Credit Union Size and Growth: Tests of the Law of Proportionate Effect

John Goddard[1], Donal McKillop[23] and John Wilson[4]

[1] Department of Economics, University of Wales, Swansea, Singleton Park, Swansea, Wales, SA2 8PP.
[2] School of Management and Economics, Queens University Belfast, Belfast, N. Ireland, BT7 1NN.
[3] Corresponding author.
[4] School of Management, University of St. Andrews, St Catherine's West, The Scores, Fife, Scotland, KY16 9AL.

Abstract

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Cross sectional and panel methods are used to test the law of proportionate effect for Federally Chartered US Credit Unions over the period 1991 to 1997. Size effects on growth are tested, using a model that also incorporates persistence of growth. The model is estimated for all credit unions, and for sub-sectors defined by common bond category. In general, the results suggest that large credit unions tend to grow faster than their smaller counterparts. This superior growth is attributed to merger and acquisition activity, scale economies and the effects of regulation in driving the growth of larger credit unions. Credit unions with above average growth in one period tend to experience below average growth in the next, and small credit unions tend to have more variable growth rates than their larger counterparts. Large credit unions may enjoy advantages associated with learning economies of scale or diversified operations, which make them less susceptible to extreme fluctuations in growth performance.

I. INTRODUCTION

Credit unions are co-operative financial institutions. As self-help democratic institutions, credit unions world-wide have demonstrated the efficacy of co-operative principles to the management of their financial affairs for millions of people[5]. Membership in a credit union is open to all within the accepted common bond of association that can make use of its services and are willing to accept the corresponding responsibilities. Credit union members enjoy equal rights to vote and participate in decisions affecting the credit union, without regard to the amount of their savings or deposits or the volume of business. The major strength of credit unions lies in the fact that their basic philosophy and objectives have such a universal appeal to a diverse range of people, who see benefit in achieving greater self-sufficiency in the running of their financial affairs.

The deregulation of US depository institutions in 1977 had a profound effect on the nature of credit unions both in terms of the kinds of products and services they can provide and in terms of their purpose and management as financial institutions. Deregulation measures also saw the introduction of a less restrictive interpretation of the common bond requirement for membership, thereby increasing potential members and creating conditions for mergers. For example, while the number of credit unions over the ten year period 1987 to 1997 declined from 15,000 to 11,200 the number of members increased from 53 million to 72 million (comparative figures for potential members are 182 million in 1987 to 244 million in 1997). The degree of concentration can be further gauged from the fact that the median share value of the largest 20 credit unions stood at $1,444 million in 1997 compared to $530 million in 1987.[6]

Relaxing previously limited common bond restrictions has brought credit unions into more direct competition with other financial institutions, and in particular retail banks. Over recent

[5] In excess of 97 million people in 84 nations now belong to a credit union and, in aggregate terms, the assets of credit unions world-wide are calculated at $430.5 billion (World Council of Credit Unions, 1997).

[6] It should be noted that among depository institutions, credit unions are generally the smallest. Their median share value totalled $5.1 million at the end of 1997. This amount contrasts with a median total domestic deposit figure of $57.4 million for commercial banks.

years a recurring theme from the banks is that the present tax exemption enjoyed by credit unions amounts to a federal subsidy and gives credit unions unfair advantages.[7] During the course of the 1990s a number of high profile cases have come before the courts challenging the legality of common bond dilution. Legislation was however passed during 1998 maintaining the concept of the common bond while allowing the combining of groups, with different common bonds, in a single credit union. In addition, the legislation does not change credit unions' tax exemption although it does place commercial loan limits on credit unions.

Changes in regulation have provided the impetus for further growth and further consolidation within the US credit union movement. The question, however, remains as to which credit unions will be the main beneficiaries of this growth. The financial literature abounds with studies offering explanations as to why certain financial institutions grow and attain large scale (Berger et al, 1999). A body of literature focuses upon the superior efficiency of large institutions through their access to scale and scope economies (Berger et al, 1993, 1997). The ability of incumbent institutions to erect entry and exit barriers may also be an important determinant. Shepherd (1997) details a wide array of exogenous and endogenous barrier sources. Other aspects of industry structure such as industry size and speed of industry growth may also be important in determining the level and change in concentration (Rose, 1987). Government legislation, through for example its policy towards mergers within a sector may also be a determinant of growth and concentration levels (Neven et al, 1993, 1998).

In contrast to the above, a body of literature has developed which argues industry concentration may in fact be random. The observation is made that the distribution of firm sizes within many industries can be approximated by various skewed distributions, of which the lognormal is most frequently utilised. A stochastic process in which the logarithmic size of

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[7] Credit unions' exemption from federal income tax dates back to the Revenue Act of 1916, which provided tax-exempt status to mutual thrift organisations and co-operatives. The US Attorney General ruled in 1917 that credit unions, which were all state chartered then were entitled to the exemption. The first federal credit unions were chartered in 1934 and granted tax-exempt status in 1935 under a ruling by the Internal Revenue Service.

each firm is subjected to a sequence of purely random shocks over time can generate a skewed distribution of this form. The hypothesis that the growth of each firm in each period is determined randomly was first investigated by Gibrat (1931) and later became known as the law of proportionate effect. The law of proportionate effect suggests that even in the absence of efficiency advantages, market power and regulatory anomalies, industries, due to random influences, may tend to become more concentrated. These random influences may include managerial talent, innovation, changes in demand or taste, organisational structure and of course luck. According to the law of proportionate effect, growth is unrelated to firm size, and large and small firms therefore have equal probabilities of attaining a particular growth rate within any given period. Over time, however, some firms will be 'lucky', and tend to draw an above average share of high growth rates, while others are 'unlucky' and tend to remain the same size or decline. Concentration can therefore be expected to increase naturally over time, with the eventual result being a skewed firm size distribution.

