

The diversification and financial performance of US credit unions [☆]

John Goddard ^{a,1}, Donal McKillop ^{b,2}, John O.S. Wilson ^{c,*}

^a Bangor Business School, Bangor University, Bangor, Gwynedd LL57 2DG, UK

^b School of Management and Economics, Queen's University, Belfast BT7 1NN, UK

^c School of Management, University of St Andrews, The Gateway, North Haugh, St Andrews, Fife, KY16 9SS, UK

Received 28 June 2007; accepted 10 December 2007

Available online 1 January 2008

Abstract

For US credit unions, revenue from non-interest sources has increased significantly in recent years. We investigate the impact of revenue diversification on financial performance for the period 1993–2004. The impact of a change in strategy that alters the share of non-interest income is decomposed into a direct exposure effect, reflecting the difference between interest and non-interest bearing activities, and an indirect exposure effect which reflects the effect of the institution's own degree of diversification. On both risk-adjusted and unadjusted returns measures, a positive direct exposure effect is outweighed by a negative indirect exposure effect for all but the largest credit unions. This may imply that similar diversification strategies are not appropriate for large and small credit unions. Small credit unions should eschew diversification and continue to operate as simple savings and loan institutions, while large credit unions should be encouraged to exploit new product opportunities around their core expertise.

© 2007 Elsevier B.V. All rights reserved.

JEL classification: G21

Keywords: Credit unions; Diversification; Risk; Performance

1. Introduction

In recent years, deregulation and technological innovation has permitted almost all financial institutions to capture an increasing share of their income stream from non-interest sources. US commercial banks, for example, generated 42% of operating income from non-interest sources in 2004 compared to 32% in 1990 and 20% in 1980. While part of the increase in non-interest income is due to diversification into lines of business such as invest-

ment banking, venture capital and insurance underwriting, growth in fee-paying and commission-paying services linked to traditional retail banking services has also been significant (DeYoung and Rice, 2004a,b,c). However, the shift towards non-interest income has not improved the risk-adjusted returns of US banks in recent years (Hirtle and Stiroh, 2007). Clark et al. (2007) detect a recent shift in the strategic behaviour of US banks. A return to retail has occurred because retail business offers relatively stable returns that can help offset volatility in non-retail business.

For banks, both in the US and elsewhere, several researchers have explored relationships between non-interest income and business strategies, market conditions, technological change and risk-adjusted financial performance (Gallo et al., 1996; DeYoung and Rice, 2004a,b,c; Stiroh, 2004a,b; Calmes and Liu, 2005; Landskroner et al., 2005; Acharya et al., 2006; Stiroh, 2006; Stiroh and Rumble, 2006; Carbo-Valverde and Fernandez, 2007; Laeven and Levine, 2007; Lepetit et al., 2007; Mercieca et al., 2007;

[☆] This paper was reviewed and accepted by the Editorial Board while Professor Giorgio Szego was the Managing Editor of The Journal of Banking and Finance.

* Corresponding author. Tel.: +44 1334 462803; fax: +44 1334 462812.
E-mail addresses: j.goddard@bangor.ac.uk (J. Goddard), dg.mckillop@qub.ac.uk (D. McKillop), jsw7@st-and.ac.uk (J.O.S. Wilson).

¹ Tel.: +44 1248 383221; fax: +44 1248 383228.

² Tel.: +44 2890973646.

Hirtle and Stroh, 2007). Similar attention has not, however, been given to the US credit union sector. In part this is because as financial cooperatives, organised to meet the needs of their members, credit unions have not had the same diversification opportunities as banks. Only since the passage of the Credit Union Membership Access Act 1998 have US credit unions been permitted to offer their members business loans, for commercial, corporate, business investment or property purposes, up to a maximum of 12.25% of assets. At the end of 2004, non-interest income contributed 18% of total operating income. This figure is similar in magnitude to that for US commercial banks in the early 1980s.

Nevertheless, since 2000 there has been a steady increase in the share of non-interest income in operating income for the US credit union sector as a whole. For the larger credit unions, the pace of growth has been exceptional. In our sample (see Section 4), the share of non-interest income in operating income for credit unions with assets greater than \$50 million increased by around 1% on average in each six-month period between 2001 and 2004. This period of rapid growth provides the background for the present study of the impact of revenue diversification on the financial performance of US credit unions.

The remainder of the paper is structured as follows. In Section 2 we describe recent developments in the US credit union sector, including the trend towards product diversification, especially among the larger institutions. In Section 3 we review the theoretical and empirical literature on corporate diversification, with particular emphasis on the financial services sector. In Section 4 we describe our data set, paying particular attention to the trend in growth of non-interest income. In this section we also describe the empirical model. In Section 5 we present and interpret the empirical results concerning the impact of diversification on credit union financial performance. Finally, we summarize and conclude in Section 6.

2. The US credit union sector

Credit unions are financial cooperatives, organised to meet the needs of their members. Surpluses or profits are returned to members in the form of reinvestment in the credit union, dividends to members, or lower interest rates on loan products (Bauer, 2007). Each credit union is governed by its members, who elect (from within the membership) unpaid volunteer officers and directors to determine the policies under which the credit union operates. Voting is one-member-one-vote, regardless of the size of the member's savings or loans balances. At the end of 2004, there were 9138 credit unions in the US, with a membership of 87 million and a total asset base of \$668 billion.³ This figure

represents about 8% of total FDIC-insured commercial bank assets.

Credit unions serve a membership defined theoretically by a common bond. The common bond might restrict membership to a local community, employees of a particular firm, or individuals with some other organizational affiliation (such as a church). The original purpose of the common bond was to enable members to substitute their knowledge of each other's creditworthiness for collateral. Over time, the common bond has become less important, partly because of the formation of nationwide credit bureaus able to provide detailed information on the creditworthiness of individuals. For federally chartered credit unions, the 1998 Credit Union Membership Access Act is widely perceived to have relaxed the constraints imposed by the common bond, by permitting select employee groups (SEGs) to be added to existing fields of membership.

Credit unions were originally distinguished from other financial institutions by their emphasis on small value, unsecured, non-mortgage loans to individuals and households. Federal credit unions gained the authority to make long-term (up to 30 years) mortgage real estate loans in 1977. Previously, federal credit unions were limited to providing short-term mortgage loans such as second mortgages and mobile home loans (Walter, 2006).⁴ According to the credit union national association (CUNA, 2005), at the end of 2004 mortgages amounted to 32% of all loans.

Credit card lending has also grown in importance. Approximately 54% of credit unions offer credit cards (CUNA, 2005). Credit card lending accounts for a large percentage of all unsecured lending, although unsecured loans account for only 10% of all lending. Secured auto loans account for 37% and mortgages account for 32% of all credit union lending. Business loans increased from \$8 billion in 2002 to \$15 billion in 2004 to \$18 billion in 2006, accounting for about 3.5% of all credit union lending. Credit unions also deal in investment products such as bankers' acceptances, cash forward agreements and reverse purchase transactions. These offerings have increased competition between credit unions and other mainstream financial services providers.⁵

In the empirical analysis that is reported in Sections 4 and 5 below, diversification is measured by subdividing total operating income into its interest income and non-interest income components. As far as we are aware, there is no publicly available data detailing the further decomposition of non-interest income for US credit unions. In order to obtain a clearer picture of the principal sources of non-

³ Although the assets and membership of US credit unions have grown over time, the number of institutions has declined through merger and liquidation. In 1970 there were 23,687 credit unions with 22 million members and assets of \$18 billion.

⁴ State chartered credit unions, in a number of states, had the authority to make long-term mortgage real estate loans for several years prior to 1977.

⁵ Recent evidence suggests that credit unions play an important role in promoting competition among retail banks in highly concentrated banking markets (Tokle and Tokle, 2000; Feinberg, 2001; Feinberg and Rahman, 2001; Hannan, 2003; Schmid, 2005).

interest income, in early 2007 we surveyed the websites of the top 100 credit unions, defined in terms of the joint criteria of asset size and component share of non-interest income. The results offer an indicative picture of the relative importance of the various non-interest income sources. The largest single category was loan, share and deposit service charges, with a 50.6% share of total non-interest income. The other categories were deposit, credit card and ATM interchange with a 29.5% share, proceeds from investments and loan sales with a 4.0% share, and other services, including investment services, consultancy, insurance fees, stock and bond brokerage, auto leasing and property sales, with a 15.9% share. From this survey, it is clear that fee and commission income is generated predominantly from credit unions' core savings and loans portfolios. The clustering of non-interest income sources around retail banking products helps explain why the contribution of non-interest income to the total income of credit unions has lagged behind that of commercial banks. However, it is interesting to note that the residual 'other' category includes some relatively specialized products, such as stock and bond brokerage and auto leasing.

