share (%)	−0.0002	0.0002
	(0.0006)	(0.0008)
Net long term assets/total assets (%)	0.0021*	0.0017
	(0.0011)	(0.0014)
Sav. dep./total dep. and borrowing (%)	−0.0005	0.0047***
	(0.0003)	(0.0007)
Loans/deposits (%)	0.0049***	−0.0059***
	(0.0006)	(0.0008)
Cash and S.T. investments/total assets (%)	0.0021**	0.0058***
	(0.0010)	(0.0015)
Net worth/total assets (%)	−0.0008	
	(0.0019)	
State charter	−0.0035	0.0724***
	(0.0112)	(0.0225)
Size	−0.0636***	0.1313***
	(0.0054)	(0.0098)
Bank deposit concentration	−0.0005	0.0640
	(0.0681)	(0.1084)
Members who borrow (%)	−0.0001	0.0003
	(0.0001)	(0.0003)
Rural	−0.0381***	0.0511*
	(0.0147)	(0.0265)
Unemployment rate (%)	0.0192***	−0.0368***
	(0.0033)	(0.0060)
Constant	0.9291***	1.7953***
	(0.1095)	(0.2194)
Observations	5378	5378
Adjusted R-squared	0.090	0.086

Analysis of a cross-section of credit unions where the dependent variable in column (1) is the standard deviation in the return on assets and in (2) is the natural logarithm of the z-score. A higher z-score indicates less risk. Each risk measure is calculated over the period 2011–2015 and mean values are used for the control variables in the regression estimates. Standard errors in parentheses are robust to heteroskedasticity

*, **, *** Statistically different from 0 at the 10, 5, and 1% level of significance

avoid multi-collinearity. Control variables used in the two-part model, which are typical to models of risk and returns are also added to the specification. We exclude the two measures of comparative advantage in PSL. The standard errors of the estimates reported in Table 5 are robust to heteroscedasticity.

The estimates in Table 5 indicate the concentration of credit unions' loans in PSL did not have a statistically significant effect on either of our measures of risk for the period 2011–2015, relative to the share in real estate. Other loan shares though did have an effect on risk. A higher share of loans in either credit cards or in unsecured credit were both tied to increased risk, as indicated by credit unions with higher variation in returns and lower z-scores. A 1 percentage point increase in the share of credit card loans, increases the standard deviation in returns by 0.004, which is an increase of 0.9% from the average variation in returns of 0.394. The z-score decreases by 1.7% from the increase in the share of credit card loans. Increasing unsecured credit increases variation in returns by 1.6%, and reduces the z-score by 0.7%. For the period 2011–2015, a period when interest rates were low and quite stable, private student loans contributed to risk similarly to real estate loans and car loans, while unsecured credit and credit cards were shown to be more risky.

Estimates for the other controls are for the most part similar to what one would expect based on findings from previous periods. We find weak evidence at the 10% level of statistical significance that exposure to interest rate risk increased the variation in returns, yet had no effect on the z-score. Ely also found the share of long-term assets increased risk among credit unions for the pre-crisis period (2004–2007), with the effect statistically significant in his specification for the z-score, but not for the variation in returns. Greater liquidity contributed to a higher z-score and lower risk for each of the three measures in our results, but only the loan to deposit ratio had a similar effect on the variation in returns. The share of cash and investments, somewhat surprisingly, contributed to higher variation in returns, while the ratio of saving deposits was not statistically significant. Differences in capitalization levels did not have an effect on the variation of returns, which differs from Goddard et al. (2008) where they found more solvent credit unions had more variable returns for the period 1993–2004.[20] We show larger credit unions are better able to diversity with scale—they are subject to less variation in their returns, and face higher z-scores, consistent with Ely's results for the period (2000–2011). Credit unions with a state charter face less risk, with the coefficient for the z-score statistically significant.

We find, similar to Ely (2014), the level of banking competition in a credit union's home market does not affect either measure of risk. Further, member demand for loans did not have an effect on risk. Variation in unemployment rates in the local market though did influence risk, with higher unemployment contributing to increased risk. For every percentage point increase in unemployment the z-score declined by 3.7%. Rural areas were subject to lower risk, as indicated by both measures—a result consistent for the period 2000–2011 (Ely 2014).