Tschoegl (1983) identifies three testable propositions which derive from the law of proportionate effect: namely, that growth rates are independent of firm size; that the variability of growth across firms is independent of size; and that above or below average growth for any individual firm does not tend to persist from one period to the next. In this paper we test each of these propositions using cross sectional and panel tests on a data set comprising the assets of federal credit unions at six-monthly intervals over the period June 1991 to June 1997. The data set yields twelve semi-annual growth observations for each of the 6,840 federal credit unions included.

Only a limited number of studies have examined the applicability of the law of proportionate effect for financial institutions. Alhadeff and Alhadeff (1964) compare the growth of the largest 200 US banks between 1930 and 1960 and find that smaller banks tended to enjoy the fastest growth. Rhoades and Yeats (1974) and Yeats et al. (1975) also find some evidence of differing average growth rates for different sized banks. More recently, US credit unions have also come under scrutiny. Barron (1992) and Barron et al. (1994) analyse state-chartered credit unions in New York City from 1914 through to 1990. They find that the law of

proportionate effect did not hold, with larger credit unions growing at a proportionately slower rate than smaller credit unions.

The majority of the above studies employed a cross sectional regression of growth over some period upon the initial size of the organisation in question, and optionally a term in lagged growth to allow for persistence in growth over time. If data is also available in a time series format, however, then this approach can be criticised for failing to exploit all available information. Consequently in this study, panel data estimations and tests are also employed.[8]

The rest of the paper is structured as follows. Section II details the econometric methodology employed to test the law of proportionate effect. Section III describes the data set. Information is provided on size and growth characteristics of the sample of federal credit unions as a whole, and sub-divided into their respective common bond categories. Empirical results for the sample period as a whole (1991-1997) and for two sub-periods (1991-1994 and 1994-1997), for federal credit unions as a whole and for the common bond criteria sub-sectors, are presented and discussed in Section IV. A summary and some concluding comments are presented in Section V.

II. METHODOLOGY

In the empirical tests of the law of proportionate effect, we assume that the data generating process for observations of credit union size and growth is:

$$s_{it} - s_{it-1} = a_i + d_t + (b-1)s_{it-1} + u_{it}; \qquad u_{it} = r u_{it-1} + e_{it} \qquad [1]$$

s_{it} is the natural logarithm of size of credit union i at time t. a_i and d_t allow for individual and time effects respectively. The parameter b determines the relationship between size and

[8] Goddard, Wilson and Blandon (1999) employ Monte Carlo methods to compare the power properties of standard cross sectional, pooled cross sectional time series, and panel data procedures. The test bed is manufacturing data for Japan over the period 1980 to 1996. The authors conclude that the panel tests outperform the cross sectional approach in most cases.

growth, and r captures serial correlation (if any) in u_{it}, the error term in the growth equation. e_{it}, a random disturbance, is assumed to be normal, independent and identically distributed (IID) with E(e_{it})= 0 and var.(e_{it}) = $s_e^2 > 0$.

If $b \geq 1$ in equation (1), $a_i = 0$ for all firms. $b > 1$ implies that growth trajectories are explosive. $b = 1$ implies that growth is non-explosive and unrelated to size. In this case the law of proportionate effect is accepted. If $b < 1$ firm sizes are mean-reverting, and $a_i > 0$. In this case, a_i can be considered as being IID with E(a_i) = 0 and var.(a_i) = $s_a^2 \geq 0$. If $s_a^2 = 0$, the individual effects are identical: the size of all credit unions tend to revert towards an identical long-term average value. If $s_a^2 > 0$, the individual effects are heterogeneous. The mean values toward which credit unions converge in size in the long term are specific to each union.

In Section IV, both a cross sectional and a panel test of the law of proportionate effect are reported. Most previous empirical studies are based on cross sectional estimation of a regression of growth over a certain period on initial size (and in many cases, a lagged growth term). If T, the number of time periods over which growth is observed, exceeds one time period in [1], the cross sectional model can be obtained by reparameterising [1] as follows:

$$s_{iT+1} - s_{i1} = a_i + (b-1)s_{i1} + r(s_{i1} - s_{i0}) + v_{iT+1} \qquad [2]$$

where $b = b^T$ and a_i, r and v_{iT+1} are transformations of a_i, ρ and ε_{it}.