3. Diversification and financial performance

A large industrial organization literature (not specific to financial institutions) examines the determinants of corporate diversification, and the impact of diversification on firm value. Motives for diversification can be classified under the headings of market power, agency and resources. Market power refers to the possibility that diversified firms indulge in various forms of anti-competitive behaviour.⁶ Agency refers to the case where managers might wish to pursue growth through diversification, in excess of what is required by shareholders. A shareholder in a publicly traded firm who wishes to eliminate idiosyncratic risk can do so by diversifying her investment portfolio, and therefore does not benefit from a diversification policy implemented by the managers of any individual firm in her portfolio. Since financial cooperatives are not publicly traded, however, the agency view is not applicable in the present case. Resources refers to the *specific assets, core competences* or *distinctive capabilities* of the firm that can, potentially, be exploited in new markets. If these resources were freely marketable, then the rationale for diversification would disappear. If there are significant transaction costs, however, the firm's managers may face the choice

of either exploiting the resources themselves, or leaving them idle.

The extent to which diversification increases or decreases shareholder value in profit-oriented firms is unclear. Some research suggests that diversification has led to a reduction in shareholder value, attributed to inefficient investments in marginally profitable activities, cross-subsidization of loss-making activities, or the pursuit of non-profit managerial objectives (Wernerfelt and Montgomery, 1988; Lang and Stulz, 1994; Berger and Ofek, 1995; Scharfstein, 1998; Siggelkow, 2003). Recently it has been suggested that some of these studies are subject to an endogeneity problem. A finding that diversified firms are more profitable than non-diversified firms is not evidence *per se* that diversification enhances profitability; it could reflect a tendency for diversified firms to outperform their non-diversified counterparts prior to the diversification decision. When the endogeneity of the diversification variable is controlled for, there is some evidence that any relationship between diversification and value disappears (Campa and Kedia, 2002; Graham et al., 2002; Villalonga, 2004).

With reference to diversification on the part of financial institutions specifically, in recent years competitive pressure on earnings streams relative to costs, attributed partly to financial deregulation, has prompted financial institutions to focus on non-interest income, including fee-paying and commission-paying services, bancassurance and off-balance sheet business. Among the motives for diversification, Santomero and Eckles (2000) cite growth, realization of efficiency gains via economies of scale and scope, reduction of idiosyncratic risk, and strengthening of the financial system.

During the 1990s US banks sought to diversify revenues, de-emphasize branch networks and target financial services to a broader range of clients. More recently, however, retail loans and deposits have claimed increasing prominence on commercial banks' balance sheets, and the number of bank branches has increased. The return to retail is motivated in part by the stability of revenue and profit from retail sources, and the volatility of income from non-retail activities such as corporate lending, investment banking, and emerging market activities.

In general, empirical evidence related to the performance and diversification of US banks suggests that expansion into less traditional financial activities is associated with more volatile revenue streams that can offset the risk-spreading benefits of diversification (DeYoung and Rice, 2004b). Demsetz and Strahan (1997) find that while large banks were more diversified than small banks, they also held less capital and granted riskier loans. DeYoung and Roland (2001) find that relationship-based income streams, including interest on loans and securities and service charges on bank deposits, were more stable than non-interest income for large US banks. A shift towards fee-based activities was associated with increased income volatility and higher leverage, both of which imply greater

⁶ For example, under a policy of cross-subsidization a diversified firm uses profits from one market to undercut its competitors in another market. A diversified firm might be in a stronger position than a specialized firm to enter into reciprocal buying agreements, such that Firm A agrees to buy from Firm B on condition that B also buys from A. If A is diversified rather than specialized, it is more likely that A can use B's product, and that a reciprocal buying agreement is feasible for A. Mutual forbearance refers to the situation where two or more large diversified firms recognize each other's market power and opt for peaceful co-existence in various shared markets.

earnings volatility. Stiroh (2004a) finds some gains to diversification within broad activities (such as lending and non-interest activities), but no benefit from diversification across broad activities, for US community banks. An increased focus on non-interest income was associated with a decline in risk-adjusted profitability. Stiroh (2004b) finds that the volatility of the net operating income of US banks declined over the period 1984–2001. However, the non-interest income component became more volatile, and increasingly correlated with interest income, over time.⁷

DeYoung and Rice (2004a) find that an increase in the share of non-interest income was accompanied by a decline in the profitability of US banks. Non-interest income may increase the volatility of total income for three reasons. First, most bank loans are relationship-based and have high switching costs, while most fee-paying services are not relationship-based. Accordingly, interest income from loans may be less volatile than income from fee-paying services. Second, the main input to produce loans is interest expense, which is variable, while the main input to produce fee-paying services is labour, which is quasi-fixed. Consequently fee-paying services may require greater operating leverage than lending, making earnings more vulnerable to a decline in revenue. Third, most fee-paying services require little or no regulatory capital. Therefore fee-paying services tend to employ greater financial leverage than lending. Hirtle and Stiroh (2007) find that the increased focus of US banks on retail banking over the period 1997–2004 was associated with significantly lower equity and accounting returns for all banks, but with lower volatility for large banks only. Stiroh and Rumble (2006) find that diversification benefits exist *between* US financial holding companies. However, these gains are outweighed by increased exposure to non-interest activities, which are more volatile but not necessarily more profitable. *Within* financial holding companies, increased diversification does not improve profitability.

A less uniform picture emerges from studies for countries other than the US. Smith et al. (2003) find that non-interest income is less stable than interest income for a sample of banks from 15 European Union (EU) countries. However, there is negative correlation between interest and non-interest income. DeYoung and Rice (2004a) suggest that the difference between US and European banks may be due to the inexperience of many US banks (small community banks in particular) in fee-paying services. In contrast, universal banking is the historical norm in many EU countries. Carbo-Valverde and Fernandez (2007) show that in European banking, market power tends to increase as banks diversify into non-traditional activities. However, Lepetit et al. (2007) show that banks

diversifying into non-interest activities are at higher risk of insolvency than banks focused on traditional retail activities. Mercieca et al. (2007) analyze the benefits from diversification for a sample of small European banks, which lack the scale to adopt the universal banking model. As in the US, there are no direct diversification benefits within and across business lines, and there is an inverse relationship between non-interest income and profitability.⁸

Laeven and Levine (2007) examine the effects of diversification on the market value of large banks from 42 countries. The market values of diversified banks were lower than those of their specialized counterparts. This suggests that the potential gains from economies of scope are insufficient to produce improved market valuations. Diversification may increase agency problems.

As far as we are aware, Esho et al.'s (2005) Australian study represents the first and only empirical investigation of the impact of diversification on the financial performance of credit unions. Over the period 1993–2001 an increased reliance on fee income generating activities was associated with increased risk. Credit unions with more highly concentrated income streams tended to have higher risk and returns. Those with a higher proportion of total income from interest on residential loans, and a lower proportion of income from interest on personal loans, had significantly lower risk and returns. Credit unions that diversified by increasing the share in income of transaction fees on loans and deposits, matched by a reduction in the income share of interest on personal loans, experienced higher risk and lower returns.

4. Data and empirical model

The data for the empirical study that is reported in Section 5 of this paper are compiled from financial information published by US credit unions in their '5300 Call Reports', made available in various forms by NCUA (National Credit Union Association) and Callahan and Associates. Semi-annual data are available for the period 1993.1–2004.2 inclusive. We investigate the determinants of financial performance using cross-sectional regressions, in which both the dependent variables and the covariates are constructed from either the means or the standard deviations of the relevant variables for each credit union, calculated over the 23 available half-yearly observations on each credit union for the period 1993.2–2004.2 inclusive.⁹ The variable definitions are as follows:

Financial performance indicators

ROA mean value (over 23 half-yearly observations) of return on assets.

⁷ Several studies of the relationship between equity market risk measures and the financial performance of banks suggest that volatility increases as banks shift towards non-interest activities (Cornett et al., 2002; Geyfman, 2005; Stiroh, 2006a,b; Baele et al., 2007). Market-based studies of bank diversification are reviewed by Stiroh (2007).

⁸ Recent studies for individual EU countries include Acharya et al. (2006) for Italy, and Hayden et al. (2006) and Kamp et al. (2007) for Germany.

⁹ The observation for 1993.1 is eliminated in calculating the initial value of the growth of assets covariate.

ROE	mean value of return on equity.
σ_{ROA}	standard deviation (over 23 half-yearly observations) of return on assets.
σ_{ROE}	standard deviation of return on equity.
RAR_{ROA}	risk-adjusted rate of return on assets = ROA/σ_{ROA} .
RAR_{ROE}	risk-adjusted rate of return on equity = ROE/σ_{ROE} .

ROA is defined as the ratio of net income (after loan-loss provisions) to total assets. ROE is the ratio of net income (after loan-loss provisions) to net worth or capital, defined as the sum of reserves, undivided earnings, loan and investment loss provisions, accumulated unrealized gains on securities and uninsured secured capital.

