Working Paper 8302

HOLDING COMPANY ORGANIZATIONAL FORM AND EFFICIENCY

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July 1983

Federal Reserve Bank of Cleveland

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Abstract

Researchers generally have assumed that the impact of multibank holding company (MBHC) affiliation on subsidiary bank efficiency would not vary across holding company groups. Several writers have argued that this view is incorrect and may explain the mixed and inconclusive findings on affiliation-related efficiencies reported in many empirical studies. In particular, Fraas has suggested that differences in MBHC organizational centralization may cause differences in subsidiary bank performance and that the failure to control for structural variation may bias estimates of affiliate-independent bank efficiency differentials toward insignificance. This study explores the impact of MBHC organizational centralization on subsidiary bank efficiency, using survey data on holding company structure and a profit-function approach. The evidence suggests that differences in MBHC structure do result in differences in affiliate efficiency.

I. Introduction

Many researchers have explored the impact of multibank holding company affiliation on bank efficiency over the past decade. Most of these researchers have focused exclusively on operational or technical

efficiency impacts, utilizing a cost-function approach. Questions of allocative or price efficiency have typically been ignored.[1] In general, the empirical evidence on affiliation-related efficiencies is mixed and inconclusive.

The methodological approach employed in virtually all of these studies may be partially responsible for obscuring MBHC impacts on subsidiary bank efficiency. Typically, researchers have assumed that holding company organizations are homogeneous entities or, alternatively, that the impact of affiliation on subsidiary bank efficiency will not vary across holding company groups.[2]

A small group of writers have provided evidence indicating that this view may be incorrect; see, for example, Lawrence (1971) and Fraas (1974). In particular, data obtained in five separate surveys have consistently shown that the degree of involvement of MBHC parent corporations in the decisions and operations of their subsidiary banks, or holding company organizational centralization, varies widely across companies.[3] Fraas and others have suggested that these obvious differences in MBHC organizational centralization might be responsible for differences in subsidiary bank performance. That is, subsidiary bank realization of potential affiliation-related economies (real or pecuniary) may require some degree of parent company centralization.[4] Fraas hypothesizes that inter-company structural variation could result in offsetting differences in the performance of affiliates of individual holding companies, blurring subsidiary-independent bank performance differentials in the typical empirical affiliation impact study.[5]

Thus, a re-examination of the MBHC impact on bank efficiency (both

technical and allocative), in which differences in holding company organizational centralization are explicitly taken into account, appears warranted and is the subject of this study. The study uses a profit-function approach, originally developed by McFadden (1966). This framework permits hypotheses to be tested about differences in the relative economic efficiency of alternative organizational forms and allows evidence on economies of scale to be obtained.

Mullineaux (1978) has been the only researcher to examine the efficiency of holding company affiliates relative to independent banks using a profit-function framework. Although he noted that differences in MBHC organizational centralization might affect subsidiary bank efficiency (see Mullineaux, p. 277), he lacked the structural data to test such a hypothesis and so treated all multibank holding company affiliates as elements of a single group.[6] The study herein thus represents an extension of his earlier work. For this reason, Mullineaux's approach and methods will be utilized in this study to the extent possible.

II. Profit Functions for Commercial Banks

The profit function expresses the maximized profit for a firm in a competitive situation as a function of output and variable input prices and quantities of fixed factors.[7] Differences in economic efficiency across firms by definition are caused by differences in technical and/or price efficiency. Such differences are reflected in the values of the actual profit functions of firms, ceteris paribus, given competitive

markets for inputs and outputs. The firms with higher profits are relatively more economic efficient.[8]

The profit-function approach to studying efficiency in banking has a number of desirable properties. First, the level of output is not a variable in the profit function. Thus, the difficulties involved in defining commercial bank output encountered when a cost function is estimated are avoided. Second, bank cost studies relate solely to technical efficiency, while the profit function entails the more complete concept of economic efficiency. Finally, given a limited set of assumptions, one can be sure that a one-to-one correspondence exists between the set of concave production functions and the set of convex profit functions. Thus, the characteristics of the production function can be identified from the parameters of the profit function, which is easier to estimate.