For [2] to be estimable, an assumption of homogeneity in a_i (and therefore in a_i) is required; otherwise the number of parameters in [2], n+2, exceeds the number of cross sectional observations, n. If $s_e^2 = 0$, we can write $a_i = a$ and $a_i = a$. If $s_e^2 > 0$ but [2] is estimated

assuming a_i = a, the resulting estimator of b is upward biased and inconsistent. The standard test of the LPE using the t-statistic on $\hat{b}$ -1 loses power, and is therefore loaded towards 'acceptance' of the LPE. Effectively therefore, cross-sectional estimation of the relationship between size and growth excludes the possibility that credit union sizes may tend toward different long-term equilibrium values. Recent advances in the econometric analysis of panel data sets, however, permit estimation, which does not impose any such conditions.

For the purposes of panel estimation, [1] can be re-written as follows:

$$s_{it} - s_{it-1} = a_i(1-r) + (d_t - rd_{t-1}) + (b-1)s_{it-1} + r(s_{it-1} - s_{it-2}) + h_{it} \qquad [3]$$

where: $h_{it} = e_{it} + r(1-b)s_{it-2}$,

Note that the form of η_{it} in [3] does not present any problems for tests of $H_0: b = 1$, because $h_{it} = e_{it}$ under H_0. [3] could be estimated using fixed effects estimation, but the resulting estimator of b is downward biased, and the sampling distribution of the t-statistic on $\hat{b}$ -1 is non-standard. This estimator also produces a full set of estimates of the individual effects, a_i, which may not be required if the main objective is to investigate the size-growth relationship. Breitung and Mayer (1994) suggest an alternative estimation approach which involves deducting the first observation (s_{i0}) for each firm from the right hand side of [3] and incorporating the individual effects into the error term. The estimable model is as follows:

$$s_{it} - s_{it-1} = (d_t - rd_{t-1}) + (b-1)(s_{it-1} - s_{i0}) + r(s_{it-1} - s_{it-2}) + x_{it} \qquad [4]$$

where: $x_{it} = h_{it} + a_i(1-r) + (b-1)s_{i0}$

The Breitung-Mayer panel estimator is denoted $\hat{b}$, and estimated over i = 1…N, and is unbiased under $H_0: b = 1$, while the t-statistic on $\hat{b}$ -1 is asymptotically normal. If $b < 1$, $\hat{b}$ is upward biased because of the presence of $(b - 1)s_{i0}$ in x_{it}. Breitung and Mayer (1994) show that the bias is $b + (1 - b)/2$. Unlike the cross-sectional estimator, however, the properties of $\hat{b}$ under H_0 are unaffected by heterogeneity in a_i.

III. DATA DESCRIPTION

This section discusses the data used to test the law of proportionate effect, using the cross sectional and panel tests described in Section II. The database is constructed from financial information published by federal credit unions in their '5300 Call Reports' made available by the National Credit Union Association (NCUA). Information is compiled on a semi-annual basis for the period June 1991 to June 1997, resulting in a total of twelve time series observations on each union. Continuous data is available for 6,840 federal credit unions over the entire six year period.

As they do with commercial banks and thrift organisations, both state and federal governments charter credit unions. State laws govern state-chartered credit unions' common bond limits and powers. These in turn vary from state to state. Reichert and Rubens (1994) argue that state regulations are typically more liberal than federal regulations. Consequently, state chartered credit unions, operating in a competitive environment, are expected to exploit any competitive advantage associated with their charter by assuming greater levels of risk as measured by higher loan-to-share and loan-to value ratios, more aggressive portfolio management techniques, and possibly higher capital-to-asset ratios to offset the greater risk.[9] To ensure a degree of homogeneity in the data set employed in this investigation, state chartered credit unions were omitted from the analysis. (As of December 1997 there were 4,396 state registered credit

[9] The National Credit Union Share Insurance Fund insures individuals' shares of all federal credit unions and a majority of state credit unions. The remaining state credit unions secure share insurance from various state and private funds.

unions.) A further reason for restricting the analysis to federally chartered credit unions is that state credit unions are unable to branch across state lines and consequently the growth potential, particularly that of the larger state credit unions, may be artificially constrained.

The size variable employed in this study is the conventional measure, total assets (see for example Tschoegl, 1983). In the case of credit unions input based measures, such as employee numbers or capital expenditure, would not be appropriate. The problem centres upon the fact that while large credit unions are faced with the need to hire staff and rent or lease premises to cover their business volume, small credit unions can cover their obligations with volunteer staff and the use of community premises, free of charge. In addition, given that smaller credit unions are more likely to have been more recently formed, it is probable that they can avail more readily of grants and subsidies from both charities and government agencies. Consequently, the implication is that the true cost of operation will exceed the actual cost to a greater extent for smaller credit unions than for larger credit unions.