Covariates

NONSH	ratio of non-interest income to operating income.
HHI	One minus Herfindahl index = $1 - [NONSH^2 + (1 - NONSH)^2]$.
lnA	natural logarithm of total assets.
$\Delta \ln A$	change in lnA between the current and previous half-yearly data points.
KA	ratio of net worth to total assets (equivalent to a capital-assets ratio).
LA	ratio of loans to assets.
$\Delta \ln GSP$	change in natural logarithm of GSP (gross state product) for the state in which the credit union is registered (between current and previous half-yearly data points).
$\Delta \ln POP$	change in natural logarithm of the population for the state in which the credit union is registered (between current and previous half-yearly data points).
MEM	ratio of actual members of the credit union to potential members, as determined by the common bond definition.
STAT	1 for state chartered, 0 for federally chartered credit unions.
MULT	1 for multiple common bond, 0 for single common bond credit unions.

Except for the dummy variables, the covariates in the cross-sectional regression are the mean values of the relevant variables as defined above, calculated over the 23 half-yearly observations. The specification of the estimated model is as follows:

$$Y = \alpha + \beta_1 NONSH + \beta_2 (1 - HHI) + \beta_3 \ln A + \beta_4 \Delta \ln A + \beta_5 [\Delta \ln A]^2 + \beta_6 KA + \beta_7 LA + \beta_8 \Delta \ln GSP + \beta_9 \Delta \ln POP + U \quad (1)$$

where Y = either ROA, ROE, σ_{ROA} , σ_{ROE} , RAR_{ROA} or RAR_{ROE} , and U is an error term.

It is important to note that the interpretation of the ROA and ROE measures differs in certain respects between

credit unions and other types of financial cooperatives on the one hand, and commercial banks and other profit-maximizing financial service providers on the other hand. The ultimate owners of the credit union are its members, who in principle may receive a return on their stake through either below-market rates charged on loans to borrowers, or above-market rates paid in the form of interest or dividends on the deposits of savers. Retained earnings which increase the credit union's capital also increase its future capacity to offer its members subsidies of this kind (Wilcox, 2006a; Bauer, 2007). Therefore the net earnings figure that enters the numerators of the ROA and ROE indicators is in certain respects analogous to the retained profit figure of a bank that is financed by shareholder equity.

Despite this qualification, we take the view that the credit union ROA and ROE indicators are meaningful measures of financial performance. While there is evidence that some credit unions offer preferential rates for certain financial products (e.g. regular savings accounts), for others (e.g. mortgages) there are no systematic differences (US Government Accountability Office, 2006). The cooperative status of credit unions is neither the sole reason nor the principal reason why their rates may differ systematically from those of banks. For example, tax-exempt status confers an implicit subsidy upon credit unions, part of which may be passed on to members through preferential rates. Banks may simply offer a superior quality of service; or by lending to wider segments of the population, banks may incur higher screening or monitoring costs or higher default rates. The ROA metric is the core earnings variable in the computation of CAMEL ratings by NCUA, which reflect "the level, growth trends and stability of earnings, particularly the return on average assets; and the sufficiency of earnings to cover necessary formation of physical capital and financial commitments" (NCUA, 2000, p. 15). Finally, we note that the use of similar or equivalent cost or profit metrics for cooperative or other non-profit financial institutions is commonplace in the academic literature (Maudos et al., 2002; Emmons et al., 2004; Stiroh, 2004a; Esho et al., 2005; Bos and Kool, 2006; Carbo-Valverde et al., 2007; Mercieca et al., 2007).

The overall effect of revenue diversification on each of the financial performance indicators is identified from the regression coefficients on NONSH and $1 - HHI$ in (1). Effectively, the model specification allows for a quadratic relationship between NONSH and the dependent variable. For variations of NONSH between its theoretical minimum value of zero and its maximum of one, it is possible to identify two effects. First, the *direct exposure effect* measured by the coefficient β_1 , is the effect that is due to a component of total income being derived from non-interest bearing activities rather than interest bearing activities. Second, the *indirect exposure effect* measured by the coefficient β_2 , reflects the effect of the extent to which the credit union itself is either specialized or diversified between interest-bearing and non-interest bearing activities. As the direct exposure effect varies between its minimum ($NONSH = 0$)

and maximum (NONSH = 1) values, $1 - \text{HHI}$ is maximized when NONSH = 0.5 (maximum indirect exposure effect), and $1 - \text{HHI}$ is minimized when NONSH = 0 or NONSH = 1 (zero indirect exposure effect). The overall marginal effect of a small change in NONSH on Y (for each of the six financial performance indicators), taking account of both the direct and indirect exposure effects, is $\partial Y / \partial \text{NONSH} = \beta_1 + 2(1 - 2\text{NONSH})\beta_2$.¹⁰

The inclusion of NONSH and its quadratic transformation HHI among the covariates raises a possible endogeneity issue. Besides influencing financial performance, NONSH could also be influenced, at least in part, by financial performance. For example, a record of low or variable returns from interest-bearing activities could motivate a credit union to diversify into non-interest bearing activities in an attempt to earn a higher or a less volatile return. In the empirical investigation, we address this endogeneity issue by instrumenting NONSH.

Since NONSH is constrained to lie within the interval (0, 1), the dependent variable in the instrumental variables regression is the logit of NONSH, $Z = \ln[\text{NONSH} / (1 - \text{NONSH})]$. The fitted values of the dependent variable from the instrumental variables regression, denoted \hat{Z} , are used to calculate $\hat{\text{NONSH}} = \exp(\hat{Z}) / [1 + \exp(\hat{Z})]$ and $\hat{\text{HHI}} = [\hat{\text{NONSH}}^2 + (1 - \hat{\text{NONSH}})^2]$. A final issue concerns the computation of the standard errors of the coefficients on NONSH and HHI in (1). The coefficient variance-covariance matrix should be based on NONSH and HHI and not on $\hat{\text{NONSH}}$ and $\hat{\text{HHI}}$. However, since $\hat{\text{NONSH}}$ and $\hat{\text{HHI}}$ are non-linear transformations of the fitted values of the dependent variable (the logit of NONSH) in the instrumental variables regression, the standard formula for the variance-covariance matrix is inapplicable. We therefore use bootstrap standard errors for the estimated coefficients in (1).¹¹

The exogenous variables that are included in (1) and in the instrumental variables regression are $\ln A$, $\Delta \ln A$, $[\Delta \ln A]^2$, KA, LA. The instrumental variables regression also includes: MEM, STAT and MULT, as defined above; an interaction term for state chartered multiple common bond credit unions ($\text{MULT} \times \text{STAT}$); and a full set of 49 0-1 dummy variables that identify the state in which the credit union is registered. The state dummy variables are perfectly collinear with $\Delta \ln \text{GSP}$ and $\Delta \ln \text{POP}$, which appear in (1) but are superfluous in the instrumental variables regression.

Among the other covariates of (1), $\ln A$ controls for the asset size of the credit union, and $\Delta \ln A$ controls for the

growth of assets. We find evidence of a non-linear relationship between growth and financial performance in most cases, so a separate term in $[\Delta \ln A]^2$ is also included. In theory, an excessively high value of KA (capital-assets ratio) could signify that a credit union is operating over-cautiously and ignoring investment opportunities that are capable of generating a positive return. On the other hand, the cost of insurance against bankruptcy may be high for a credit union with a low KA. This would suggest a positive association between KA and returns (Berger, 1995). Alternatively, according to the signalling hypothesis, managers may have both private information as to the financial institution's future value, and a stake in the institution's value through personal membership. It may be less costly for managers of low-risk institutions to signal quality by maintaining a high KA than for managers of high-risk institutions.

The covariate LA (loans-assets ratio) is interpreted a measure of lending specialization. Freixas (2005) suggests that lending specialization provides informational advantages, which may reduce intermediation costs and increase returns.

Empirical evidence suggests that regional economic conditions influence bank profitability (Avery and Gordy, 1998; Berger et al., 2000; Daley et al., 2003; Furlong and Krainer, 2007). Accordingly, the covariates $\Delta \ln \text{GSP}$ and $\Delta \ln \text{POP}$ control for average growth in gross state product and state population, respectively.¹²

A credit union's services can be accessed only by those individuals who fall within its field of membership defined by its common bond. Therefore MEM (the ratio of actual to potential members) controls for the extent to which a credit union has captured its potential market. In a preliminary analysis of the data, we found that the correlation between NONSH and MEM is high, but the correlations between each of the financial performance indicators and MEM are relatively low.¹³ Accordingly MEM is used as an instrument for NONSH.

The Callahan and Associates database provides information on 9138 institutions that were live in 2004.¹⁴

¹² The data on gross state product and state population are obtained from the US Bureau of Economic Analysis.