To estimate the bank profit function, some functional form must be postulated.[9] To facilitate comparison with the results reported earlier by Mullineaux, a profit-function specification similar to the one he used was adopted. Assuming price-taking behavior in all markets by commercial banks and a Cobb-Douglas production technology, the profit function has the following general form:[10]

$$(1)\quad \ln PROF = a_0 + \sum a_i \ln P_i + \sum b_j \ln w_j + \sum c_k \ln Z_k ,$$

where

$PROF$ = short-run profits,

$P_i (i = 1, n)$ = the n output prices,

$w_j (j = 1, n)$ = the n variable input prices, and

$Z_k (k = 1, t)$ = the auantities of the fixed factors.

If output price data are available, the profit function can be used to test the assumption that firms are price takers in particular markets. Output prices do not appear in a monopolist's profit function.'' Thus, for multi-product firms such as commercial banks, a finding that some bank output prices make insignificant contributions to the empirical explanation of bank profits is consistent with the hypothesis that banks are not price takers in all markets. Such a finding suggests that some variable reflecting the external structure of a bank's market be used in the profit function in place of some or all output prices.

The test for superior economic efficiency revolves around the level of profit "predicted" from the profit function. Lau and Yotopoulos (1971) have proven that, given Cobb-Douglas production conditions, differences in technical efficiency and/or differences in price efficiency translate into constant differences in the level of profits, given market prices (see Lau and Yotopoulos, pp. 101-03). Consequently, tests for relative efficiency can be based on the significance of organizational dummy variables included in an estimated profit function.

Mullineaux classified each of his sample banks as either a one-bank holding company affiliate, a multibank holding company affiliate, or an independent bank. He then examined the economic efficiency of the two classes of subsidiary banks relative to independent banks.

In the study herein, the sample consists entirely of MBHC affiliates

and independent banks. Following the approach originally used by Lawrence, the sample holding company banks were assigned to one of three structural classifications (centralized, moderately centralized, decentralized) on the basis of detailed survey data concerning the operational policies of their respective parent corporations,. Affiliates were placed in the centralized category if the survey data indicated that the parent company was heavily involved in the decisions and operations of its constituent banks. Subsidiary banks were classified as moderately centralized if their parent was somewhat less involved in their decisions and operations. Affiliates were placed in the decentralized category if their parent had very limited involvement in their decisions and operations.[12] Roughly 19 percent of the sample affiliates were classified as centralized, 65 percent as moderately centralized, and 16 percent as decentralized. Thus, the aim of this study is to examine the relative economic efficiency of the three classes of alternatively structured MBHC affiliates and independent banks.

III. Estimation of the Commercial Bank Profit Function

The data used (with the exception of the organizational structure data) to estimate the profit function were obtained from the 1979 year-end bank reports of income and condition. The non-random sample consists of 1210 banks drawn from twelve states, equally divided between holding company affiliates and independent banks.[13] The subsidiary bank portion of the sample consists of affiliates of 65 MBHCs that responded to a 1979 survey of their corporate operational policies.[14]

The sample was completed by including a "comparable" independent bank for each MBHC subsidiary bank. The average asset size for the entire sample of banks was approximately $68 million.

The dependent variable, bank profits (PROF), is measured as pre-tax total operating revenue minus operating expenses net of occupancy costs.[15] Occupancy costs are treated as fixed costs; following McFadden, they are not included in the measure of profit.

The independent variables used in the estimated bank-profit function are defined below. Unfortunately, data availability limited the set of independent variables employed relative to the set used by Mullineaux.

Ideally, output prices should appear as independent variables in the profit function so that the hypothesis of price-taking behavior can be tested. However, it is not possible to construct output-price variables similar to those used by Mullineaux using reports of income and condition data. The lack of output-price data may not be problematic. Mullineaux found that the estimated coefficients on the output price variables employed were generally insignificant or failed to conform to a priori expectations. He tentatively concluded that these findings indicated noncompetitive behavior. Thus, he excluded all output price variables from the final form of the profit function he estimated and substituted a market-structure variable instead.

Mullineaux used average salaries plus fringe benefits per employee as the price of labor in his estimated profit equations. The same variable (WAGE) is used in this study.[16] The sign of this variable should be negative.

Mullineaux treated deposits as variable inputs in his study and so

included yields on various categories of deposits as explanatory variables in a preliminary version of the profit functions he estimated. As was the case with his output-price variables, the estimated coefficients of the deposit yield terms had unanticipated signs and/or were insignificant. Mullineaux likewise interpreted this to be evidence of non-competitive behavior; thus, these variables were dropped from the final form of the profit equation he estimated.[17] Because similar findings were obtained in this study, deposit-yield variables do not appear in the profit function reported below.