As earlier indicated credit union membership is open to all within the accepted common bond of association that can make use of its services and are willing to accept the corresponding responsibilities. Many commentators would argue that much of the recent growth in credit unions' share of consumer lending, which in 1997 stood at 12.5 percent, was driven by the more liberal approach adopted by the NCUA to the interpretation of the common bond in the early 1980s. In keeping with this approach the interpretation of the common bond and the associated fields of membership concept became more permissive. Through this change, credit unions were allowed to have more than one common bond group in the same organisation. Later NCUA expanded this policy to allow credit unions in financial difficulty to merge. For example downsizing or closings at manufacturing firms, military bases, and other large employers have significantly reduced the membership base of many occupational credit unions and consequently relaxation of the common bond requirements has been important in permitting credit unions to sustain growth. As of end December 1997, 3,454 of the 6,840 federal credit unions had multiple group fields of membership. These credit unions had a total

membership of 33 million and accounted for approximately 80 percent of total federal union shares.

To explore whether growth rates and growth variability are influenced by common bond categorisation and indeed whether credit unions classed as having multiple common bonds are on a differential growth spectrum from those with more focused common bonds we also sub-divided the federal credit unions into a number of sub-groups. Based on common bond classifications a total of nine sub-groups were considered as follows: Associational (religious, fraternal, other than low-income); Community (other than low-income); Educational; Military; Federal, State and Local Government; Manufacturing; Services; Multiple-Group; and Low-Income (community and Associational). If common bond restrictions were a hindrance to the growth of, for example, larger credit unions, one might expect such a result to be less apparent for those classed as having Multiple-Group common bonds.

Table 1 presents summary information on the asset size of all federal credit unions and by common bond categorisation. It is perhaps interesting to note that the skewness and kurtosis statistics indicate that each of the data series is highly non-normal. The respective series are positively skewed and relative to the normal distribution they exhibit fat tails in their distributions. Clearly the distribution of institutions within the US credit union movement is similar in form to that of most other industrial and financial sectors.

In terms of credit union numbers the sub-groups based upon common bond display considerable differences. Credit unions based upon more than one common bond dominate (Multiple-Group), however, there is also strong representation where membership type is categorised as either Manufacturing, Services or Associational. At the other extreme there is only marginal representation, in terms of credit union numbers, of credit unions classified as Military. This latter category is nevertheless retained as it includes some of the largest credit unions. Indeed credit union '5536 Navy', based at Merrifield Virginia, which is almost three times larger than any other US federal credit union belongs to this category. This size dominance of Military credit unions is highlighted in Table 1. The average asset size of Military credit unions is some six times greater

than the average asset size of Multiple-Group credit unions which in turn is in excess of 50 percent greater than the average asset size of Community credit unions. Thereafter there is a sharp fall in average asset volume with the remaining sub-groups between $5 million and $12.5 million.

IV. EMPIRICAL RESULTS

Table 2 reports our estimates of the parameters b in [2] and b in [4], which identify the relationship between size and growth, for our sample of federal credit unions. Results are reported for the credit unions sector as a whole, and for sub-sectors based upon distinct common bond categorisations. In each case, results are reported for the sample period as a whole (1991-1997) and for two sub-periods (1991-1994 and 1994-1997). The error terms in equations (2) and (4) are found to be heteroscedastic (see below) so all standard errors and hypothesis tests are based on White's heteroscedasticity-consistent estimator of the variance-covariance matrix.

From the evidence presented in Table 2 the law of proportionate effect clearly has little merit as an explanation of credit union growth and market concentration. For the sample period as a whole, the hypotheses H_0: b=0 and H_0: b =0 are rejected at the 1% significance level in both the cross sectional test and the panel test on all credit unions. In both cases, the results indicate that larger credit unions grew faster than their smaller counterparts. For the sub-sectors based on distinct common bond categorisations, the panel test consistently rejects H_0: b =0, with positive and significant estimates of b obtained for all sub-sectors. The cross sectional test, in contrast, is rather more ambiguous. Among the nine sub-sectors, there are seven positive coefficients, but only two are significantly different from zero at the 5% level. Of the two remaining negative coefficients, one is significantly different from zero at the 1% level.

For the two sub-periods 1991-1994 and 1994-1997, the results produced by the panel test are also very consistent. In both cases, positive estimates of b , which are significantly different from zero at the 1% level, are obtained throughout. The cross sectional test, however, is less consistent. For 1991-1994, the estimates of b are negative for all credit unions, and for eight

of the nine sub-sectors. These estimates are significantly different from zero at the 5% level for all credit unions, and for two of the sub-sectors. For 1994-1997, in contrast, there is general agreement between the cross sectional and panel test results. The cross sectional estimates of b are positive for all credit unions, and for eight of the nine sub-sectors. These estimates are significantly different from zero at the 5% level for all credit unions, and for five of the sub-sectors.

Overall, the results suggest that larger credit unions grew faster than their smaller counterparts over the sample period as a whole, and especially during the second half of this period. These results do not depend on the manner in which the data set is structured. For the first half of the sample period, the results are slightly less clear, and do seem to depend on the structure of the data set. In this case, the panel estimates (which are based on six times as many observations) seem to produce results that are more consistent, pointing to the same size-growth relationship as is found for the second half of the sample period. The question to be addressed now is what are the factors, which drive these results? It seems likely that there is more than one factor at work. Merger and acquisition activity, the persistence of scale economies, and the role of regulation each appear to have had a role to play in shaping the credit union movement over the course of the last decade.