4.3 Model specification and estimates of returns

For the model specification of the annual return on assets we make use of the panel of returns for each credit union and estimate a two-way fixed effects model, where fixed effects for time and credit union are included. The specification of which is given in Eq. 1

$$y_{it} = \beta x_{it} + \delta_t + \theta_i + \varepsilon_{it} \tag{1}$$

[20] The net-worth ratio is excluded from the specification of the z-score given its use in the score's calculation.

where X_{it} represents the covariates that vary by credit union $i = 1{:}N$ and time $t = 1{:}T$, with time and credit union fixed effects given by δ_t and θ_i, respectively. By adding the credit union level fixed effect we are able to control for any unobserved time invariant heterogeneity at the credit union level. For example, unobserved differences in a credit union's management ability, or preferences toward risk aversion may affect concentration in PSL, in addition to their return on assets. If these unobserved differences are stable over the time period examined, then they are captured by the fixed effects at the credit union level. Inclusion of fixed effects though prevents inclusion of time invariant, or nearly invariant measures such as the indicators for state charter or rural area.

It is likely though that the error term (ε_{it}) in our panel model is not necessarily independently and identically distributed, therefore we adjust our standard errors to control for the possible presence of heteroskedasticity and correlation of errors over time for a given credit union by reporting cluster robust standard errors with our estimates in Table 6.

Turning attention to the effects on returns, the estimates in column 1 of Table 6 indicate increasing loan concentration in private student loans has a negative and statistically significant effect on a credit union's return on their assets. A 1 percentage point increase in PSL concentration reduces returns by 1.6 basis points, which amounts to a 3.8% decrease. Our specification controls for the shares of other loan categories, so the finding cannot simply be that credit unions holding PSL, also have a higher share of loans in higher return loan categories. We instead find that returns do not vary by the other loan categories for the period—PSL in this regard are unique. Finding credit union returns do not vary by loan shares is not surprising. Ely's (2014) analysis showed the shares of loans in credit cards and auto loans had no impact on credit union returns relative to the share in real estate in several periods examined: 2000–2003, 2004–2007, and 2000–2011. Only during the crisis was there variation across loan categories, with auto loans outperforming real estate, and credit cards underperforming.

Most of the other coefficients are statistically significantly different than zero. Returns are lower the more a credit union is exposed to interest rate risk, which is consistent with findings (Ely 2014) pre-crisis. More liquidity, indicated by a higher ratio of cash and securities to total assets and lower ratio of loans to deposits each contribute to lower returns. More solvent credit unions exhibit higher returns with a marginal effect of 19 basis points similar to the 21 basis point found by Goddard et al. (2008) for the 1992–2004 period. Larger credit unions earned higher returns, though we did not find that banking competition had a statistically significant effect. Strong member demand for loans contributes to higher returns, while higher unemployment lowers returns.

4.4 Channel to lower returns

Credit unions' return on assets are shown here to be lower the higher the share of loans that are in PSL—what remains to be shown is the channel whereby holding PSL lowers returns. Returns are lowered, in large part, due to higher non-interest expenses from PSL concentration (column 2, Table 6). The increase in non-interest expense explains 1.3 of the 1.6 basis point change we find in returns. We posit these higher expenses are a direct result of the need by credit unions for additional resources to market, originate, and service a new loan product with unique risk characteristics. These credit unions' costs increase as they add employees and the systems necessary to assess and monitor risk. In column 3, we show empirical support for this point—credit unions with higher PSL concentration have higher employee compensation as a share of average assets. Increasing the share of loans in PSL increases employee compensation, by more than any other loan category. We also show

