



## American Finance Association

---

Affiliated Bank Performance and the Simultaneity of Financial Decision-Making

Author(s): Duane B. Graddy and Reuben Kyle, III

Source: *The Journal of Finance*, Vol. 35, No. 4 (Sep., 1980), pp. 951-957

Published by: Blackwell Publishing for the American Finance Association

Stable URL: <http://www.jstor.org/stable/2327212>

Accessed: 28/11/2009 08:18

---

Your use of the JSTOR archive indicates your acceptance of JSTOR's Terms and Conditions of Use, available at <http://www.jstor.org/page/info/about/policies/terms.jsp>. JSTOR's Terms and Conditions of Use provides, in part, that unless you have obtained prior permission, you may not download an entire issue of a journal or multiple copies of articles, and you may use content in the JSTOR archive only for your personal, non-commercial use.

Please contact the publisher regarding any further use of this work. Publisher contact information may be obtained at <http://www.jstor.org/action/showPublisher?publisherCode=black>.

Each copy of any part of a JSTOR transmission must contain the same copyright notice that appears on the screen or printed page of such transmission.

JSTOR is a not-for-profit service that helps scholars, researchers, and students discover, use, and build upon a wide range of content in a trusted digital archive. We use information technology and tools to increase productivity and facilitate new forms of scholarship. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).



Blackwell Publishing and American Finance Association are collaborating with JSTOR to digitize, preserve and extend access to *The Journal of Finance*.

<http://www.jstor.org>

## Affiliated Bank Performance and the Simultaneity of Financial Decision-Making

DUANE B. GRADDY and REUBEN KYLE, III\*

THE REMARKABLE GROWTH of bank holding companies (BHCs) during the last decade has aroused a great deal of interest and controversy among academic economists and bank regulators. One of the important issues discussed has been the impact of holding company affiliation on the operating performance of the acquired banks. Subsequent empirical testing of the question has produced a wide array of results. Nevertheless, a recent survey of the literature by the staff of the Federal Reserve Board [18] concluded that while not entirely unambiguous, the findings are "relatively consistent and conclusive." Such a sweeping generalization seems premature at best.

In a recent issue of this Journal [4], we proposed an empirical model designed to test the interdependency between financial decision-making and bank performance. The purpose of this note is to examine the implications of that investigation for the BHC performance issue. The impact of affiliation on bank performance has been analyzed in several different ways; however, no study has considered the important theoretical and statistical implications of the simultaneity question.

### I. The Issue

Lack of a theoretical model of consolidated holding company behavior frustrates the study of affiliated bank performance. Most of the work done to this point has been based on the performance claims of the parent organizations in their applications for new acquisitions. Given this limitation we have chosen to test the null hypothesis that affiliated bank performance does not differ from that of independent banks.

The past few years have witnessed a proliferation of holding company performance studies [3]. The earliest works [11, 14, 17, 19] compared a group of financial ratios for affiliated banks to those of independent banks in the same geographic market.<sup>1</sup> These studies attempted to distinguish the operating policies of acquired banks from those of independents by analyzing the mean changes in the differences between the performance measures before and after BHC affiliation.

The paired-comparison technique, and univariate studies in general, were

\* Associate Professors of Economics and Finance, Middle Tennessee State University. The authors would like to acknowledge the support received through M.T.S.U. Faculty Research Grant 1-30123-009 and to thank F. M. Murtaugh, Jr. for his invaluable assistance.

<sup>1</sup> The geographic market has generally been defined as the county or the Standard Metropolitan Statistical Area (SMSA) in which the main banking office is located. Either choice can and has been criticized, but they both continue to be used as convenient proxies for the "true" banking market.

criticized on several grounds [8], particularly for ignoring the interdependence of the performance measures. Subsequently, a number of investigations were made employing multivariate statistical methods. Multivariate discriminant analysis [9], factor analysis [6], and multiple regression [2, 6, 7, 13, 16] were used to test for performance differences between affiliated and independent banks. Each of these approaches has provided useful insights into the holding company performance issue. Nevertheless, several methodological criticisms can be raised, particularly with respect to the multiple regression analyses. With few exceptions [5] the regression studies have failed to give adequate consideration to the interdependencies among the bank performance equations. Neglect of this point raises serious questions about the estimating procedures and, consequently, about the findings.