Kaushik and Lopez (1994) stress that merger activity has been a highly pervasive influence during recent years. The pattern of consolidation through mergers between credit unions has increased the accessibility of credit unions to the general public, as measured by number of offices and branches. The merger/consolidation trend has also resulted in a safer and more stable credit union movement. However, for merger activity to be important in shaping the growth pattern identified in Table 2, the expectation must be that in the main larger credit unions are the acquiring institutions. Fried et al. (1999), who examined the impact of mergers on credit union service provision, addressed this issue. Over the period 1988 to 1995 the authors sampled 1,654 credit unions (from a population of 6,804) which were involved in merger activity over the period. The sample set included 1,215 acquiring credit unions with an average asset size of $79.5m and 439 acquired credit unions that had an average asset size

of $2.5m. Their results therefore provide solid support for the contention that the stronger growth enjoyed by larger credit unions is in part due to merger activity. Dunne and Hughes (1994) also find that growth through merger and acquisition is a preserve of larger institutions in most other financial and industrial sectors.

There are three main types of regulation, which influence the structure of an industry, namely structural regulation, conduct regulation and prudential regulation. Structural regulation seeks to alter or maintain industry structure. Conduct regulation attempts to alter the behaviour of institutions. Prudential regulation attempts to safeguard the stability of institutions and protect the interest of consumers. On all three counts regulation has been instrumental in furthering the growth aspirations of credit unions, which are already large. Restrictions on the types of business institutions can undertake is one aspect of structural regulation. Lending powers of credit unions have increased, and now allow credit unions to offer revolving lines of credit. This in turn has permitted credit unions to expand into areas such as credit card provision. Home equity loan and general real estate lending has been another significant growth area. With respect to the investment proportion of credit union assets, there has been significant expansion in both the volume and variety allowable under NCUA guidelines. When credit unions were simple savings and loan vehicles, it was clearly easier for small-scale credit unions to compete. Today, a certain critical mass is necessary before it is feasible to offer an expanded array of services. Consequently a growth advantage is conferred on larger credit unions. The relaxed position adopted by the regulatory authorities to defining common bonds and the amalgamation of common bonds may be viewed as an element of conduct regulation. Clearly without such freedoms the acquiring stance adopted by larger credit unions, identified in the earlier discussion of merger activity, would not have proved possible. In terms of prudential regulation, larger credit unions are subject to lower capital requirements than their smaller counterparts. This necessarily implies that larger credit unions have more free capital to pursue expansionist policies.

Economies of scale result from cost savings that occur as an institution changes in size. The assumption is that institutions seek to become large in order to achieve cost efficiencies. If

this process continues it can ultimately lead to a concentrated market structure. As part of a study exploring the operational dynamics of federally chartered and federally insured credit unions, Emmons and Schmid (1999) examine the relationship between asset size and average cost. They find that for small credit unions, average costs increase slightly with asset size. They argue that for small credit unions, subsidies (such as rent-free office space, volunteer workers, and so on) tend to be relatively more important than for large credit unions. As these costs become less important for credit unions with larger asset volumes, average costs decrease sharply, with no evidence of a flattening of the long run average cost curve even at the largest asset volumes. Sustained asset growth by large credit unions is therefore warranted on grounds of cost efficiency.

Table 3 reports estimates of the parameters r in [2] and ρ in [4], which incorporate persistence effects into the growth equation. The parameter r in [2], which quantifies the relationship between growth over the six months before the start of the sample period, and growth over the sample period, does not have a direct interpretation as a measure of persistence from one six-month period to the next. The estimates of r are reported in Table 3 only for the sake of completeness. In contrast, the parameter ρ in [4] provides a suitable measure of the strength and direction of persistence in growth from one six-month period to the next.

In the tests for persistence of growth based on the panel estimations, H_0: $\rho = 0$ is rejected in favour of H_1: $\rho \neq 0$ at the 1% for the credit unions overall, and in 17 out of a possible 27 cases in the tests for sub-sectors over the sample period as a whole and over the two sub-periods. There is consistent evidence, therefore, those credit unions with above average growth in one period tend to experience below average growth in the next. In contrast, most studies of other industrial or financial sectors have found there to be either no persistence of growth (Acs and Audretsch, 1992; Dunne and Hughes, 1994), or positive persistence (Chesher, 1979; Kumar, 1985; Wagner, 1992). A smaller number of researchers have found evidence of negative persistence of growth, perhaps the most notable example being Contini and Revelli's (1989) study of the growth of Italian manufacturing firms.

The negative persistence of growth is clearly a robust result in the present study. Given the structure and operational characteristics of the credit union movement, this finding should perhaps be expected. Credit unions have been subject to unprecedented levels of change during the 1980s and 1990s. Part of this change, as discussed above, has been greater freedom to develop new products, which has been instrumental in improving their growth performance[10]. As relatively homogeneous organisations, credit unions have been able to learn from the experience of others and where possible (accepting limitations due to size constraints) have tended to copy each other in terms of new service provision. Integration of many of the services that involve significant levels of data processing through trade associations such as NCUA, has aided this process. The net effect is that any successful product innovation by an individual credit union is likely to be copied rapidly by other credit unions. Consequently, sustained periods of above average growth are less likely to occur for credit unions than for most other organisational forms. In essence, barriers between different groups of existing firms due to product variety, vertical integration or through ownership differences which have been identified as important in other industries (Caves and Porter, 1977) are less evident within the credit union movement. Consequently, individual credit unions will face difficulty in sustaining above average growth performance over the long term.