¹³ The sample correlation coefficient between MEM and NONSH is $-.290$. The sample correlations between MEM and ROA, ROE, σ_{ROA} , σ_{ROE} , RAR_{ROA} and RAR_{ROE} are $.059$, $-.090$, $.058$, $-.047$, $-.027$ and $-.031$, respectively.

¹⁴ Credit unions with incomplete data for the period 1993.1 to 2004.2 were eliminated from the sample, reducing the sample size to 8910 institutions. Very few credit unions were formed between 1993 and 2004, but around 3500 credit unions disappeared through merger and acquisition or liquidation over this period. Evidence suggests that small credit unions were more likely to disappear (through acquisition or failure) than their larger counterparts (Wilcox, 2005a,b). In the present study, the smaller credit unions tend to be less diversified. Therefore it is likely that the estimations reported below are subject a form of survivorship bias. This seems unavoidable, because we require complete data over a certain number of time periods in order to calculate a mean and (especially) a standard deviation of ROA and ROE for each credit union.

¹⁰ The variance of the estimated $\partial Y / \partial \text{NONSH}$ is $\text{var}(\hat{\beta}_1) + 4(1 - 2\text{NONSH})^2 \text{var}(\hat{\beta}_2) + 2(1 - 2\text{NONSH}) \text{cov}(\hat{\beta}_1, \hat{\beta}_2)$.

¹¹ This procedure involves constructing bootstrap samples by sampling with replacement from the data set used for each estimation. For each bootstrap sample, the fitted values from the instrumental variables regression are used to calculate $\hat{\text{NONSH}}$ and $\hat{\text{HHI}}$, which are then used as covariates in (1). The bootstrap standard errors are the standard deviations of the coefficients obtained from (1) over 5000 replications of the bootstrap procedure.

The following exclusion criteria were applied to eliminate individual observations with extreme or non-sensical values for individual variables: share of non-interest income in total income ≤ 0 ; natural logarithm of total assets > 9.00 ; one-period logarithmic growth in total assets either < -0.5 or > 0.75 ; capital-assets ratio either ≤ 0 or > 0.5 ; loans-assets ratio either ≤ 0.05 or > 0.95 ; potential members ≤ 0 ; and ratio of members to potential members ratio > 1 . The data for any credit union with an individual observation excluded under any of these criteria was reclassified as incomplete, resulting in the exclusion of that credit union from the sample. This procedure further reduced the sample size to 5784 credit unions.

Table 1 reports the mean share of non-interest income in total income, and the correlation between the growth in interest and non-interest income, for all 5784 sample credit unions and for credit unions in each of six assets size bands, for each of the 23 half-yearly data points between 1993.2 and 2004.2. These data indicate that non-interest income has increased in importance over time. The share of non-interest income tends to be greater for larger credit unions. The growth of non-interest income has gathered momentum since 2000, especially for the larger credit unions. The correlations between the rates of growth of both income components are predominantly but not exclusively positive. It is likely that the positive correlation reflects the tendency for most credit unions to focus on the provision of services to individuals and households, and to generate non-interest income through the cross-selling of fee and commission products linked to core savings and loan products. Table 2 reports descriptive statistics for the sample mean values of each of the main variables for each of the 5784 sample credit unions.

5. Estimation results

In this section, we report and interpret the results of the empirical analysis. We start by reporting the instrumental variables regression, which is estimated over all 5784 sample credit unions:

$$Z = .2141\ln A - .3279\Delta\ln A + 18.25[\Delta\ln A]^2 \\ \quad \quad \quad 25.34 \quad \quad - 0.46 \quad \quad 7.92 \\ - 4.044KA - .1336LA - .9679MEM + \text{error} \\ \quad \quad \quad - 14.40 \quad \quad - 1.40 \quad \quad - 18.54$$

The dependent variable is $Z = \ln(\text{NONSH}/(1 - \text{NONSH}))$. The estimated intercept and coefficients on MULT, STAT, MULT \times STAT and the US state dummy variables are not reported. *z*-statistics are reported in italics.

The coefficients on $\ln A$ suggest, as expected, that NONSH tends to be higher for the larger credit unions and higher for the faster-growing credit unions. Although the coefficient on the linear term in $\Delta\ln A$ is insignificant, the coefficient on the squared term in $[\Delta\ln A]^2$ is positive and significant. The coefficients on KA suggest that highly capitalized credit unions tend to have a lower NONSH.

The coefficients on LA are less well defined, but also suggest a negative association with NONSH.

The coefficient on the instrumental variable MEM is negative and highly significant. Therefore credit unions that have been successful in achieving a membership close to the maximum tend to have a lower NONSH. The *F*-statistic for the joint significance of MEM, MULT, STAT and MULT \times STAT and the state dummies is 14.5. These variables make a satisfactory contribution to the explanatory power of the instrumental variables regression, according to criteria recommended by Staiger and Stock (1997).¹⁵

Table 3 reports the estimation results for (1), in which the dependent variables and covariates are defined as the sample mean values of six financial performance indicators defined previously (ROA, ROE, σ_{ROA} , σ_{ROE} , RAR_{ROA} and RAR_{ROE}). Based on the estimated coefficients on NONSH and HHI, Table 3 also reports the marginal effect of a small change in NONSH on each dependent variable ($\partial\text{ROA}/\partial\text{NONSH}$ and so on), taking into account both the direct and indirect exposure effects (see Section 4), for NONSH = 0.0, 0.05, 0.1, 0.15, 0.2 and 0.25.

Table 4 reports the corresponding results for the risk-adjusted returns indicators RAR_{ROA} and RAR_{ROE} from estimations in which the 5784 credit unions are split into three asset size bands based on sample mean values: mean assets less than \$10 million (2501 credit unions), between \$10 million and \$50 million (2057 credit unions), and greater than \$50 million (1226 credit unions). The samples and subsamples for all of the estimations reported in Tables 3 and 4 are trimmed by dropping the observations for which the dependent variable lies above the top percentile and below the bottom percentile.

5.1. Effects of revenue diversification on the financial performance of credit unions

In Table 3 the estimated coefficients in the regressions for ROA and ROE suggest that an increased reliance on non-interest income is associated with higher unadjusted returns; but at the same time a more highly diversified revenue portfolio is associated with lower returns. Over the range of values of NONSH that is characteristic of most credit unions, the marginal effect of a small change in NONSH on ROA ($\partial\text{ROA}/\partial\text{NONSH}$) is negative, but the absolute size of this negative effect diminishes as NONSH increases. In other words, over typical values of NONSH, the negative indirect exposure effect of an increase in NONSH tends to dominate the positive direct exposure effect, and any further increase in NONSH tends to reduce returns. The adverse effect on returns is larger for credit

¹⁵ Staiger and Stock recommend that this *F*-statistic should exceed 10. In the regression of the logit of NONSH on $\ln A$, $\Delta\ln A$, $[\Delta\ln A]^2$, KA, LA, $\Delta\ln\text{GSP}$ and $\Delta\ln\text{POP}$ only, $R^2 = 0.2613$. For the regression reported above, with the instrumental variables MEM, MULT, STAT and MULT \times STAT included and $\Delta\ln\text{GSP}$ and $\Delta\ln\text{POP}$ replaced by a set of state dummy variables, $R^2 = 0.3549$.

Table 1
 Mean share of non-interest income in total income, and correlation between growth in interest and non-interest income by asset size band and by half-yearly period, 1993.2–2004.2