Table 6 PSL concentration and credit union returns, 2011–2015

	(1)	(2)	(3)	(4)
PSL concentration (%)	−0.0162**	0.0133**	0.0041***	0.0048*
	(0.0071)	(0.0056)	(0.0014)	(0.0029)
Credit card loan share (%)	−0.0068	0.0262***	0.0026***	0.0087***
	(0.0058)	(0.0046)	(0.0009)	(0.0027)
Unsecured credit loan share (%)	0.0019	0.0060***	0.0001	0.0024***
	(0.0023)	(0.0017)	(0.0002)	(0.0008)
Car loan share (%)	−0.0005	0.0029***	0.0008***	0.0014***
	(0.0014)	(0.0009)	(0.0002)	(0.0005)
Net long term assets/total assets (%)	−0.0034***	0.0001	−0.0002**	−0.0001
	(0.0011)	(0.0006)	(0.0001)	(0.0004)
Sav. dep./total dep. and borrowing (%)	−0.0010	0.0011	0.0001	−0.0001
	(0.0020)	(0.0014)	(0.0002)	(0.0009)
Loans/deposits (%)	0.0054***	0.0136***	0.0015***	0.0065***
	(0.0015)	(0.0009)	(0.0001)	(0.0006)
Cash and S.T. investments/total assets (%)	−0.0083***	0.0019***	−0.0000	0.0007*
	(0.0011)	(0.0006)	(0.0001)	(0.0004)
Net worth/total assets (%)	0.1906***	0.0014	−0.0048***	0.0158***
	(0.0245)	(0.0075)	(0.0008)	(0.0046)
Size	0.7527***	−0.5963***	−0.0302**	−0.2134***
	(0.1417)	(0.1085)	(0.0124)	(0.0531)
Bank deposit concentration	−0.0929	−0.0276	0.0169	−0.0903
	(0.1454)	(0.0878)	(0.0150)	(0.0565)
Members who borrow (%)	0.0022***	−0.0011**	−0.0000	−0.0006
	(0.0005)	(0.0005)	(0.0001)	(0.0004)
Unemployment rate (%)	−0.0306***	−0.0013	−0.0006	0.0001
	(0.0072)	(0.0056)	(0.0008)	(0.0029)
Observations	27,031	27,031	27,031	27,031
Adjusted R-squared	0.49	0.89	0.88	0.82

The regression estimates in column (1) examine the annual return on assets. The dependent variable in column (2) is non-interest expense, while for columns (3–4) the dependent variables are two components of non-interest expense—employee compensation (3) and loan servicing (4), with each a share of average assets. The analysis use panel data with specifications that include two way fixed effects for year and credit union (not shown). Standard errors in parentheses are robust to heteroskedasticity clustered by credit union

*, **, *** Statistically different from zero at the 10, 5, and 1% level of significance

evidence (column 5, Table 6) that a higher PSL concentration increases loan servicing expenses, which include costs associated with information technology, customer support, regulatory reporting, and managing collections. Only the share of loans in credit cards has a larger effect on servicing expenses than PSL.

Private student loans appear to date to contribute to overall risk in a similar fashion to the share of real estate and car loans, and less so than credit card loans and unsecured credit. This finding is somewhat surprising given PSL are typically perceived to be high

risk. The concentration of private student loans though has a negative return on assets, relative to other loan types. One thing to keep in mind is that over time risk and return may move in different directions for different loan types as shown by Ely (2014). Private student loans, may have a small effect on overall risk, due to their being in deferral and not yet seasoned. As growth of the PSL portfolio slows, the loans in the portfolio will age and the share of the PSL portfolio in delinquency and default will likely rise. In addition, if interest rates should rise, then the performance of adjustable rate PSL will likely change in the near future. We explore these effects further in a comparative analysis of PSL portfolios below.

5 Comparative analysis of private student loan portfolio performance

5.1 Delinquency and charge-off rates

The data reported in quarterly call reports does not break down the sources of net income by type of asset or loan category, yet it does contain data on delinquency and charge-off rates for separate loan categories such as PSL, which can be used to evaluate their performance. At first appearance, PSL seem to be lower risk than the average asset in the loan portfolio. The average 60 days or more delinquency rate of PSL portfolios held by credit unions was 1.07% of their value and charge-offs averaged 0.34% during the period 2011–2015, both of which were lower than the total portfolio delinquency and charge-off rates for credit unions with PSL (1.10 and 0.57%), and those without (1.32, and 0.69% respectively).

A concern is credit unions may underestimate their risk exposure if they compare the current performance of PSL portfolios to other assets, due to their PSL being in deferral. A unique feature of student loans is the payment of interest and principal can be deferred while a student remains enrolled in school, with unpaid interest capitalized into the loan balance. Credit unions may thereby temporarily increase their net income by issuing PSL and collecting their origination fees, with the effects of delinquent payments deferred into the future. Starting in 2013, credit unions have been required to report the amount of PSL in deferral status. At year-end 2013, 37% of all PSL held by credit unions was in deferral with 33% in 2014, and 31% in 2015, thus it appears credit unions are slowly gaining experience with PSL in repayment.[21] In the analysis that follows, we examine the variation in PSL portfolio performance across credit unions to determine how factors, such as loans being in deferral, impact underlying risk in the PSL portfolio.