Following Mullineaux, the number of bank offices (OFF) and a proxy variable for office size (AVOFS), defined as the ratio of furniture and equipment expenses to the number of offices, are used to represent the quantities of fixed factors in the estimated profit function. Additions to the number of offices or to the size of existing offices should increase bank profits, ceteris paribus.

The coefficients of the fixed-factor variables provide insight on the existence of economies of scale. In particular, if the sum of the coefficients of the fixed-factor variables equals one in the estimated profit equation, one can conclude that there are constant returns to scale in banking.[18] If the sum of the coefficients exceeds one, increasing returns prevail. A sum of less than one indicates decreasing returns.

Branching regulations limit the ability of banks in unit banks to operate at more than one location and thus affect the marginal return unit banks can earn on full-service offices relative to banks in branching states. To measure this difference in marginal returns,

Mullineaux includes two interaction variables in his estimated equation. The variables are

$$DUM1 = D1 * \ln OFF,$$

$$DUM2 = D2 * \ln OFF,$$

where

D1 = 1 if a bank is located in a statewide branching state; otherwise, 0.

and

D2 = 1 if a bank is located in a limited branch state; otherwise, 0.

Mullineaux expects the coefficients of both variables to be negative.[19] Indentical variables are used in this study.

Based on his analysis, Mullineaux concluded that bank-output markets were generally non-competitive and so included a market-structure variable (a "numbers equivalent" market-structure measure) in his estimated equations. He founa that tne coefficient of this measure was significant and had the anticipated sign. Given these findings, a market-structure variable was included in the profit function estimated in this study. Because a measure like the one used by Mullineaux was not readily available, a very crude market-structure variable was employed. Specifically, a dummy variable (SMSADUM), which takes on a value of one if a bank was headquartered in an SMSA or a value of zero otherwise, was used as a market-structure proxy. Assuming that urban banking markets are more competitive than rural markets, the coefficient of this variable

should be negative.

Mullineaux categorized his sample banks as independents, MBHC affiliates, or one-bank holding company affiliates. He used two organizational dummies in his profit equation to examine differences in bank efficiency, choosing independents as his reference group. The coefficients on his two organizational dummies thus indicated whether a particular type of holding company subsidiary bank was relatively more economic efficient than independents.

In this study, the sample consists of four groups: centralized MBHC affiliates, moderately centralized affiliates, decentralized affiliates, and independent banks. The group of centralized affiliates was used as the reference group. Thus, one dummy variable was used for each of the three latter groups (MCDUM, DCDUM, and IBDUM, respectively) in the estimated profit equation. The sign of the estimated coefficient on each dummy thus indicates whether that particular type of bank is relatively more (positive sign) or less (negative sign) economic efficient than centralized holding company affiliates.

IV. Estimation Results

The profit equation was estimated using ordinary least squares (see the estimation in table 1).[20] Examination of the coefficients in table 1 reveals that virtually all of the non-organizational variables possess the anticipated signs. Only the coefficient on DUM1 is not statistically significant. The adjusted R^2 for the equation is quite high, given that the analysis is cross sectional.

The coefficients on the fixed-factor variables suggest that the production function of commercial banks is characterized by increasing returns to scale. The measures of economies of scale derived from the estimated equation are 1.660 for banks in unit banking states, 1.510 for banks in limited branching states, and 1.541 for banks in statewide branching states, all of which are significantly greater than one. These findings are similar to those reported by Mullineaux.

The critically important coefficients in this study are those on the three organizational form dummies. The coefficients on both the IBDUM and DCDUM variables are negative and significant, indicating that centralized holding company affiliates are relatively more economic efficient tnan independent banks and subsidiary banks of decentralized holding companies.[21] The coefficient on the MCDUM variable is also negative but insignificant.

These findings are not unreasonable. Researchers writing on this subject have hypothesized that realization of significant affiliation-related economies may require that holding companies centralize decisions and operations to some undefined degree.[22] If this were indeed true, one would expect to discover insignificant differences in efficiency between centralized and moderately centralized affiliates, while observing significant differences in efficiency between relatively centralized affiliates and independent banks and between centralized affiliates and relatively decentralized affiliates. This last result is reasonable, since, by definition, affiliates of decentralized MBHCs operate with a great deal of autonomy, essentially as independent banks.