	Mean share of non-interest income in total income							Correlation between growth in interest income and growth in non-interest income						
	Assets							Assets						
	All	<\$2m	\$2–5m	\$5–10m	\$10–50m	\$50–100m	>\$100m	All	<\$2m	\$2–5m	\$5–10m	\$10–50m	\$50–100m	>\$100m
1993.2	.0946	.0590	.0656	.0862	.1112	.1316	.1347	.0251	.0148	–.0066	.1025	–.0096	.0872	–.0334
1994.1	.0925	.0543	.0641	.0874	.1071	.1279	.1281	.0492	–.0210	.0775	.0624	.0926	.1915	.0911
1994.2	.0920	.0587	.0671	.0877	.1057	.1244	.1208	.0745	.0073	.0637	.0560	.1615	.2710	.0503
1995.1	.0911	.0540	.0675	.0877	.1039	.1228	.1200	.0645	.0676	.0696	.0827	.0478	.0260	–.0079
1995.2	.0935	.0583	.0700	.0881	.1065	.1235	.1228	.0441	.0296	.0521	.0538	.0314	–.0529	.2390
1996.1	.0933	.0567	.0673	.0873	.1062	.1230	.1244	.0395	.0040	.0437	.0528	.0672	.1233	.1498
1996.2	.0964	.0568	.0725	.0900	.1101	.1248	.1265	.0976	.0797	.0276	–.0121	.2071	.2423	.1626
1997.1	.0938	.0517	.0682	.0871	.1071	.1218	.1259	.0908	.0397	.0548	.0879	.1733	.0969	.0603
1997.2	.0997	.0600	.0756	.0909	.1127	.1266	.1325	.0882	.0307	.0719	.2174	.0537	.1136	–.0129
1998.1	.0993	.0539	.0715	.0916	.1122	.1278	.1339	.0533	.0106	.0542	.1663	.0544	.0525	.1515
1998.2	.1074	.0607	.0794	.0972	.1197	.1374	.1446	.0269	–.0015	.0357	.0988	.0410	.0450	.1759
1999.1	.1070	.0537	.0763	.0960	.1200	.1365	.1452	.0283	.0160	–.0040	.1240	.0335	.1562	.1127
1999.2	.1154	.0630	.0858	.1040	.1286	.1452	.1529	.0606	–.0378	.0764	.1604	.0057	.2585	.0085
2000.1	.1110	.0552	.0804	.1013	.1237	.1390	.1496	.0465	–.0076	.0580	.0242	.0503	.1519	.0961
2000.2	.1136	.0559	.0850	.1026	.1272	.1403	.1511	.1711	.2269	.1171	.1324	.1429	.0969	.0907
2001.1	.1191	.0561	.0833	.1085	.1308	.1474	.1623	.1756	.2288	.0989	.1601	.1775	.1407	.1461
2001.2	.1264	.0581	.0889	.1111	.1381	.1584	.1734	.1297	.0371	.1023	.1896	.1999	.0703	.1649
2002.1	.1303	.0601	.0877	.1132	.1407	.1629	.1781	.0860	.0103	.0708	.0991	.1297	.2651	.0550
2002.2	.1451	.0664	.1006	.1244	.1563	.1802	.1985	.1123	–.0011	.0885	.1599	.1274	.4420	.0384
2003.1	.1531	.0636	.0980	.1276	.1625	.1930	.2170	.1127	.0069	.1731	.0760	.1301	.2372	.1374
2003.2	.1642	.0753	.1074	.1393	.1746	.2077	.2243	.1469	.0710	.2033	.0330	.2844	.1716	–.0992
2004.1	.1678	.0704	.1097	.1428	.1771	.2140	.2284	.0824	–.1079	.1390	.1414	.2255	.1061	–.0260
2004.2	.1800	.0795	.1218	.1520	.1914	.2304	.2403	.1848	.1438	.2478	.2149	.2359	–.0647	.1529

Note: Results for each half-yearly period are calculated using data for 5784 credit unions.

Table 2
Sample descriptive statistics

	Mean	Standard deviation
ROA	.0047	.0021
ROE	.0396	.0176
σ_{ROA}	.0033	.0026
σ_{ROE}	.0291	.0201
RAR_{ROA}	1.9679	1.3175
RAR_{ROE}	1.8011	1.1528
NONSH	.1168	.0741
1–HHI	.1911	.1035
ASSETS	57.6	235.5
$\Delta \ln A$.0279	.0190
KA	.1226	.0435
LA	.6238	.1278
$\Delta \ln GSP$.0261	.0041
$\Delta \ln POP$.0050	.0034
MEM	.5079	.2145

Note: Descriptive statistics are for the sample mean values of each variable, calculated over 23 observations from 1993.2 to 2004.2, for each of 5784 credit unions. ASSETS are measured in US\$ million.

unions starting from a low value of NONSH than for those starting from a high value of NONSH.¹⁶

For credit unions that are heavily concentrated in interest income (with a low non-interest income share) in particular, marginal increases in non-interest income impact adversely upon returns. Table 1 indicates that low levels of diversification tend to be associated with smaller credit unions. It is likely that many smaller credit unions are disadvantaged relative to their larger counterparts, in terms of both staff expertise and technological capability. Small credit unions are commonly dependent on volunteers, who may have insufficient expertise or experience in financial services provision to be able to formulate or implement a strategy of product or service diversification. Furthermore, data supplied by Callahan and associates suggests that the paid employees of larger credit unions are of higher quality on average than those of the smaller ones. The average levels of employee compensation in 2004 for full-time equivalent employees were \$26,880 for credit unions with asset size up to \$10 million, \$37,737 for asset size between \$10 million and \$50 million, and \$45,032 for asset size over \$50 million. Since 2000, NCUA have reported survey data on the adoption by US credit unions of various technological innovations. In this case as well, there is a significant size effect. For example, in December 2001 the proportions of credit unions in the same three asset size bands that supported a transactional website

were 2.6%, 25.4% and 53.2%, respectively. In December 2004, the corresponding proportions were 8.2%, 55.6% and 50.0%.¹⁷

Further evidence of the importance of economies of scale and scope for the cost-effective provision of non-interest income services is provided by CUNA (2005), who report a descriptive profile of US credit unions by asset size band. For example, credit unions with assets of less than \$2 million primarily offer their members shares and loans. Only 29% of credit unions in this size band are automated clearing house (ACH) receivers. In contrast, credit unions with assets of between \$5 million and \$10 million have a sufficiently large membership to support more extensive services. Typically they provide larger loans and offer share drafts and IRAs. 41% of credit unions in this size band offer credit cards, 55% offer ATM access, and 78% are ACH receivers. Credit unions with assets between \$50 million and \$100 million are capable of being full-service financial institutions. Around 90% of credit unions in this size band are ACH receivers, and a similar proportion offer ATM access. Many also support telephone and internet banking. Further product portfolio differences emerge in the highest size categories. For example, credit unions with assets of less than \$100 million lend heavily to support vehicle purchase, while those with assets exceeding \$1 billion are heavily involved in first mortgage lending (which has increased the interest rate exposure of this group).

In Table 3, the estimated coefficients in the regressions for the volatility measures σ_{ROA} and σ_{ROE} suggest that an increased reliance on non-interest income is associated with higher volatility; but a more highly diversified revenue portfolio is associated with lower volatility. These results are consistent with the notion that while returns from non-interest bearing activities tend to be less stable than those from interest bearing activities, there is also a gain in the form of greater stability of overall returns for more highly diversified credit unions. Overall, the marginal effect of a small change in NONSH on σ_{ROA} and σ_{ROE} tends to be negative at low values of NONSH, and positive at high values of NONSH. However, none of the estimated values of $\partial \sigma_{ROA} / \partial \text{NONSH}$ or $\partial \sigma_{ROE} / \partial \text{NONSH}$ is statistically significant. Therefore it appears that the direct and indirect effects on volatility come close to cancelling each other out.

The patterns in the estimated coefficients in the regressions for the risk-adjusted returns measures RAR_{ROA} and RAR_{ROE} in Table 3 are similar to those for the unadjusted measures ROA and ROE. As before, the direct exposure effect (coefficient on NONSH) is positive, the indirect exposure effect (coefficient on 1–HHI) is negative, and over typical values of NONSH the marginal effect of a small change in NONSH on risk-adjusted returns is negative and diminishing in absolute value as NONSH

¹⁶ In economic terms, the effects are modest but non-negligible. For example, according to the effects reported at the bottom of Table 3, an increase in NONSH from 0.0 to 0.1 would reduce ROA by 0.00037, or about 0.2 standard deviations (where standard deviation refers to the cross-sectional standard deviation of the mean ROA for each credit union over the 23 half-yearly observations during the sample period). An increase in NONSH from 0.1 to 0.2 would reduce ROA by 0.00031, or about 0.15 standard deviations. For RAR_{ROA} the corresponding effects would equate to around 0.3 standard deviations and 0.21 standard deviations, respectively.

¹⁷ Between 2001 and 2004, the number of credit unions with assets exceeding \$50 million increased by more than 50%. This increase in numbers appears to account for the drop in the percentage in the top size band that supported a transactional website.

