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GEOGRAPHIC DEREGULATION OF NORTH DAKOTA'S COMMERCIAL BANKS: WHAT IS THE POTENTIAL?

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Highlights

Small, rural agricultural banks dominate North Dakota, not unlike the structure of other states that restrict branch banking. The two objectives of this study are to gauge the potential for state-wide commercial bank branching in North Dakota and to identify bank characteristics that lead to ideal merger candidates. A correlation-decomposition model is developed to quantify diversification potential among in-state banks. The model is empirically estimated with pooled cross-sectional time-series financial data (1976-87) obtained from Federal Reserve System Call Reports.

Results of this study show that one-fourth of possible commercial bank mergers within the state could yield diversification benefits, leading to improved financial institution performance, intermediation, and service delivery. Bank characteristics important to merger assessment include bank size, loan portfolio diversity, loan pricing strategies, service income generation and liability management practices.

The study does not consider the potential for capital flight from rural areas, management or business changes that may either enhance or detract from the operation of combined financial institutions, or the personnel issues that may limit the attractiveness of rural bank mergers.

Keywords: bank mergers, branching, diversification, rural, agricultural

GEOGRAPHIC DEREGULATION OF NORTH DAKOTA'S COMMERCIAL BANKS: WHAT IS THE POTENTIAL?

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Public interest in the regulation of financial institutions has intensified after the savings and loan crisis, restructuring of the Farm Credit System and near record number of commercial bank failures. Of the three institutions, commercial banks are unique in that they have not received a large-scale infusion of public sector capital. However, regulatory oversight of commercial banks has intensified. Increased future regulation may take the form of higher capital standards, risk-based deposit insurance premiums and limitations on investment and lending activities that banks may engage in.

At the same time however, commercial banks are having difficulty competing with their unregulated competitors, namely credit unions, investment brokers, securities dealers, captive finance companies and insurance companies. As a consequence, commercial banks are seeking authority to offer nontraditional financial services such as securities underwriting and brokerage, to liberalize involvement in real estate transactions, and to relax geographic bounds on their activities (Gup, Fraser and Kolari; Hiemstra; Hunter and Wall).

Restrictions on geographic branching, particularly as they relate to commercial banks in North Dakota, is the primary focus of this study. On a national basis, Rose reports that the number of bank mergers doubled in the 1980s. At present, individual states have jurisdiction over bank branching. Alternatives include statewide branching, limited branching or unit banking. North Dakota is a unit banking state where public support for branching is increasing (Clark, 1990). Proponents argue that liberalization of branching regulations would expand financial intermediation and services in the state while opponents fear capital flight from rural to urban areas and more impersonal service.

The two objectives of this study are to gauge the potential for commercial bank branching in North Dakota and to identify bank characteristics that lead to ideal merger candidates. A correlation-decomposition model is developed to quantify diversification potential among in-state banks. The model is empirically estimated with pooled cross-sectional time-series financial data obtained from Federal Reserve System Call Reports. Following sections of the paper describe the study's methodological approach, source of data and results.

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Methodological Approach

Small rural agricultural banks dominate North Dakota, not unlike the structure of other states that restrict branch banking (Gilbert and Belongia). They are highly dependent on agriculture and energy sectors of the economy. The lackluster performance of these sectors in the 1980s created significant hardship for North Dakota banks as sizable loan losses reduced operating profitability. New, diversified economic bases has the potential for strengthening these financial institutions (Gustafson and Beauclair).

Because of the small size of these banks, managers typically have a significant equity interest. Therefore, agency problems are assumed to be negligible and bank management would be expected to select business plans that maximize the certainty equivalent income r_{ce}:

$$\max r_{ce} = E(r) - \frac{\lambda}{2}\sigma^2 \tag{1}$$

where $E(r)$ is the expected value of equity returns, σ^2 is the variance of equity returns and $\lambda/2$ is the equilibrium slope along the expected value-variance set (Markowitz). Expected equity returns resulting from the merger of two commercial banks $E(r_{\blacksquare})$ is a weighted average of each individual bank's equity returns, r_1 and r_2:

$$E(r_{\blacksquare}) = w_1 r_1 + w_2 r_2 \tag{2}$$

where w_1 and w_2 are the respective sizes of each bank. The variability of equity returns $\sigma_{\blacksquare}$ arising from the merger of two commercial banks, assuming equity returns from each individual bank are normally distributed is:

$$\sigma_{\blacksquare} = w_1^2\sigma_1^2 + w_2^2\sigma_2^2 + 2w_1w_2\rho\sigma_1\sigma_2 \tag{3}$$

where σ_1 and σ_2 are the variability of each individual bank's equity returns and ρ is the correlation between the two banks equity returns (Mendenhall, et al.).