V. Summary

The results suggest that MBHC organizational structure affects the relative economic efficiency of subsidiary banks. In particular, the results indicate that the subsidiaries of relatively centralized MBHCs are more efficient than independent banks and relatively decentralized holding company affiliates. The significant efficiency difference detected between centralized and decentralized affiliates lends credence to the view voiced by Fraas; that is, it is inappropriate in empirical studies to consider all holding company affiliates to be homogeneous elements of a single group.

Footnotes

1. The exception is Mullineaux (1978).

2. This assumption is reflected in the use of a single binary holding company affiliation dummy in the cost functions estimated.

3. See also Weiss (1969), Jesser and Fisher (1973), Stodden (1975) and the Association of Bank Holding Companies (1978).

4. See also Benston and Hanweck (1977), Longbrake (1974), Mullineaux (1978), and Mayne (1976). The study by Mayne represents the only attempt to examine empirically linkages between MBHC organizational centralization and subsidiary performance.

5. See Fraas (1974), p. 1.

6. Actually, Mullineaux did distinguish between multibank and one-bank holding company affiliates.

7. The assumptions used in deriving the profit function are:

(1) firms are profit maximizers,

(2) firms are price takers in all markets,

(3) the production function is concave in the variable inputs.

The derived profit function is non-negative, convex, increasing in output prices, decreasing in input prices, and increasing in the quantities of

fixed factors. The profit function is also homogeneous of degree 1 in output and input prices.

8. In certain cases it is possible to identify the source of economic efficiency differences; see Yotopoulos and Lau (1973).

9. Because of the existence of duality relationships, one can simply specify a well-behaved profit function and be sure that it corresponds one-to-one with a concave production function.

10. Mullineaux tested his Cobb-Douglas specification by including squared and cross-product labor price terms in his equations and found that it could not be rejected. In this study a squared wage term was used in preliminary runs and was found to be insignificant. Thus, a Cobb-Douglas functional form was used in this study.

11. For a demonstration, see Lau (1969).

12. Specifically, survey data were used to construct numerical indexes designed to proxy the degree of MBHC organizational centralization in 11 different subsidiary bank operational areas for a sample of 65 MBHCs. The policy-area indexes were then summed for a summary centralization index for each company. Companies were classified as centralized (13 companies) if their summary index was greater than the mean index for all companies plus one standard deviation. Companies were labeled decentralized if their summary index was less than the mean index minus

one standard deviation (11 companies). The remainder were categorized as moderately centralized (41 companies).

13. The states are Alabama, Colorado, Florida, Massachusetts, Michigan, Missouri, New Jersey, Ohio, Tennessee, Texas, Virginia, and Wisconsin.

14. Lead banks were excluded; non-seasoned (short-term) affiliates were not excluded.

15. Changing the definition of the profit variable (by including occupancy costs in expenses or excluding furniture and equipment costs) did not alter any significant conclusions of the study.

16. As noted above, a squared wage term was included in preliminary runs and was always insignificant. Thus, it does not appear in the final form of the profit function estimated.

17. Actually, Mullineaux retained a variable proxying the implicit rate of return paid on demand deposits. Data availability precluded use of such a variable in this study.

18. For proof, see Lau and Yotopoulos (1972, pp. 13-14).

19. Mullineaux (1978, p. 268) reasons that banks in unit banking states respond to branching restrictions by operating larger offices with higher average profitability. If bigger offices are an imperfect substitute for

additional offices, banks in unit states likewise should earn a higher marginal return on offices than banks in states permitting branching.

20. The regression results were virtually unchanged when the equation was re-established with a squared wage term and without the DUM1 and DUM2 variables.

21. The source of these differences in efficiency (technical vs. price) is not explored in this study.

22. See, for example, Lawrence (1971, p. 3) and Benston and Hanweck (1977, p. 159).

Table 1 Regression Results
ln PROF Dependent

Variable	Coefficient[a]
Intercept	1.30524 (4.26)**
ln WAGE	-0.71729 (-2.43)**
ln OFF	0.93787 (11.86)**
ln AVOFS	0.72219 (26.74)**
DUM1	-0.11917 (-1.47)
DUM2	-0.14988 (-1.97)**
SMSADUM	-0.20450 (-4.39)**
IBDUM	-0.14189 (-1.85)*
MCDUM	-0.09497 (-1.22)
DCDUM	-0.19964 (-1.95)*
$\bar{R}^2$	0.58
F-statistic	151.71

a t-Statistics are in parentheses.
* Significant at 10 percent level, 2-tail test.
** Significant at 5 percent level, 2-tail test.

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