A final set of tests investigates the relationship between credit union sizes and the variability (between credit unions and over time) of growth rates. In other words, we test the null hypotheses $H_0: \sigma_v^2(i) = \sigma_v^2$ (homoscedasticity) against $H_1: \sigma_v^2(i) \neq \sigma_v^2$ (heteroscedasticity), where $\sigma_v^2(i)$ = var.(v_i) in [2]; and $H_0: \sigma_\xi^2(i,t) = \sigma_\xi^2$ (homoscedasticity) against $H_1: \sigma_\xi^2(i,t) \neq \sigma_\xi^2$ (heteroscedasticity), where σ_ξ^2=var.($\xi_{i,t}$) in [4]. In both cases, a Lagrange Multiplier test based on an auxiliary regression of the squared residuals in [2] or [4] on the square of the initial size measure, s_{1t-1}^2 in [2] or s_{it-1}^2 in [4], produces parameter estimates denoted $\hat{g}$ (in the cross-

[10] Srinivasan and King (1998) estimate that the market share of credit unions among depository institutions rose from 4.97 percent at the end of 1987 to 8.37 percent by the end of 1997.

sectional estimation) and $\hat{g}$ (in the panel estimation), and test statistics which follow a c_1^2 distribution under the null hypothesis. Results are presented in Table 4.

The null hypothesis of homoscedastic growth is rejected at the 1% level for all credit unions over the sample period as a whole, and over the two sub-periods, in both the cross sectional and panel tests. In all of these cases, a negative coefficient estimate is obtained, indicating that growth rates tend to be more variable for smaller credit unions than for their larger counterparts. For the credit union sub-sectors, the same null hypothesis is also rejected at the 5% level in ten out of 27 cases by the cross sectional test; a negative coefficient estimate is obtained in nine of these ten cases. The null hypothesis is rejected at the 5% level in 22 out of 27 cases by the panel test; a negative coefficient estimate is obtained in all of these cases.

Similar results for other industries have been reported in a number of previous studies (Singh and Whittington, 1968; Jovanovic, 1982; Dunne and Hughes, 1994). A variety of reasons have been suggested to explain this difference in growth rates between large and small organisations. Singh and Whittington and Dunne and Hughes both argue that larger firms are likely to pursue a strategy of diversification, and so can spread risk over a large number of production activities making them less susceptible to fluctuations in growth. Jovanovic argues that larger firms are likely to be older than smaller firms, and may experience learning economies of scale that enables them to avoid costly mistakes. Both arguments would appear to have possible validity in the case of US credit unions.

The issue of the differential impact of management expertise between large and small institutions is stark in the case of credit unions. Credit unions' underlying philosophy is one of mutual self help. The emphasis for small credit unions, perhaps in the early stage of their development, is on educating volunteer leaders so that they can carry out the responsibilities of running the credit union. As volunteers, many are likely to have limited financial and management experience, creating the possibility of significant variability in the performance of these credit unions. Large credit unions, many of which offer services similar to those of retail banks, have sophisticated management teams and a salaried workforce. Assuming some

uniformity in the level of this expertise, it is likely that it will translate into relatively stable growth rates among large credit unions.

In an earlier section we argued that product innovation by individual credit unions would in all likelihood be copied by other credit unions, because barriers such as those that exist in other industries (product variety, vertical integration and ownership differences) are not as immediately apparent for credit unions. Accepting this point it is still the case that when credit unions at the two ends of the size spectrum are compared, significant differences between their product portfolios are found. Barron (1992) argues that discrepancies in size are reflected in large differences in organisational structure and strategy. For example all credit unions irrespective of size offer secured and unsecured personal loans, with most also providing automobile loans. When new product areas are examined, however, a more fragmented picture emerges. During the 1980s increasing numbers of credit unions began to furnish their members with real estate mortgages. In 1980, only 5% of credit unions' assets were held in this form, a figure that by the end of 1997 had increased to 22 percent. This, however, masks a pronounced disparity between small and large credit unions. By 1997 some 99.5 percent of the top 1,000 credit unions offered real estate mortgages compared with a mere 5.5 percent of the bottom 1,000 credit unions. Similarly the 1980s saw a large increase in credit unions offering share draft accounts. Only 16 percent of credit unions provided this service in 1980, but this figure had risen to 55 percent by 1997. Again this clouds differences between credit unions at the opposite ends of the size distribution. Of the top 1,000 credit unions, 98.5 percent in 1997 offered share drafts compared to only 1.6% of the bottom 1,000 credit unions. Similar statistics emerge for other product lines. 98.1 percent of the top 1,000 credit unions and only 1.8 percent of the bottom 1,000 offered IRA and Keogh accounts, in 1997. Comparable figures for money market accounts are 97.9 percent and 6 percent. This is strongly supportive of the argument that larger credit unions are more likely to pursue a strategy of diversification, and so can spread risk over a large number of production activities making them less susceptible to large fluctuations in growth.