When commercial banks merge, they may benefit from both economies of size and diversification (Hunter and Wall). Merged banks achieve economies of size if operational efficiencies or market concentration yields greater equity returns than the simple summation of w_1r_1 and w_2r_2. Previous research has identified considerable size economies, particularly among banks with less than $100 million of assets (Kolari and Zardkoohi; Clark, 1988). Given these results, economies of size considerations are not the primary focus of this study.

Diversification is the second potential benefit of a bank merger. Even if mergers do not yield increased bank profits, profit variability may be reduced (Liang and Rhodes, Gilbert and Belongia). As seen in equation 3, diversification, which implies lower equity return variability for the merged banks, can only be achieved if the correlation coefficient ρ is negative.

Small rural banks have limited opportunities to diversify portfolio risk by lending to businesses in a variety of alternative industries. Still, opportunities for diversification within a state, such as North Dakota, do

exist.[1] Agricultural enterprises, nonfarm businesses, and population levels differ considerably across the state. Hence, the overall potential for bank diversification within North Dakota is unknown.

Several characteristics of commercial banks are likely to influence diversification potential according to previous ex-post studies of bank mergers (Amel and Rhoades, Hunter and Wall, Rose). These include bank size, loan portfolio diversity, loan pricing strategies, service income generation, cost of funds, liability management practices and overhead costs. For each of these variables, three considerations are important, 1) the absolute difference between merging banks, 2) the average level of each bank, and 3) the trend of each bank over time.

To illustrate, consider bank size, as measured by total assets. In North Dakota, small banks are typically located in rural areas and serve niche markets, primarily agriculture and energy. Larger banks tend to be more diversified, although their focus is primarily consumer and commercial lending. Therefore, as the absolute difference in size between to merger candidates increases, diversification potential is expected to rise. The average level of each bank is important because hypothesized relationships between two small banks and two large banks may differ, even though the absolute difference between each bank is zero.

Thus, with bank size, diversification potential is expected to be indirectly related to average bank size. Merging two small banks that specialize in energy and agriculture is likely to yield greater diversification benefits than the merger of two large consumer banks located in metropolitan areas. Finally, divergent trends in bank size are expected to increase diversification potential as economic conditions resulting in size changes vary by bank.

Commercial banks in North Dakota derive the majority of their income from lending activities. Loans originated by commercial banks are typically classified as either agricultural, commercial or consumer. At least for farm loans, interest income has been highly correlated among commercial banks across the state. Increased exports and rising land values strengthened lending incomes in the 1970s while high real interest rates and three consecutive drought years pressured agricultural loan repayment rates during the 1980s. These broad sectorial shifts have overwhelmed local and regional fluctuations. Therefore, two banks with similar loan portfolios in the state are hypothesized to possess minimal diversification potential.

Loan pricing strategies vary significantly by bank (Barry and Calvert). As such, diversification potential is expected to be related to the pricing policies pursued by each merger candidate. Theoretically, loans of risky borrowers are priced higher reflecting the increased chances of either variable repayment or loan loss. Thus, loan incomes generated by banks charging higher than average rates are expected to be more variable, leading to diversification potential.

Service income represents various fees and profits collected by banks on demand deposit transactions, insurance premiums, trust supervision, and safety deposit box activity. Although service activities are highly profitable, they contribute only modestly to the gross incomes of banks in North Dakota because

service opportunities in most rural areas are quite limited. However, it is an enterprise that some banks choose to specialize in. Banks with proportionately large service incomes would be expected to be prime merger candidates.

The most significant expense for commercial banks is interest (Gup, Fraser and Kolari). Again, funding sources vary considerably by bank. Most rural commercial banks rely primarily on local deposits for funding. More aggressive banks obtain funding from federal funds purchased, securities sold, subordinated notes, debentures, etc. Obviously, differing sources of funding among commercial banks leads to diversification potential.