Given credit unions lack experience with PSL, it is not surprising many have entered the PSL market through participation loans. The average ratio of PSL participations purchased to loans in the PSL portfolio is 24%. Buying participation into PSL allows credit unions to add PSL to their balance sheet without having to originate the loans themselves, which allows loans to be extended to members without adding infrastructure. It may also be beneficial if there isn't sufficient demand among members for PSL or if the credit union wishes to diversify credit risk across regions. Participation loans though tend to have higher delinquency rates and charge-off rates than loans in general. The concern from regulators (NCUA 2008) is credit unions may not be providing due diligence in assessing the risk of third-party relationships, or adequate monitoring of risk over time. The reason

[21] What is unclear from the data and potentially a much larger concern is the vintage of the PSL held and whether credit unions understand the effects of seasoning beyond the deferral period. Without cohort level data this cannot be addressed.

for this is loan sales create moral hazard, which reduces costly monitoring below the most efficient level (see Pennacchi 1988; Gorton and Pennacchi 1995).

Several other characteristics of the PSL loans in the portfolio are of interest. Interest rates on private student loans are determined by the borrower's level of risk, thus portfolios of PSL with higher interest rates are likely subject to more risk and place a larger financial burden on repayment, which one would expect to increase delinquencies and charge-offs. The average interest rate of loans in credit unions' PSL portfolios was 6.26%, and ranged between 1.75 and 15.62%. Understanding how interest rates influence delinquency may help to understand the impact on student loan debt when interest rates rise in the future. Rising student loan balances have also created concerns whether students will be able to meet their loan obligations, which is something we also wish to examine. In addition, we are interested in whether a higher concentration in PSL influences the PSL portfolio's performance. Regulators require credit unions to have more advanced risk management policies the more they concentrate in an industry, which may impact performance. Further, one would expect credit unions that put more of their lending focus on PSL to have a better understanding of the risks. For the average credit union, concentration in PSL is low, which highlights the limited experience credit unions have with PSL. Summary statistics for the PSL portfolios examined here appear in column 1 of Table 7.

Our performance analysis of PSL portfolios focuses on delinquency and charge-off rates, where the delinquency rate is the share of the current PSL portfolio dollar value that is more than 60 days delinquent. We limit our analysis here to the period of time in which data for PSL in deferral are available (2013–2015) and limit the sample to credit unions that held PSL during the period. Given our data, we are unable to add a fixed effect as there is a high level of correlation, more than 95%, between our PSL portfolio measures and their mean value by credit union, i.e. x_{it} is highly correlated with $\bar{x}_i$ which creates multicollinearity when using the within estimator. We therefore estimate fractional models for delinquency and charge-off using pooled data and the quasi-maximum likelihood procedure of Papke and Wooldridge (1996). Our model specification includes the five characteristics of PSL portfolios of interest—deferral share, loan participation share, average loan size, interest rate, and PSL concentration. In addition we add an indicator variable for whether the PSL portfolio is new to the credit union, i.e. the credit union did not previously hold PSL. This variable is included to proxy for seasoning and to explore whether the effects of portfolio characteristics differ for portfolios of presumably "less seasoned" loans.[22] Our specification also includes whether the credit union has a state charter and its size, along with our market environment characteristics, and our two measures of PSL comparative advantage.

5.2 Estimates and discussion of results

Coefficient estimates for the delinquency rate model appear in column 2 of Table 7, with marginal effects appearing in column 3. The marginal effects measure a one standard deviation change in the continuous variables, from their mean values, whereas the indicator variables measure a one unit change. The results show the share of PSL that are in deferral has a statistically significant effect on the delinquency rate of the portfolio—increasing

[22] A variable indicating the number of previous years the credit union held PSL was also examined, but did not have an observed effect either by itself or interacted with the portfolio variables. We presume they are fresher, but in fact a credit union could potentially enter into a participating agreement with a pool of loans long in repayment.