For example, a number of studies [2, 6, 7, 12] report ordinary least square estimates for single equation models containing performance measures as regressors. The estimators derived from such a procedure suffer from simultaneous equation bias and inconsistency [10]. Other studies [13, 16] avoid the use of interdependent variables in the same equation; however, they ignore the correlation of disturbances across the performance equations. The OLS estimators are thus inefficient [10] and the results are unreliable. In short, ordinary least squares analyses of the affiliation-performance issue have not solved the interdependency problem.

## II. Findings

A sample of 463 banks was selected from the entire population of banks in unit and limited-area branching states.<sup>2</sup> Financial ratios were calculated for each bank from the reports of condition and statements of income and dividends for the period ending December 31, 1974. Three stage least squares (3SLS) estimating procedures were chosen instead of single equation techniques because the disturbances across the equation system were correlated [10].

In our original model, we included dummy variables in thirteen simultaneous equations to test for differences in the intercept coefficients between affiliates and independent banks. The holding company affiliation dummy was significant at the .10 level or less in seven of thirteen equations. The results indicated that, *ceteris paribus*, affiliated banks held a significantly higher fraction of total resources in business and consumer installment loans; had a lower average loan rate; held a higher portion of total deposits in demand deposits; charged higher fees for checking services; paid higher average deposit rates; and maintained a higher ratio of equity capital to risk assets than their independent counterparts. The complete results for the thirteen equations are included in the original paper [4].

These results suggested further examination of the implications of simultaneity

<sup>2</sup> The sequential sampling procedure was initiated from a randomly selected starting point on the FRS-FDIC data tapes. The sample was drawn from the population of all insured commercial banks in unit and limited branching states. Banks were identified as affiliates of multibank holding companies after the completion of the selection process.

in decision-making for the holding company affiliation performance issue. A complete comparison of the performance of affiliates vis-à-vis independents requires examination of not only differences in intercepts, but differences in the entire systemic relationship among the variables.<sup>3</sup> Each equation was expanded to include dummy variables to test for differences in the slope coefficients as well as the intercept terms. It may well be that the saturated model will reveal that the results found when only intercept dummies are included, were misleading. Although, the saturated model is too cumbersome to report in its entirety, selected results are presented in Table I. The findings reveal some striking contrasts with our own earlier results and with the conclusions of other investigators.

First, the typical BHC affiliate held a smaller proportion of total assets in U.S. Treasury securities than its independent counterpart. The difference in the average loan rate coefficient between the two groups implies that independents' decisions regarding secondary reserves are more strongly influenced by loan alternatives than the decisions of BHC affiliates. That is, the adjusted loan rate coefficient was a smaller negative value for affiliated banks than for independents. The implication is less discretion in liquidity management by affiliated banks, a predictable outcome of centralized BHC liquidity policies.

The results for U.S. Treasury securities are in general agreement with the claims of holding company officials and with the findings of several univariate studies [14, 17, 19]. However, they are at odds with some OLS studies [e.g., 2]. Fraas [2] found that affiliates held a larger fraction of total assets in precautionary reserves than independents; nevertheless, his results suffer from the simultaneous equation bias noted above. Another interesting comparison is between our original results and the findings presented here. When only the intercept terms are compared, the difference in the relative holdings of U.S. Treasury securities between the two categories of banks is insignificant. Apparently, the assumption of common slopes between the two groups is unwarranted and, in fact, causes an upward bias in the BHC intercept term.

Second, the relative composition of the loan portfolio differed between affiliated and independent banks. For example, when the substitutability of loan products and yield differentials are accounted for, affiliated banks are found to hold a significantly larger portion of total assets in business loans than their independent competitors. Two earlier OLS studies [13, 16] found a lower fraction of business loans at affiliated banks while univariate studies [11, 14, 17, 19] have generally detected no difference in the business lending decisions of affiliated banks relative to independents.

Affiliates reacted differently to market growth than independent banks in

<sup>3</sup> The preferred method of comparing the two groups of banks would be by analysis of covariance [10, pp. 420-423]. However, the methods of the analysis of covariance are only appropriate for single equation models estimated by OLS. Since ours is a simultaneous equation model estimated by 3SLS the sums of squares required for the analysis of covariance tests have different statistical properties than those of OLS methods. It would be possible of course to use the OLS estimations of our model to make such tests. But, that would seem to be at cross purposes with the principal argument of this paper: that OLS methods are not appropriate for examining the affiliate performance issue.