V. CONCLUDING COMMENTS

The US credit union movement grew from origins which stressed that it existed: '*to make available to people of small means credit for provident purposes'* (Federal Credit Union Act 1934). Credit unions were viewed as member-owned democratic institutions emphasising self-help and voluntarism, and with social objectives concerning educational and developmental concerns, particularly for weaker, disadvantaged segments of society. In consequence credit unions have traditionally been treated differently to banks. Federal credit unions, for instance, enjoy a tax-exempt status, which still maintains even after recent vigorous legal attack by the banks who assert that credit unions are no longer dedicating themselves to their traditional social purpose of helping the poorer sections of society. With repeated liberalisation of the common bond and fields of membership, the opportunity to extend membership more universally has been seized by credit unions. This is evident in statistics such as those that suggest that some thirty percent of Americans now belong to a credit union. The recent legal victory by credit unions over banks means that this growth is likely to continue in the foreseeable future.

The contribution of this paper centres upon the fact that we have clearly identified that growth is likely to be concentrated upon larger credit unions. Employing both a traditional cross sectional test, and the Breitung and Meyer panel data test for federal credit unions over the period 1991 to 1997, we investigated whether the size distribution of credit unions was the cumulative outcome of a series of random growth shocks to credit union size. There was an unambiguous rejection of this hypothesis. Instead it emerged that larger credit unions grew faster than their smaller counterparts. Larger credit unions also exhibited lower levels of variability in growth, although growth rates did demonstrate negative persistence. Each of these elements is a rejection of the tenets of the law of proportionate effect.

The reasons for the rejection of the law of proportionate effect were explored. Merger and acquisition activity, the persistence of scale economies, and the role of regulation were mooted as being instrumental in the relatively stronger growth performance of large credit

unions. It was suggested that the finding of negative persistence in growth rates and the lack of sustained periods of growth by individual credit unions was due to the fact that, within broad size bands, credit unions are relatively homogeneous organisations with innovations by one group quickly copied by others. The fact that product diversification and learning economies of scale are more easily available to large credit unions was viewed as instrumental in the finding of lower variability in the growth rates of larger credit unions.

The fact that credit union growth is not random and that large, diversified credit unions are increasingly tending to dominate the sector, may result in some credit unions approaching their business loan limits. If such trends do continue in the future, the call by the banks for the removal of credit unions' tax-exempt status is likely to re-emerge. Over time such a call is likely to capture an enhanced credibility.

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TABLE 1: SUMMARY STATISTICS, JUNE 1997

	No.	Mean ($m)	Max. ($m)	Min. ($m)	St. dev.	Skew	Kurtosis	Total ($m)
All credit unions	6840	30.18	10,004	0.0004	154.8	41.89	2550	206,419
Community	359	29.42	348.48	0.029	49.1	3.52	15.3	10,562
Associational	624	4.87	482.35	0.0004	25.5	13.64	223.1	3,035
Educational	331	7.30	337.99	0.051	22.49	10.86	146.8	2,412
Military	39	275.7	10,004	1.528	1,599	6.24	38.9	10,751
Fed., State and Local Gov.	422	12.55	740.91	0.77	44.5	11.71	175.2	5,294
Manufacturing	853	8.24	458.81	0.021	29.5	9.32	108.1	7,031
Services	593	11.68	835.25	0.02	42.15	13.97	252.6	6,928
Multiple-Group	3454	46.18	2,722.2	0.011	129.5	8.76	113.8	159,491
Low-income	165	5.52	106.2	0.015	14.95	4.47	21.7	910,689

TABLE 2: THE RELATIONSHIP BETWEEN SIZE AND GROWTH

	1991-1997		1991-1994		1994-1997	
	$\hat{b}$ -1	$\hat{b}$ -1	$\hat{b}$ -1	$\hat{b}$ -1	$\hat{b}$ -1	$\hat{b}$ -1
All credit unions	0.014** (5.50)	0.062** (35.47)	-0.004** (-2.38)	0.113** (23.44)	0.021** (12.55)	0.133** (25.92)
Community	0.005 (0.35)	0.044** (6.41)	-0.007 (-0.84)	0.097** (6.83)	0.014 (0.88)	0.102** (4.69)
Associational	-0.025** (-2.33)	0.043** (7.68)	-0.012 (-1.78)	0.089** (7.57)	-0.007 (-1.08)	0.077** (6.21)
Educational	-0.024 (-1.80)	0.088** (12.85)	-0.020* (-2.25)	0.160** (10.78)	0.001 (0.07)	0.202** (11.70)
Military	0.018 (0.65)	0.055** (2.82)	0.003 (0.16)	0.076** (2.46)	0.023* (1.98)	0.141** (2.87)
Federal, State and Local Government	-0.000 (-0.11)	0.048** (10.34)	-0.008 (-1.18)	0.067** (5.97)	0.013* (1.99)	0.119** (8.82)
Manufacturing	0.011 (1.51)	0.062** (14.78)	-0.007 (-1.46)	0.122** (10.99)	0.024** (4.63)	0.129** (12.04)
Services	0.018* (2.22)	0.057** (9.75)	-0.005 (-0.96)	0.080** (4.49)	0.027** (5.14)	0.175** (11.37)
Multi-Group	0.008* (2.07)	0.064** (29.21)	-0.007** (-3.02)	0.122** (17.44)	0.020** (8.82)	0.131** (19.39)
Low-income	0.008 (0.35)	0.055** (4.22)	-0.004 (-0.26)	0.066** (3.30)	0.020 (1.40)	0.119** (4.04)

White-adjusted t-statistics are shown in parentheses.