In addition to interest expense, the level of a bank's liabilities affects diversification potential (Hunter and Wall). Liabilities represent a fixed obligation whereas returns to equity holders are discretionary. While most commercial banks in North Dakota are well capitalized, selected banks choose to operate with greater leverage. As a consequence, the financial performance of two commercial banks may diverge when economic conditions change.

Remaining bank expenses for employee salaries, office equipment, furnishings and housing are classified as noninterest expenses. Higher noninterest expenses are frequently correlated with productivity, particularly among rural financial institutions where employee education levels and utilization of computer technology vary. Likewise, high noninterest expenses may arise from operational inefficiencies. Either way, these differences create opportunities for diversification.

Empirical Model and Data Source

Data to test the above relationships was obtained from the Federal Reserve System's Consolidated Reports of Condition and Income (Call Reports) from 1976-87. All national and state commercial banks in North Dakota are required to file these financial statements quarterly. Call Report data have the advantage of being internally consistent, containing all key indicators of commercial bank financial performance, and reviewed by trained, independent bank examiners to insure accuracy.

Annual year-end Call Report summaries are employed for this study. The time frame selected balances periods of both regulation (1976-82) and deregulation (1982-87). The pooled time-series, cross-sectional data yield individual bank financial performance indicators over both time and for banks with a variety of structural characteristics. As such, the database contains significant variation--a requirement for econometric methods.

A correlation decomposition empirical model was formulated in the context of an ordinary least squares (OLS) regression equation to test the relationships hypothesized above (Solemsaas). The dependent variable for the model was specified to be the correlation coefficient C_{re} between rates of return to equity between two banks. Individual pair-wise correlation coefficients were estimated for each possible bank merger combination in North Dakota using twelve years of Call Report data. With complete and continuous

record information on 158 banks over the entire period, 12,403 observations on the dependent variable were available.

The following independent variables were selected based on the theoretical considerations outlined in the previous section:

TOTALAS - Total Bank Assets
FRMLOAN - Ratio of Farm Loans to Total Loans
COMLOAN - Ratio of Commercial Loans to Total Loans
INDLOAN - Ratio of Individual Loans to Total Loans
INTINC - Ratio of Interest Income to Total Assets
LOANINC - Ratio of Loan Income to Total Assets
SERVINC - Ratio of Service Income to Total Assets
OTHINC - Ratio of Other Income to Total Assets
INTEXP - Ratio of Interest Expense to Total Assets
NINTEXP - Ratio of NonInterest Expense to Total Assets
LIAB - Ratio of Liabilities to Total Assets

Definitions of financial variables used to construct the independent variables are available in the Call Report documentation (Federal Reserve System) and summarized by Solemsaas. Three alternative specifications of the independent variables representing the absolute difference between merging banks, the average level of each bank, and the trend of each bank over time are signified by a suffix of "1", "2", and "3", respectively. The first variable, TOTALAS, captures economies of size considerations which affect diversification potential. The remaining variables are standardized by dividing by either total bank loans or assets to remove size affects.

Potential For Commercial Bank Branching

Before the results of empirical model estimation are presented, the potential for commercial bank branching in North Dakota is intuitively depicted. Shown in Table 1 is the frequency distribution of C_{re}, the pair-wise correlation between rates of return to equity for each possible bank merger combination in the state.

The distribution has 3,422 negative observations and 8,981 positive observations. Although the distribution is highly skewed, at least 25 percent of possible merger combinations in North Dakota have potential for diversification. Of particular interest are the 5 percent of combinations with $C_{re} < -0.5$.

Casual inspection of banks with either highly negative and highly positive C_{re} did not readily identify bank characteristics that could be utilized to delineate diversification potential. Banks in either group possessed similar size, loan portfolios, liability structures, profitability, and geographic location. Thus, multivariate techniques are necessary to understand the complex financial linkages involved.