**Table I**  
**The Impact of Holding Company Affiliation on the Thirteen Performance Measures**  
*(t statistics in parentheses)*

| Performance*<br>Measure              | BHC<br>Intercept<br>Dummy | Average<br>Loan<br>Rate | Average<br>Deposit<br>Rate | Yield<br>Diff.     | Significant BHC Slope Dummies |                      |                   |                      |                 |                                | Bank<br>Size      | Herfindahl<br>Index   | Market<br>Power<br>Interac-<br>tion |                      |
|--------------------------------------|---------------------------|-------------------------|----------------------------|--------------------|-------------------------------|----------------------|-------------------|----------------------|-----------------|--------------------------------|-------------------|-----------------------|-------------------------------------|----------------------|
|                                      |                           |                         |                            |                    | Business<br>Loans             | Wage<br>Expenses     | Market<br>Size    | Market<br>Growth     | Income<br>Level | Branching<br>Restric-<br>tions |                   |                       |                                     |                      |
| U.S. Treas. Sec./<br>Total Assets    | -218.002+<br>(-1.936)     | 3.181*<br>(3.216)       |                            |                    |                               |                      |                   |                      |                 |                                |                   |                       |                                     |                      |
| Real Estate Loans/<br>Total Assets   | -12.116<br>(-0.168)       |                         |                            |                    |                               |                      |                   | 0.128 £<br>(1.707)   |                 | -93.215*<br>(-3.707)           |                   |                       |                                     |                      |
| Business Loans/<br>Total Assets      | 135.848+<br>(2.132)       |                         |                            |                    |                               |                      | 0.005+<br>(1.948) |                      |                 |                                |                   |                       |                                     |                      |
| Installment Loans/<br>Total Assets   | -40.719<br>(-0.569)       |                         |                            |                    |                               |                      |                   |                      |                 | -78.881*<br>(-3.266)           |                   |                       |                                     |                      |
| Total Loans/<br>Total Assets         | -34.350<br>(-0.411)       |                         |                            | 3.706 £<br>(1.736) |                               |                      |                   |                      |                 |                                |                   |                       |                                     |                      |
| Total Capital Accts./<br>Risk Assets | 131.045*<br>(2.800)       |                         |                            |                    |                               |                      |                   | -0.117 £<br>(-1.605) |                 |                                |                   | -139.078*<br>(-2.482) | -0.013+<br>(-2.144)                 |                      |
| Average Loan Rate                    | -4.479<br>(-0.292)        |                         |                            |                    | -0.072 £<br>(-1.681)          | 2.473*<br>(2.705)    |                   |                      |                 |                                |                   | 68.788*<br>(4.037)    |                                     |                      |
| Ser. Chgs. on D.D.                   | 15.288+<br>(1.913)        |                         |                            |                    |                               |                      |                   |                      |                 |                                |                   |                       |                                     |                      |
| Average Dep. Rate                    | -5.923<br>(-0.324)        |                         |                            |                    |                               |                      |                   |                      |                 |                                |                   |                       |                                     | -10.684*<br>(-3.444) |
| Wage Expenses/<br>Total Assets       | 5.100<br>(1.226)          |                         |                            |                    |                               | 0.530 £<br>(1.834)   |                   |                      |                 |                                |                   |                       |                                     |                      |
| Yield Differential                   | 3.142<br>(0.447)          |                         |                            |                    |                               | -7.537 £<br>(-1.627) |                   |                      |                 |                                | 2.737+<br>(2.114) |                       |                                     |                      |
| Demand Dep./<br>Total Dep.           | 32.449<br>(0.271)         |                         |                            |                    |                               |                      |                   |                      |                 |                                |                   |                       | 0.537+<br>(1.951)                   |                      |
| Savings Dep./<br>T & S Dep.          | -2871.351<br>(-0.943)     |                         | 52.394+<br>(1.918)         |                    |                               |                      |                   |                      |                 |                                |                   |                       |                                     |                      |

<sup>a</sup> An asterisk (\*) indicates that the coefficient is significant at the .01 level or less; a plus (+) indicates significance at the .05 level; and a pound sign (£) indicates significance at the .10 level.

terms of their relative holdings of real estate loans, the significant slope coefficient indicates a stronger response on the part of BHC affiliates to market growth. In the case of consumer installment loans, the original model, including only the intercept dummy, indicated that BHC affiliates held a significantly larger fraction of their portfolios in installment loans. However, this difference disappeared in the saturated model.