Table 3
Estimation results for full sample period

Dependent variable →	ROA	ROE	σ_{ROA}	σ_{ROE}	RAR_{ROA}	RAR_{ROE}
<i>Covariates ↓</i>						
NONSH	0.0020 <i>0.60</i>	0.1248*** <i>4.23</i>	0.0192*** <i>3.27</i>	0.0779* <i>1.84</i>	4.2911 <i>1.55</i>	4.0075 <i>1.63</i>
1–HHI	–0.0030 <i>–1.24</i>	–0.0850*** <i>–4.05</i>	–0.0114*** <i>–2.79</i>	–0.0404 <i>–1.35</i>	–4.1494** <i>–2.17</i>	–3.8390** <i>–2.27</i>
lnA	0.0001*** <i>3.50</i>	0.0007*** <i>4.08</i>	–0.0006*** <i>–17.23</i>	–0.0042*** <i>–15.25</i>	0.3421*** <i>21.75</i>	0.2922*** <i>22.06</i>
Δ lnA	0.0677*** <i>41.81</i>	0.5500*** <i>42.57</i>	–0.0052** <i>–2.25</i>	–0.0819*** <i>–4.28</i>	24.9581*** <i>25.36</i>	24.0428*** <i>26.23</i>
$[\Delta$ lnA] ²	–0.0054 <i>–0.85</i>	0.0125 <i>0.24</i>	0.0394*** <i>3.64</i>	0.3995*** <i>4.04</i>	–15.7916*** <i>–3.31</i>	–15.1021*** <i>–3.23</i>
KA	0.0211*** <i>24.50</i>	–0.0523*** <i>10.72</i>	0.0071*** <i>7.78</i>	–0.1129*** <i>–16.48</i>	3.6692*** <i>9.67</i>	3.2498*** <i>10.07</i>
LA	–0.0001 <i>–0.55</i>	–0.0011 <i>–0.81</i>	0.0012*** <i>5.08</i>	0.0117*** <i>6.51</i>	–0.7096*** <i>–6.62</i>	–0.5856*** <i>–6.47</i>
Δ lnGSP	0.0178* <i>1.66</i>	0.1140 <i>1.34</i>	–0.0226* <i>–1.80</i>	–0.2763*** <i>–2.66</i>	21.7970*** <i>3.16</i>	27.1978*** <i>4.52</i>
Δ lnPOP	–0.0352*** <i>–2.84</i>	–0.3393*** <i>–3.40</i>	0.0442*** <i>3.02</i>	0.4315*** <i>3.50</i>	–43.9396*** <i>–5.13</i>	–47.0423*** <i>–6.40</i>
<i>Marginal effect of a small change in NONSH (sum of direct and indirect exposure effects) = ∂ROA/∂NONSH etc.</i>						
NONSH = 0.0	–0.0040**	–0.0451***	–0.0035	–0.0029	–4.0078***	–3.6705***
0.05	–0.0037***	–0.0366***	–0.0024	0.0011	–3.5928***	–3.2866***
0.1	–0.0034***	–0.0281***	–0.0013	0.0052	–3.1779***	–2.9027***
0.15	–0.0031***	–0.0196***	–0.0001	0.0092	–2.7629***	–2.5188***
0.2	–0.0028***	–0.0111*	0.0010	0.0132	–2.3480***	–2.1349***
0.25	–0.0025**	–0.0026	0.0021	0.0173	–1.9331	–1.7510***

Note: *** Denotes coefficient significantly different from zero, two-tail test, 1% significance level; ** same at 5% level; * same at 10% level. *z*-statistics based on bootstrap standard errors are reported in italics. Estimated intercepts are not reported. Estimations are over 5670 cross-sectional observations (after exclusion of outliers). The covariates NONSH and HHI are instrumented.

increases. In Table 4, the same pattern is observed for the two smaller assets size bands. For the largest size band, however, the estimated direct exposure effect is negative and the indirect exposure effect is positive. However, none of the coefficients on NONSH and 1–HHI reported in Table 4 is significant. This suggests that the empirical relationship between diversification and financial performance is size-dependent, and that this relationship is not apparent within subsamples that are defined using a size criterion.

Esho et al. (2005) find that an increase in the share of loan and deposit transaction fees in the total income of Australian credit unions, matched by an equal reduction in the share of interest income on personal loans, was associated with higher risk and lower earnings principally because transaction fees were squeezed in response to increasing pressure on interest rate margins. It is interesting to note that the gross spread for US credit unions fell to a two-decade low of 331 basis points in 2004. When credit unions initially expand into non-interest bearing activities, loan and deposit transaction fees are commonly the main areas open to them. The fact that the adverse effect of increases in NONSH on risk-adjusted returns tends to be less for credit unions that already have relatively large NONSH may be due in part to the superior capacity of larger credit unions to exploit diversification opportunities through higher levels of staff expertise and technological capability. Furthermore, diversification, although still

linked to retail provision, can be wider-ranging for larger institutions. Examples of fee and commission services which more diversified and usually larger credit unions tend to enter, but are not accessed to any extent by smaller less diversified credit unions, include auto leasing, stock and bond brokerage, safe deposit boxes, formal financial planning, home banking including relational internet banking services, and business checking. Earlier we noted evidence that US banks are experiencing a renewed interest in retail banking and retrenching from selling a proliferation of products and services in retail, corporate and wholesale banking. “(R)etail focused banks have offered higher risk-adjusted returns, particularly in recent years when wholesale portfolios were negatively affected by the recession and other macroeconomic developments” (Clark et al., 2007, p. 13). In contrast, credit unions are not retrenching into retail in order to improve their risk-adjusted returns, but they are engaged in expansionary diversification within retail.

5.2. Other influences on financial performance

In this subsection, we interpret the estimated coefficients on the control variables lnA, Δ lnA, $[\Delta$ lnA]², KA, LA, Δ lnGSP and Δ lnPOP in the regressions for ROA, ROE, σ_{ROA} , σ_{ROE} , RAR_{ROA} and RAR_{ROE} . In most cases, the coefficients reported in the estimations for RAR_{ROA} and

Table 4
 Estimation results for sample disaggregated by asset size band: Dependent variable = RAR_{ROA} , RAR_{ROE}

Asset size band →	≤\$10m	\$10m-\$50m	>\$50m	≤\$10m	\$10m-\$50m	>\$50m
Dependent variable →	RAR_{ROA}	RAR_{ROA}	RAR_{ROA}	RAR_{ROE}	RAR_{ROE}	RAR_{ROE}
<i>Covariates ↓</i>						
NONSH	3.3400 <i>0.22</i>	5.5114 <i>0.62</i>	-2.1829 <i>-0.38</i>	5.3930 <i>0.38</i>	6.4069 <i>0.84</i>	-3.7861 <i>-0.80</i>
1-HHI	-3.2020 <i>-0.36</i>	-4.8061 <i>-0.81</i>	1.1390 <i>0.25</i>	-4.4114 <i>-0.51</i>	-5.0665 <i>-0.99</i>	2.1386 <i>0.58</i>
lnA	0.3449*** <i>15.18</i>	0.2944*** <i>5.40</i>	0.3153*** <i>6.56</i>	0.2903*** <i>14.23</i>	0.2370*** <i>5.33</i>	0.2850*** <i>7.56</i>
ΔlnA	18.2727*** <i>16.29</i>	34.4867*** <i>20.06</i>	38.0909*** <i>10.75</i>	17.5340*** <i>10.73</i>	32.9094*** <i>21.89</i>	37.2490*** <i>12.97</i>
[ΔlnA] ²	-8.8581* <i>-1.84</i>	-43.5221*** <i>-5.13</i>	-61.9260*** <i>-2.67</i>	-9.6889** <i>-1.99</i>	-41.7126*** <i>-5.64</i>	-48.8254*** <i>-2.59</i>
KA	2.9342*** <i>6.87</i>	4.6677*** <i>5.27</i>	4.3135*** <i>2.69</i>	2.4578*** <i>6.63</i>	4.1924*** <i>5.66</i>	4.2555*** <i>3.09</i>
LA	-0.3696*** <i>-2.95</i>	-1.1349*** <i>-5.29</i>	-1.3926*** <i>-4.02</i>	-0.3373*** <i>-3.15</i>	-1.0125*** <i>-5.62</i>	-0.9755*** <i>-3.46</i>
ΔlnGSP	21.3072** <i>2.19</i>	17.1728 <i>1.60</i>	20.7470 <i>1.17</i>	24.4837*** <i>2.77</i>	17.0700* <i>1.81</i>	39.2877*** <i>2.60</i>
ΔlnPOP	-27.1847** <i>-2.23</i>	-49.1343*** <i>-3.51</i>	-58.6558*** <i>-2.83</i>	-31.5574*** <i>-2.92</i>	-40.5853*** <i>-3.36</i>	-77.2007*** <i>-4.49</i>
<i>Marginal effect of a small change in NONSH (sum of direct and indirect exposure effects) = ∂RAR_{ROA} / ∂NONSH etc.</i>						
NONSH = 0.0	-3.0641	-4.1009	0.0950	-3.4297	-3.7260	0.4910
0.05	-2.7438*	-3.6202*	-0.0189	-2.9886**	-3.2194*	0.2772
0.1	-2.4236**	-3.1396***	-0.1328	-2.5475***	-2.7127***	0.0633
0.15	-2.1034	-2.6590***	-0.2467	-2.1063	-2.2061***	-0.1506
0.2	-1.7832	-2.1784	-0.3606	-1.6652	-1.6995	-0.3644
0.25	-1.4630	-1.6978	-0.4744	-1.2240	-1.1928	-0.5783

Note: *** Denotes coefficient significantly different from zero, two-tail test, 1% significance level; ** same at 5% level; * same at 10% level. *z*-statistics based on bootstrap standard errors are reported in italics. Estimated intercepts are not reported. Estimations for the three asset size bands are over 2406, 2043 and 1221 cross-sectional observations (after exclusion of outliers), respectively. The covariates NONSH and HHI are instrumented.