TABLE 1. DISTRIBUTION OF RETURN TO EQUITY CORRELATION COEFFICIENTS, NORTH DAKOTA COMMERCIAL BANKS, 1976-87

Range of Correlation Coefficient	Frequency	Percent of Total	Cumulative Frequency	Cumulative Percent
-1.00 - -.9	5	0.0	5	0.0
- .89 - -.8	35	0.3	40	0.3
- .79 - -.7	96	0.8	136	1.1
- .69 - -.6	213	1.7	349	2.8
- .59 - -.5	300	2.4	649	5.2
- .49 - -.4	348	2.8	997	8.0
- .39 - -.3	444	3.6	1,441	11.6
- .29 - -.2	531	4.3	1,972	15.9
- .19 - -.1	648	5.2	2,620	21.1
- .09 - 0	802	6.5	3,422	27.6
.01 - .1	972	7.8	4,394	35.4
.11 - .2	1,114	9.0	5,508	44.4
.21 - .3	1,250	10.1	6,758	54.5
.31 - .4	1,354	10.9	8,112	65.4
.41 - .5	1,320	10.6	9,432	76.0
.51 - .6	1,109	8.9	10,541	85.0
.61 - .7	924	7.4	11,465	92.4
.71 - .8	595	4.8	12,060	97.2
.81 - .9	284	2.3	12,344	99.5
.91 - .99	59	0.5	12,403	100.0

Bank Characteristics Leading to Merger

Results of the model estimation are shown in Table 2. Several variables described above had to be deleted from the model because of multicollinearity. The Goldfeld-Quandt test for heteroskedasticity was conducted but the null hypothesis could not be rejected. An adjusted R^2 of .1234 was obtained. A low R^2 value was anticipated due to the inherent variability of cross-sectional bank financial data and the large number of observations available.

TABLE 2. RESULTS OF BANK MERGER CORRELATION DECOMPOSITION MODEL, NORTH DAKOTA, 1976-87

Variable[a]	Parameter Estimate	t-Value[b]
INTERCEPT	5.912	16.18
TOTALAS1	-0.000000896	-2.39
COMLOAN1	0.085	1.64
SERINC1	-0.183	-7.29
OTHINC1	-53.658	-7.77
NINTEXP1	-12.293	-5.82
LIAB1	-1.005	-4.23
TOTALAS2	0.00000177	4.62
COMLOAN2	-0.278	-4.06
INDLOAN2	-0.930	-17.56
SERINC2	0.014	2.13
LOANINC2	4.147	4.31
INTINC2	-37.663	-10.03
INTEXP2	68.236	16.33
OTHINC2	61.390	6.72
NINTEXP2	43.348	14.17
LIAB2	-7.048	-17.26
TOTALAS3	-0.00000162	-5.71
FRMLOAN3	-0.108	-3.54
COMLOAN3	0.167	4.36
SERINC3	0.017	2.10
LOANINC3	-0.649	-2.77
INTINC3	-0.205	-1.55
INTEXP3	-1.864	-3.18
NINTEXP3	-8.794	-4.83

[a]Suffix of 1, 2, and 3 distinguishes among variables that are an absolute difference, a weighted average, or a trend, respectively.
[b]All variables except INTINC3 are statistically significant at $\rho = .05$.

Parameter estimates range in size from -8.96×10^{-7} to 61.4. Care must be taken when comparing these values because the magnitude of the parameter estimates depends upon the scale of the independent variables. Data for the series total assets are not in ratio form.

In order to interpret the parameter estimates, recall that diversification potential of two banks increases as C_{re} becomes more negative. By definition, all of the data values for the independent variables are positive. Therefore, negative parameter estimates are associated with bank characteristics leading to greater diversification potential.

Absolute Difference Variables

Parameters of absolute difference variables with negative coefficients include TOTALAS1, SERINC1, OTHINC1, NONINTEXP1, and LIAB1. Thus, diversification potential increases as the absolute difference in total size, service income, other income, noninterest expenses, and liabilities increases between two banks. In North Dakota, average bank size is $40 million with larger banks being concentrated in urban areas (Solemsaas). Thus, absolute differences in size reflect diverse economic bases and increase merger potential.

Differences in service and noninterest incomes/expenses arise if one of the two banks emphasizes nontraditional banking enterprises such as trust management, investment banking, etc. -- activities that most banks are only tangentially involved in. Incomes form these activities balance earnings from other bank enterprises and increase diversification potential.