Table 7 GLM estimates of PSL portfolio performance 2013–2015

	(1)	(2)	(3)	(4)	(5)
Deferral share (%)	34.10	−0.0095***	−0.257	−0.0195***	−0.075
	(33.03)	(0.0032)		(0.0050)	
Participation share (%)	23.67	0.0046**	0.151	−0.0162***	−0.076
	(40.45)	(0.0022)		(0.0053)	
Average loan size ($1000)	12.25	−0.0097	−0.205	−0.0828***	−0.251
	(25.87)	(0.0095)		(0.0276)	
Interest rate	6.26	0.1752***	0.215	0.0578	0.010
	(1.50)	(0.0312)		(0.0690)	
PSL concentration (%)	2.55	−0.0046	−0.014	−0.0443	−0.020
	(3.77)	(0.0203)		(0.0639)	
First year PSL	0.20	−0.3875*	−0.126	−0.6042	−0.028
	(0.40)	(0.2232)		(0.4074)	
State charter	0.37	0.3864**	0.317	1.3319***	0.156
	(0.48)	(0.1757)		(0.3301)	
Size	18.97	−0.1801***	−0.230	−0.0732	−0.013
	(1.56)	(0.0681)		(0.2318)	
Bank deposit concentration	0.18	0.4168	0.032	−1.2458	−0.014
	(0.09)	(1.4677)		(1.3208)	
Members who borrow (%)	54.56	0.0002	0.005	0.0049	0.015
	(26.72)	(0.0018)		(0.0058)	
Rural	0.18	−0.2676	−0.219	−0.1769	−0.021
	(0.39)	(0.2990)		(0.5047)	
Unemployment rate (%)	5.92	−0.0112	−0.015	−0.1979	−0.038
	(1.63)	(0.0508)		(0.1469)	
Education field of membership	0.08	0.1191	0.098	0.3970	0.046
	(0.27)	(0.1981)		(0.4977)	
Proximity to campus	0.26	0.2821**	0.231	0.4402	0.051
	(0.44)	(0.1434)		(0.6272)	
Constant		−2.5328**		−2.5085	
		(1.1904)		(4.2201)	
Log pseudo likelihood		−91.6		−31.4	
Observations		1969		1969	

Column (1) contains the mean and standard deviation for the covariates of credit unions that have private student loans. Estimates in columns (2) and (4) are from a generalized linear model with a logit link and binomial distribution. The dependent variables are the delinquency rate (2) and the charge-off rate (4) for PSL. Each specification includes a time fixed effect, which are omitted here to conserve space. The marginal effects (3, 5) reported measure the percentage point change from a one standard deviation change of non-indicator variables and a one unit change of indicator variables (state charter, rural, education field of membership, and proximity to campus). Standard errors in parentheses are robust to heteroskedasticity clustered by credit union

*, **, *** Statistically different from zero at the 10, 5, and 1% level of significance

deferral by a standard deviation reduces delinquency by 26 basis points, which is a 30% reduction in the rate. We also find that increasing the share of the PSL portfolio from loan participation increases the delinquency rate by 15 basis points. A higher interest rate on loans in the portfolio also contributes to higher delinquency. Increasing the interest rate a standard deviation (1.5 percentage points), increases delinquency by 21 basis points. Credit unions new to PSL also exhibited lower delinquency.

The effects (estimates and marginal effects) of PSL characteristics on charge-offs appear in columns 4 and 5. Similar to delinquency, we find the share of the portfolio in deferral reduces charge-offs by 7.5 basis points or 64%. Charge-off rates though are lower the more the portfolio consists of participation loans, with the effect significant at the 1% level. This is despite the fact that participated loans have higher delinquency rates. It would appear sellers of participation loans, who retain a stake in the loan, are more reluctant to charge-off delinquent loans they have sold than are credit unions that originate and hold PSL. This may be due to recourse provisions that exist in case of charge-offs, or to attempts by sellers to obscure what is actually poorer performance of their loans.[23] The other statistically significant PSL measure is average loan size, which has a negative effect on charge-offs. Increasing the average loan size by $26,000, one standard deviation, reduces the charge-off rate by 25 basis points. Improvement in portfolio performance from a high average loan size could be explained by these borrowers' attendance at expensive private nonprofit colleges, where graduation tends to be more likely as is repayment.[24] This finding suggests the importance that school cohort characteristics may have on PSL performance. Lenders of private student loans regularly use cohort default rates to guide whether students from a particular post-secondary institutions are eligible to borrow (CFPB 2012).