RAR_{ROE} , (disaggregated by asset size band) in Table 4, are similar to their counterparts in Table 3. For brevity the following discussion focuses on the coefficients reported in Table 3 only.

The estimated coefficients for the assets size and growth control variables lnA, ΔlnA and [ΔlnA]² suggest that larger credit unions deliver higher returns, both adjusted and unadjusted for risk. In addition, larger credit unions experience lower volatility in their returns. This size effect is in line with the findings of Wilcox (2006b), who suggests that large credit unions tend to offer more favourable rates to savers and borrowers than small credit unions, and tend to generate higher ROA, because their operating expenses are low relative to their interest expenses. According to Table 3, faster-growing credit unions tend to deliver higher returns with less volatility.¹⁸

The estimated coefficients on KA in the regressions for ROA and ROE are of opposite signs, but both coefficients on KA are positive in the regressions for RAR_{ROA} and RAR_{ROE} . In common with evidence for commercial banks reported by Berger (1995) and Demirgüç-Kunt and Huizinga (1999), a higher capital-assets ratio is unambiguously

associated with increased risk-adjusted profitability. The estimated coefficients on LA are negative but insignificant in the regressions for ROA and ROE, positive and significant in the regressions for σ_{ROA} and σ_{ROE} , and negative and significant in the regressions for RAR_{ROA} and RAR_{ROE} . Therefore less specialization appears to be associated with higher volatility and higher risk-adjusted profitability. This result contrasts with that found elsewhere in the banking literature, where it has been argued that lending specialization provides information advantages which may lower intermediation costs and improve profitability (Kinsball, 1997; Kolari et al., 1997; Kolari and Shin, 2006). That this is not the case for credit unions may be because credit unions are *de facto* specialized member-based institutions, which already have access to relatively rich information as a consequence of being structured around a defined field of membership.

Finally, credit union financial performance, across a range of specifications, is found to be positively related to growth in GSP. In addition, credit unions located in states with faster growth in GSP tend to experience lower volatility in financial performance. For the growth in state population covariate, the reverse pattern emerges: returns tend to be higher, and volatility tends to be lower, in states with slower population growth.

¹⁸ For an analysis of the growth patterns of US credit unions, see Goddard et al. (2002) and Goddard and Wilson (2005).

6. Conclusion

For US credit unions, the share of non-interest income in total income increased significantly between 1993 and 2004. Between 1993 and 2000, the pace of growth was steady but slow, with the share of non-interest income in total income increasing by about 3%. Between 2001 and 2004, the pace of growth quickened, with the non-interest income share increasing by a further 7%. Over this period, the dichotomy between large and small credit unions widened. By the end of 2004, the share of non-interest income for credit unions with assets of more than \$100 million was about three times that of credit unions with assets below \$2 million. The growth of non-interest income has been made possible by technological progress and deregulation, and the opportunities have been more readily open to exploitation by the larger institutions. Lines of business that have been the subject of diversification activity include stock and bond brokerage, mutual funds, financial planning, business checking and (to a lesser extent) auto leasing. Smaller credit unions have, in the main, shied away from these opportunities. For all US credit unions, however, growth in non-interest income has been centered primarily upon new product developments around their existing member-focused savings and loans portfolios.

In this paper we have reported an empirical analysis of the impact of revenue diversification by US credit unions on various financial performance measures. The impact on financial performance of a change in strategy that alters the share of non-interest income is the summation of a direct exposure effect, reflecting the difference in average performance between interest bearing and non-interest bearing activities, and an indirect exposure effect, reflecting the effect of the institution's own degree of specialization or diversification between the two types of activity. In general, the direct exposure effect on both risk-adjusted and unadjusted returns is positive: average returns were higher from non-interest bearing activities than from interest bearing activities. However, the indirect exposure effect was negative: returns tended to be lower if a credit union was more heavily diversified than if it remained specialized.

Consistent with portfolio theory, an increased reliance on non-interest income is associated with higher volatility of returns, but a more highly diversified revenue portfolio is associated with lower volatility. These results are consistent with the notion that while returns from non-interest bearing activities tend to be less stable than those from interest bearing activities, there is also a diversification benefit in the form of reduced volatility for credit unions with a higher share of non-interest income in total income. Overall, however, it appears that these two effects on volatility come close to cancelling each other out.

Over the range of values for the share of non-interest income in total operating income that characterizes most US credit unions, the negative indirect exposure effect appears to dominate the direct exposure effect in most cases. This negative indirect exposure effect seems likely

to reflect the difficulties encountered by the smaller credit unions in capturing the benefits of diversification, perhaps due to their reliance on non-specialist volunteers with limited levels of expertise or experience, or due to their limited technical capability. For the largest credit unions only, the estimation results suggest that the positive direct exposure effect may have outweighed the negative indirect exposure effect on the (unadjusted) ROA and ROE measures. However, this pattern was less evident for the corresponding risk-adjusted measures. By diversifying more rapidly into non-interest bearing activities, the results suggest that the larger credit unions have been able to improve their unadjusted returns, at the cost of assuming some additional risk.

This results of this study suggest that similar diversification strategies are not appropriate for large and small US credit unions. Small credit unions have neither sufficient scale nor the requisite expertise to diversify away from their core product of loan provision to members. Therefore smaller credit unions should limit diversification and continue to operate as simple savings and loans vehicles. In contrast, the larger credit unions, many of which now have shares of non-interest income in total income of 25% or more, should be encouraged to further exploit diversification opportunities around their core expertise in retail financial services. However, in view of the recent experience of US retail banks, credit unions should be wary of entering lines of business in which they lack the requisite expertise and experience.

Acknowledgements

The authors acknowledge helpful comments and suggestions from Dave Canning at Harvard University, Jerry Coakley at Essex University, Kevin Davis at University of Melbourne, Dave McMillan at University of St Andrews, Phil Molyneux at Bangor University, participants at the Workshop on the Economics of Cooperative Banking held at the Helsinki School of Economics in December 2007, and three anonymous referees. The usual disclaimer applies. The authors wish to thank Callahan and Associates for the data used in the empirical analysis. The first-named author wishes to thank Ente 'Luigi Einaudi' for Monetary, Banking and Financial Studies, Rome, for hospitality and financial support during a visiting appointment as a Targeted Research Fellow in Autumn 2007.

References

- Acharya, V., Hasan, I., Saunders, A., 2006. Should banks be diversified? Evidence from individual bank loan portfolios. *Journal of Business* 79, 1355–1412.
- Avery, R.B., Gordy, M., 1998. Loan growth, economic activity and bank performance. Board of Governors of the Federal Reserve System, Working Paper.
- Baele, L., De Jonghe, O., Vander Venet, R., 2007. Does the stock market value bank diversification? *Journal of Banking and Finance* 31, 1999–2023.
- Bauer, K., 2007. Detecting abnormal credit union performance. *Journal of Banking and Finance*, in press, doi:10.1016/j.jbankfin.2007.04.022.