Loan portfolio disparity did not influence diversification potential as hypothesized. Neither FRMLOAN1, COMLOAN1, or INDLOAN1 were statistically significant. Loan emphasis between banks was found to be highly correlated with bank size. Hence, addition of the three variables accounting for loan portfolio diversity did not improve overall estimation of the equation once TOTALAS1 was included.

Weighted Average Variables

In terms of variables that are a weighted average of bank characteristics, greater commercial and individual loans, total interest income and total liabilities increase diversification potential. Two large banks and banks that each have high levels of service income, loan income, noninterest income, interest expense, and noninterest expense, are less desirable merger partners.

Two banks with significant proportions of commercial and individual loans in their lending portfolios possess diversification potential even though they specialize in similar areas. Banks with these characteristics tend to be located in the state's major metropolitan areas. These areas tend to be rather diverse economically offering diversification potential.

The negative sign on the weighted average of interest income, INTINC2, and the positive sign on the weighted average of interest expense, INTEXP2,

merits special discussion. Under the hypothesis of efficient financial markets, one would expect similar signs on these two variables. However, in North Dakota, major sources of investment funds are local deposits and opportunities for lending are limited as evidenced by low loan-to-deposit ratios (Gustafson and Beauclair). Thus, bankers invest these funds in a variety of securities in national money markets - yielding interest incomes that vary significantly depending on the investment vehicle. As a result, funding costs in North Dakota are highly correlated, but interest incomes are not, enhancing diversification potential.

Contrasting the previous section where differences in bank size, service and noninterest income/expenses lead to greater diversification potential, results of this section show that most of these advantages accrue to small banks that merge. To illustrate, consider the coefficient of TOTALAS2. It is positive indicating that a merger of two large banks is less desirable than one of two smaller banks. But, TOTALAS2 > |TOTALAS1| which implies that the merger of two banks of vastly different size reduces diversification. Similar relationships occur for service and noninterest income/expenses, although absolute differences among banks can still improve diversification potential.

LOANINC2 represents the pricing strategy or average loan interest rate charged. Higher rates are generally associated with loans that embody greater credit risk or loan loss. In North Dakota, opportunities for risky lending are highly correlated. Farm loans dominate the loan portfolios of most banks in the state and have been risky investments following the farm financial crisis. Thus, two banks that charge high interest rates on loans may be lending to similar economic sectors where diversification potential is limited.

Absolute Difference in Trends

Important trend differences in bank characteristics that affect diversification potential include TOTALAS3, FRMLOAN3, LOANINC3, INTINC3, INTEXP3, and NONINTEXP3. Recall that these variables are defined to be the absolute difference in each bank's initial and ending position over the twelve year period. A trend value close to zero indicates banks possess similar trends and have limited diversification potential. Obviously, banks choosing divergent growth plans, loan portfolio composition, loan pricing strategies, or investment opportunities would be expected to have higher diversification potential.

To illustrate, consider bank size again. In the previous section, two banks of vastly different size were found to have limited diversification potential. However, a further caveat is needed. If each bank's growth pattern diverged historically (i.e. one bank increased in size while the other decreased) diversification potential increases and may overshadow the impact of TOTALAS2.

Two trends that reduce diversification potential are COMLOAN3 and SERINC3. Earlier results show that both of these enterprises are desirable for diversification. If only one of the two merger candidates pursues these enterprises, diversification potential is reduced.

Conclusion

At present, North Dakota is unit banking state where statewide branching is prohibited. Results of this study show that one-fourth of possible commercial bank mergers within the state could yield diversification benefits, leading to improved financial institution performance, intermediation, and service delivery. Bank characteristics important to merger assessment include bank size, loan portfolio diversity, loan pricing strategies, service income generation and liability management practices.

The study did not consider the potential for capital flight from rural areas, management or business changes that may either enhance or detract from the operation of combined financial institutions, or the personnel issues surrounding bank mergers. In addition, the results of this study are limited to North Dakota. Thus, further study of the potential for and economic impacts of financial institution deregulation in rural areas appears warranted.

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Endnotes

1. Interstate banking may have even greater potential. Sherwood Call notes that North Dakota's economy is highly insulated from national economic fluctuations. This implies that North Dakota banks would be ideal merger candidates with out-of-state banks. However, concerns over capital flight, impersonal service, and market concentration would probably limit deregulation that is so extensive.