Our results indicate having a comparative advantage in PSL did not benefit the portfolios' performance. We find there to be no significant difference in the charge-off rate for either the education field of membership or proximity to campus measures. While an education field of membership did not affect delinquency, we find that proximity to campus increased delinquency by 23 basis points. Rather than reduce risk exposure, proximity instead increases risk as measured by the delinquency rate. None of our measures of the credit unions' market characteristics influenced their PSL portfolios' performance. This is not entirely surprising if the majority of borrowers, either relocate after graduation for loans originated within the credit union's market, or were participated in outside of their market.

In Table 8 we highlight how the delinquency and charge-off rates of private student loan portfolios vary with the share of the portfolio in deferral and the share made up of participation loans. The predicted delinquency rate of a portfolio consisting entirely of participation loans not in deferral is 1.632%, as compared to 1.035% for portfolios originated by the credit union. Despite their higher rate of delinquency, participation loans exhibit lower charge-off rates. Charge-offs for portfolios not in deferral are predicted to be near zero (0.066%) for participation loans as compared to 0.334% for loans originated. Charge-offs unlike delinquency rates allow for discretion in recognition, which we believe leads originators of PSL participations agreements to delay recognition of loan impairment.

[23] Call reports only provide data on loans sold with recourse at the aggregate level of loans. Typically it is left to the originator to determine when to account for the charge-off in a participation loan.

[24] The 3 year cohort default rate (CDR) on federal student loans for the fiscal year 2011 cohort was 7% for private nonprofit 4-year institutions and 8.9% for public institutions (see Snyder et al. 2016, Digest of Education Statistics 2014, Table 332.50). Average student loan borrowing for full-time, first-time undergraduate students who borrowed averaged $6326 at public 4-year institutions and 7493 at private institutions (See Snyder et al. 2016, Digest of Education Statistics 2014, Table 331.20).

Table 8 Predicted delinquency and charge-off rates of PSL

Delinquency rate %				
Deferral share (%)	Participation share (%)			
	0	33.33	66.67	100
0	1.035	1.204	1.402	1.632
33.33	0.754	0.877	1.021	1.189
66.67	0.549	0.639	0.744	0.866
100	0.400	0.465	0.542	0.631
Charge-off rate %				
Deferral share (%)	Participation share (%)			
	0	33.33	66.67	100
0	0.334	0.195	0.113	0.066
33.33	0.174	0.102	0.059	0.035
66.67	0.091	0.053	0.031	0.018
100	0.048	0.028	0.016	0.009

Controls other than deferral share and participation share are evaluated at their mean

6 Conclusion

The results presented here indicate the decision by credit unions to become involved with PSL has been in part a response to market forces. Stiff competition with other depository institutions, strong loan demand, and proximity to campus were all driving forces behind credit unions having more exposure to PSL. In addition, credit unions appear to have been motivated by a desire to hold PSL to offset exposure to interest rate risk. For the period examined, the level of PSL exposure has not had an influence on overall risk, which is for the time being comforting given less solvent credit unions are more exposed to PSL. We also find the concentration of PSL has reduced returns, in part as a result of higher loan servicing expenses associated with these types of loans. It is unclear whether in a period where interest rates are rising, we may see concentration in variable rate PSL associated with higher returns. The result will largely depend on what happens to PSL nonperformance.

Of concern, is whether credit unions fully understand how PSL portfolios perform differently than other consumer loans and their exposure to risk. Private student loans in deferral can obscure the underlying level of risk. As PSL portfolios age, and deferral declines, risk exposure will increase, which is evident from our comparative analysis of PSL portfolios. Currently, the typical credit union with PSL has approximately one-third of their portfolio in deferral. If none of the portfolio was instead in deferral, delinquency rates would be 37% higher and charge-off rates 91% higher than their current values for credit unions that originate their own portfolios. Credit unions entering the PSL market need to monitor the seasoning of the loans in their portfolio or they risk underestimating future risks and overstating returns based on current performance. Similarly as interest rates rise, delinquency rates of PSL will also rise, such that net incomes may decline, despite attempts to mitigate gap exposure through holdings of PSL. Lenders need to be particularly wary given the current calls by policymakers and regulators to reduce payments for overextended borrowers of PSL. If interest rates rise, such pressure is likely to rise

disproportionately along with credit risk. Underestimating assets' risk exposure can have significant effects, as we learned during the financial crisis with commercial banks.

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