** denotes $\hat{b}$ -1 or $\hat{b}$ -1 significantly different from zero, two-tail test, 1% significance level;
* as above, 5% significance level.

TABLE 3: PERSISTENCE OF GROWTH

	1991-1997		1991-1994		1994-1997	
	$\hat{r}$	$\hat{r}$	$\hat{r}$	$\hat{r}$	$\hat{r}$	$\hat{r}$
All credit unions	0.890** (5.45)	-0.146** (-16.18)	0.682** (5.53)	-0.186** (-15.83)	0.544** (6.22)	-0.277** (-15.95)
Community	0.716 (1.72)	0.056 (1.79)	0.600* (2.18)	-0.023 (-0.56)	0.535 (1.77)	-0.011 (-0.24)
Associational	1.370** (4.06)	-0.01 (-0.34)	1.036** (4.03)	0.014 (0.45)	0.520* (2.26)	-0.116** (-2.64)
Educational	0.671** (2.96)	-0.52** (-20.13)	0.487** (2.71)	-0.525** (-12.81)	0.380** (2.75)	-0.666** (-19.44)
Military	0.798 (1.22)	0.001 (0.01)	0.809** (2.62)	-0.000 (-0.00)	1.077 (1.95)	-0.131 (-1.02)
Federal, State and Local Government	1.137** (5.48)	0.01 (0.48)	0.865** (5.81)	0.032 (0.89)	0.869** (4.38)	-0.124** (-3.80)
Manufacturing	1.258** (5.50)	-0.154** (-5.06)	0.883** (5.85)	-0.203** (-7.37)	0.324 (1.04)	-0.187** (-5.42)
Services	0.349 (1.23)	-0.289** (-10.11)	0.201 (1.08)	-0.268** (-6.38)	0.188 (0.71)	-0.407** (-9.31)
Multi-Group	1.144** (6.00)	-0.127** (-12.30)	0.845** (6.21)	-0.182** (-11.29)	0.773** (8.16)	-0.212** (-12.57)
Low-income	-0.099 (-0.20)	-0.122** (-2.78)	0.220 (0.80)	-0.173** (-3.12)	0.486* (1.96)	-0.161* (-2.29)

White-adjusted t-statistics are shown in parentheses.

** denotes $\hat{r}$ or $\hat{r}$ significantly different from zero, two-tail test, 1% significance level;
* as above, 5% significance level.

TABLE 4: TESTS FOR HETROSCEDASTICITY IN GROWTH RATES

	1991-1997		1991-1994		1994-1997	
	$\hat{g}$	$\hat{g'}$	$\hat{g}$	$\hat{g'}$	$\hat{g}$	$\hat{g'}$
All credit unions	-0.660** (106.3)	-0.046** (422.97)	-0.128** (12.58)	-0.055** (343.20)	-0.564** (147.9)	-0.05** (249.19)
Community	-0.481 (2.20)	-0.07** (48.92)	-0.152 (0.70)	-0.058** (38.76)	-0.995** (12.62)	-0.086** (27.59)
Associational	1.579** (13.49)	-0.067** (31.29)	0.196 (0.97)	-0.083** (66.74)	-0.044 (0.06)	-0.77** (29.81)
Educational	0.950 (3.16)	-0.063** (49.90)	0.195 (0.40)	-0.078** (29.80)	-0.169* (5.32)	-0.042** (36.59)
Military	-0.464 (0.79)	0.002 (0.03)	0.089 (0.34)	-0.001 (0.01)	-0.397 (0.68)	-0.01 (0.30)
Federal, State and Local Government	0.302 (1.30)	-0.032** (12.62)	0.279 (2.29)	-0.035 (3.52)	-0.422** (24.46)	-0.033** (73.23)
Manufacturing	-0.600** (16.30)	-0.04** (31.12)	0.139 (0.97)	-0.054** (16.08)	-0.593** (14.12)	-0.053** (115.83)
Services	-0.461** (10.53)	-0.047** (54.00)	0.141 (0.74)	-0.079** (43.80)	-0.644** (16.61)	-0.052** (108.63)
Multi-Group	-0.364** (21.26)	-0.038** (152.14)	-0.040 (0.58)	-0.05** (139.18)	-0.43** (117.5)	-0.036** (58.42)
Low-income	-0.771 (0.202)	-0.113** (7.80)	0.079 (0.03)	-0.13** (12.97)	-2.12 (2.36)	-0.096 (1.69)

χ^2-statistics are shown in parentheses.

** denotes or significantly different from zero, two-tail test, 1% significance level;
* as above, 5% significance level.