- Berger, A.N., 1995. The relationship between capital and earnings in banking. *Journal of Money, Credit and Banking* 27, 432–456.
- Berger, P.G., Ofek, E., 1995. Diversification's effect on firm value. *Journal of Financial Economics* 37, 39–65.
- Berger, A.N., Bonime, S.D., Covitz, D.M., Hancock, D., 2000. Why are bank profits so persistent? The roles of product market competition, information opacity and regional macroeconomic shocks. *Journal of Banking and Finance* 24, 1203–1235.
- Bos, J., Kool, C., 2006. Bank efficiency: the role of bank strategy and local market conditions. *Journal of Banking and Finance* 30, 1953–1974.
- Calmes, C.P.A., Liu, Y., 2005. Financial structure change and banking income: A Canada–US comparison. Bank of Canada Working Paper 030-2005.
- Campa, J., Kedia, S., 2002. Explaining the diversification discount. *Journal of Finance* 57, 1731–1762.
- Carbo-Valverde, S., Fernandez, F.R., 2007. The determinants of bank margins in European banking. *Journal of Banking and Finance* 31, 2043–2063.
- Carbo-Valverde, S., Humphrey, D.B., Lopez del Paso, R., 2007. Do cross-country differences in bank efficiency support a policy of “national champions”. *Journal of Banking and Finance* 31, 2173–2188.
- Clark, T., Dick, A., Hirtle, B., Stiroh, K., Williams, R., 2007. The role of banking in the US banking industry: risk, return and industry structure. Federal Reserve Bank of New York, *Economic Policy Review* 13, 39–56.
- Cornett, M., Ors, E., Tehranian, H., 2002. Bank performance around the introduction of Section 20 subsidiary. *Journal of Finance* 57, 501–521.
- Credit Union National Association, CUNA, 2005. Annual Report 2005, Madison, Wisconsin.
- Daley, M.C., Krainer, J., Lopez, J.A., 2003. Does regional economic performance affect bank conditions? New analysis of an old question. Federal Reserve Bank of San Francisco Working Paper 2004-01.
- Demirgüç-Kunt, A., Huizinga, H., 1999. Determinants of commercial bank interest margins and profitability: Some international evidence. *World Bank Economic Review* 13, 379–408.
- Demsetz, R.S., Strahan, P.E., 1997. Diversification, size, and risk at bank holding companies. *Journal of Money, Credit and Banking* 29, 300–313.
- DeYoung, R., Rice, T., 2004a. Non-interest income and financial performance at U.S. commercial banks. *Financial Review* 39, 101–127.
- DeYoung, R., Rice, T., 2004b. How do banks make money? The fallacies of fee income. Federal Reserve Bank of Chicago *Economic Perspectives* 40, 34–51.
- DeYoung, R., Rice, T., 2004c. How do banks make money? A variety of business strategies. Federal Reserve Bank of Chicago *Economic Perspectives* 40, 52–67.
- DeYoung, R., Roland, K.P., 2001. Product mix and earnings volatility at commercial banks: Evidence from a degree of total leverage model. *Journal of Financial Intermediation* 10, 54–84.
- Emmons, W., Gilbert, A., Yeager, T., 2004. Reducing the risk at small community banks: Is it size or geographic diversification that matters? *Journal of Financial Services Research* 25, 259–281.
- Esho, N., Kofman, P., Sharpe, I.G., 2005. Diversification, fee income and credit union risk. *Journal of Financial Services Research* 27, 259–281.
- Feinberg, R.M., 2001. The competitive role of credit unions in small local financial services markets. *Review of Economics and Statistics* 83, 560–563.
- Feinberg, R.M., Rahman, A.F.M. Aatur, 2001. A causality test of the relationship between bank and credit union lending rates in local markets. *Economics Letters* 71, 271–275.
- Freixas, X., 2005. Deconstructing relationship banking. *Investigaciones Económicas* 29, 3–31.
- Furlong, F., Krainer, J., 2007. Regional economic conditions and the variability of rates of return in commercial banking. Federal Reserve Bank of San Francisco Working Paper number 2007-21.
- Gallo, J., Apildado, V., Kolari, J., 1996. Commercial bank mutual fund activities. *Journal of Banking and Finance* 20, 1775–1791.
- Geyfman, V., 2005. Banks in the securities business: Market-based risk implications of Section 20 subsidiaries. Federal Reserve Bank of Philadelphia Working Paper No. 05–17.
- Goddard, J., Wilson, J.O.S., 2005. US credit unions: An empirical investigation of size, age and growth. *Annals of Public and Cooperative Economics* 76, 375–406.
- Goddard, J., McKillop, D., Wilson, J.O.S., 2002. The growth of US credit unions. *Journal of Banking and Finance* 22, 2327–2356.
- Graham, J., Lemmon, M., Wolf, J., 2002. Does corporate diversification destroy value? *Journal of Finance* 57, 695–720.
- Hannan, T.H., 2003. The impact of credit unions on the rates offered for retail deposits by banks and thrift institutions. Board of Governors of the Federal Reserve System Working Paper 2003-6.
- Hayden, E., Porath, D., Westerhagen, N.V., 2006. Does diversification improve the performance of German banks? Evidence from individual bank loan portfolios, Deutsche Bundesbank Working Paper.
- Hirtle, B.J., Stiroh, K.J., 2007. The return to retail and the performance of US Banks. *Journal of Banking and Finance* 31, 1101–1133.
- Kamp, A., Pfingsten, A., Memmel, C., Behr, A., 2007. Diversification and the banks' risk-return characteristics: evidence from loan portfolios of German banks, Deutsche Bundesbank Discussion Paper, Number 05-2007.
- Kinsball, R.C., 1997. Specialization, risk, and capital in banking, New England Economic Review. Federal Reserve Bank of Boston, (November/December), 51–73.
- Kolari, J.W., Shin, G.H., 2006. Assessing the profitability and riskiness of small business lenders in the banking industry. Available at the Social Science Research Network http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1017093.
- Kolari, J.W., Berney, R., Ou, C., 1997. Small business lending and bank profitability. *Journal of Entrepreneurial and Small Business Finance* 5, 1–16.
- Laeven, L., Levine, R., 2007. Is there a diversification discount in financial conglomerates? *Journal of Financial Economics* 85, 331–367.
- Landskroner, Y., Ruthenberg, D., Zaken, D., 2005. Diversification and performance in banking: The Israeli case. *Journal of Financial Services Research* 27, 27–49.
- Lang, L.H., Stulz, R.M., 1994. Tobin's q, corporate diversification, and firm performance. *Journal of Political Economy* 102, 1248–1280.
- Lepetit, L., Nys, E., Rous, P., Tarazi, A., 2007. Bank income structure and risk: An empirical analysis of European banks. *Journal of Banking and Finance*, in press, doi:10.1016/j.jbankfin.2007.12.002.
- Maudos, J., Pastor, J., Perez, F., Quesada, J., 2002. Cost and profit efficiency in European banks. *Journal of International Financial Markets, Institutions and Money* 12, 33–58.
- Mercieca, S., Schaeck, K., Wolfe, S., 2007. Small European banks: Benefits from diversification and the regulatory environment. *Journal of Banking and Finance* 31, 1975–1998.
- NCUA, 2000. CAMEL rating system, Letters to Credit Unions, Number 00-CU-08, November 2000.
- Santomero, A.M., Eckles, D.L., 2000. The determinants of success in the new financial services environment: now that firms can do everything, what should they do and why should regulators care? Federal Reserve Bank of New York, *Economic Policy Review*, 6, No. 4.
- Scharfstein, D.S., 1998. The dark side of internal capital markets II, NBER Working Paper No. 6352.
- Schmid, F., 2005. When for-profits and not-for profits compete. *Managerial Finance* 31 (11), 50–69.
- Siggelkow, N., 2003. Why focus? A study of intra-industry focus effects. *Journal of Industrial Economics* 51, 121–150.
- Smith, R., Staikouras, C., Wood, G., 2003. Non-interest income and total income stability. Bank of England Working Paper, Number 198.
- Staiger, D., Stock, J.H., 1997. Instrumental variables regression with weak instruments. *Econometrica* 65, 557–586.
- Stiroh, K.J., 2004a. Do community banks benefit from diversification? *Journal of Financial Services Research* 25, 135–160.
- Stiroh, K.J., 2004b. Diversification in banking: Is non-interest income the answer? *Journal of Money, Credit and Banking* 36 (5), 853–882.

- Stiroh, K.J., 2006a. A portfolio view of banking with interest and non-interest assets. *Journal of Money, Credit and Banking* 38, 1352–1361.
- Stiroh, K.J., 2006b. New evidence on the determinants of bank risk. *Journal of Financial Services Research* 30, 237–263.
- Stiroh, K.J., 2007. Diversification in banking. In: Berger, A., Molyneux, P., Wilson, J.O.S. (Eds.), *Oxford Handbook of Banking*. Oxford: Oxford University Press, in press
- Stiroh, K.J., Rumble, A., 2006. The dark side of diversification: the case of US financial holding companies. *Journal of Banking and Finance* 30, 2131–2432.
- Tokle, R.J., Tokle, J.G., 2000. The influence of credit union and savings and loan competition on bank deposit rates in Idaho and Montana. *Review of Industrial Organization* 17, 427–439.
- US Government Accountability Office, 2006. Greater transparency needed on who credit union serve and on senior executive compensation arrangements, GAO Report, 07–29.
- Villalonga, B., 2004. Diversification discount or premium? *Journal of Finance* 59, 479–506.
- Walter, J.R., 2006. Not your father's credit Union, Federal Reserve Bank of Richmond. *Economic Quarterly* 92 (4), 353–377.
- Wernerfelt, B., Montgomery, C.A., 1988. Tobin's q and the importance of focus in firm performance. *American Economic Review* 78, 246–250.
- Wilcox, J.A., 2005a. Credit union failures and insurance losses: 1971–2004, Federal Reserve Bank of San Francisco Economic Letter, Number 2005-20, August 19, 2005.
- Wilcox, J.A., 2005b. Economies of scale and the continuing consolidation Credit union failures and insurance losses, 1971–2004, Federal Reserve Bank of San Francisco Economic Letter, No. 2005-29, November 4, 2005.
- Wilcox, J.A., 2006a. Credit union conversion to banks: facts, incentives, issues and reforms. Madison, WI: Filene Research Institute.
- Wilcox, J.A., 2006b. Performance divergence of large and small credit unions, Federal Reserve Bank of San Francisco Economic Letter, No. 2006-19, August 4, 2006.