Third, although the average loan rate did not differ between affiliated and independent banks, the response of the two groups to changes in loan portfolio composition, factor cost, and firm size were quite different. Previous OLS studies have found either no significant difference in average loan rates [12, 13] or that the risk-adjusted rate was higher for affiliated banks [6].<sup>4</sup> One univariate study [14] detected lower average rates for affiliates while three others [11, 17, 19] found no significant differences. Lower average loan rates among BHC affiliates were also indicated in Johnson and Meinster's discriminant analysis [9].

Fourth, our results indicate that, *ceteris paribus*, affiliates had higher service charges on demand deposits than independents, i.e., BHC affiliates paid lower implicit rates for demand deposit inputs than independent banks.<sup>5</sup> Two prior OLS studies [2, 13] as well as the Johnson and Meinster paper [9] reported similar results. Univariate studies have been characterized by inconsistent findings [e.g., 11, 17] for the service charges ratio.

Fifth, the findings of our original study [4] for the average explicit deposit rate showed that with deposit composition held constant, BHC affiliates generally paid higher deposit rates than their independent counterparts. However, the results changed dramatically with the addition of the BHC slope dummies. The difference arises, as noted in Table I, from the reaction of affiliated banks to the degree of monopsony power within individual banking markets. The implication is that BHC affiliates segment their deposit markets and thus act as price discriminating monopsonists. Prior studies of deposit rates have produced inconsistent findings. Two OLS analyses [2, 6] discerned higher deposit rates for affiliates. In contrast, univariate studies [11, 14, 17, 19] have generally found no significant differences in deposit rates between the two groups of banks.

Sixth, the BHC affiliates in our sample tended to hold more equity capital per dollar of risk assets than independent banks.<sup>6</sup> This result contradicts the conclusions of the Board survey which was based on several OLS studies [2, 7, 12, 15,

<sup>4</sup> Instead of analyzing the average loan rate, Jackson [6] examined loan revenues minus loan losses divided by total loans. Unfortunately, Jackson's specification of the estimating equation included time deposit measures, bank labor costs, and deposit size variability which meant that the OLS estimators were biased and inconsistent.

<sup>5</sup> The difference in implicit deposit rates between affiliated and independent banks could be attributable to differences in the mix of services offered to demand deposit customers. To some extent those differences should be accounted for in the specification of the service charges equation; however, no explicit measure of product "quality" was included in the model.

<sup>6</sup> This result is highly plausible in light of the BHCs ability to circumvent supervisory constraints at the bank level. By operating as financially integrated units, BHCs can satisfy or surpass the capital adequacy guidelines of bank regulators while still maintaining a consolidated financial structure consistent with managerial preferences [1, p. 39]. Such a consolidated structure can be accomplished by downstream debt funds to affiliated banks as equity (i.e., double leveraging) or by issuing equity at the parent to support capital at the bank level while undercapitalizing nonbank affiliates.

16] reporting a negative coefficient for the affiliation intercept dummy.<sup>7</sup> In only one univariate study was any significant difference reported for the capital adequacy ratios. Ware [19] found that in the third year after acquisition, Ohio affiliates held higher capital accounts to total deposits than their independent counterparts. Our results also parallel those of Mingo [16] in finding that in contrast to independents, affiliates react to increased market concentration by leveraging their financial structures further. Similarly, BHC affiliates respond to increases in firm size by reducing capital/risk assets to a greater degree than independents.

### III. Conclusions

Recent contributions to the theory of the banking firm suggest that bank input, output, and pricing decisions are interdependent. However, studies purporting to explain the influence of holding company affiliation on the decision parameters of bank managers have generally ignored this important aspect of bank behavior.

The purpose of this note was to examine the impact of BHC affiliation on bank performance by means of a simultaneous equation model of the banking firm. The model included not only intercept dummies but slope coefficients for all the regressors, in order to analyze the differential behavior of affiliates and independents at each juncture in the decision process. Our results indicated that, other things equal, affiliated banks behaved differently than independent banks with regard to decisions concerning secondary reserves, loan portfolio composition, loan rates, deposit rates, and bank capital.

While our regression results were frequently in agreement with previous studies, important differences were revealed. One point is clear. By neglecting the theoretical and statistical implications of the simultaneity of bank decision-making, previous researchers have confounded their test results. Moreover, past studies have been incomplete because they failed to show the interaction between BHC affiliation and important bank decision parameters. In view of the fact that this type of research will be a major input into the process of formulating public policy, we think it essential that this problem be recognized and remedied.

### REFERENCES

1. Evelyn Fallek and Richard W. Nelson. "Bank Holding Company Financial Structure and Bank Capital Supervision: An Economic Appraisal." *Proceedings From A Conference On Bank Structure and Competition*, Federal Reserve Bank of Chicago (April 1978).
2. Arthur G. Fraas. *The Performance of Individual Bank Holding Companies*, Staff Economic Study 84, Board of Governors of the Federal Reserve System (1975).

<sup>7</sup> Four of the multiple regression studies [2, 7, 15, 16] included interdependent variables in the estimating equations for capital accounts; thus, the estimators were biased and inconsistent. Mayne [13] did not include interdependent variables in the same equation but her study is essentially an analysis of covariance with only bank size used as the covariate. As a result, it can be argued that a lower capital-to-asset ratio for affiliated banks has not been found in any true multiple regression study for which the estimation procedures were not tainted by the simultaneity problem.

3. Duane B. Graddy. *The Bank Holding Company Performance Controversy* (Washington, D.C.: University Press of America, 1979).
4. ——— and Reuben Kyle. "The Simultaneity of Bank Decision-Making, Market Structure, and Bank Performance." *Journal of Finance* (March, 1979).
5. David B. Humphrey and Samuel H. Talley. "Market Regulation of Bank Leverage." *Papers in Banking and Financial Economics*, Board of Governors of the Federal Reserve System (January, 1977).
6. William Jackson. "Multibank Holding Companies and Bank Behavior." *Working Paper 75-1*, Federal Reserve Bank of Richmond (July, 1975).
7. Michael A. Jessee and Steven A. Seelig. *Bank Holding Companies and the Public Interest: An Economic Analysis* (Lexington, Mass.: D.C. Heath and Co., 1977).
8. Rodney D. Johnson and David R. Meinster. "An Analysis of Bank Holding Company Acquisitions: Some Methodological Issues." *Journal of Bank Research*, 4 (Spring, 1973).
9. ——— and ———. "The Performance of Bank Holding Company Acquisitions: A Multivariate Analysis." *Journal of Business* (April, 1975).
10. Jan Kmenta. *Elements of Econometrics* (New York: The Macmillan Co., 1970).
11. Robert J. Lawrence. *The Performance of Bank Holding Companies*, Board of Governors of the Federal Reserve System (June, 1967).
12. Jack S. Light. "Effects of Holding Company Affiliation on *De Novo* Banks." *Conference on Bank Structure and Competition*, Federal Reserve Bank of Chicago (1976).
13. Lucille S. Mayne. "A Comparative Study of Bank Holding Company Affiliates and Independent Banks, 1969-1972." *Journal of Finance* (March, 1977).
14. Joe W. McCleary. "Bank Holding Companies: Their Growth and Performance." *Monthly Review*, Federal Reserve Bank of Atlanta (October, 1968).
15. John J. Mingo. "Capital Management and Profitability of Prospective Holding Company Banks." *Journal of Financial and Quantitative Analysis* (June, 1975).
16. ———. "Managerial Motives, Market Structures and The Performance of Holding Company Banks." *Economic Inquiry* (September, 1976).
17. Samuel H. Talley. *The Effect of Holding Company Acquisitions on Bank Performance*, Staff Economic Study 69, Board of Governors of the Federal Reserve System (February, 1972).
18. *The Bank Holding Company Movement to 1978: A Compendium*, A Study by the Staff of the Board of Governors of the Federal Reserve System (September, 1978).
19. Robert E. Ware. "Performance of Banks Acquired by Multi-Bank Holding Companies in Ohio." *Economic Review*, Federal Reserve Bank of Cleveland (March, 1973).