

# Internal organization and economic performance: The case of large U.S. commercial banks

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Organization theorists have long been aware of the productivity ramifications of firms' organizational structures and innovations. Indeed, some have asserted that if changes in business procedures and practices were patentable, their contributions to the economic growth of the nation would be as widely recognized as the influence of mechanical inventions. More recently, economists have come to realize that questions about the efficiency of production, marketing, and finance are bound up with social questions about organizational structure and change, culture, and management style and practice. As is well known, the recent deregulation (and re-regulation) of the U.S. commercial banking industry has had a dramatic impact on the way in which banks produce, price, and manage their financial services—from consolidation of operations through mergers, to the more recent unbundling of traditional packaged services, to the phenomenon of loan sales. What is less well known, particularly among academic economists studying the industry, is the dramatic set of parallel changes taking place in banks' internal decisionmaking and organizational structures. Changes in these areas will likely have a significant impact on how efficiently banks produce their financial services, how effectively they interact with their customers, and how successfully they compete in their product markets.

If the tenets of organizational economics that relate elements of internal organizational structure to the productive efficiency of firms

are robust across industries, then managerial and public policy prescriptions drawn from empirical studies of bank production and cost functions that take account of these influences should be better informed than those that ignore them. Such knowledge takes on added importance given the current debate over whether universal banking as practiced in many European countries is the most appropriate organizational structure for insuring the long-term competitiveness of U.S. banks.

This article reports empirical evidence on the impact of management decisionmaking characteristics on the productive efficiency of banks. Specifically, I examine the impact on bank costs of centralized versus decentralized decisionmaking, product delivery systems, and back-office operations. The analysis is based on data from a sample of 118 large U.S. commercial banks. The results show, first, that centralized decisionmaking tended to increase costs. Second, centralized product delivery systems either increased or had an insignificant impact on costs. In no case did centralized product and service delivery systems reduce costs as envisioned by proponents of centralization. Third, centralized back-office operations significantly reduced costs. This latter result is consistent with the existence of scale economies in back-office operations.

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## **Organizational structure and firm performance**

Organizational economics concerns itself with the study of organizations and organizational phenomena using concepts taken from contemporary organizational theory, organizational behavior, and microeconomics.<sup>1</sup> The fundamental factor distinguishing organizational economics from traditional microeconomic analysis of the firm is that the former views the firm as an organization that competes with the market as a mechanism for allocating resources, as opposed to an abstract entity characterized by a production function and an objective of profit maximization. Under this view, firms and markets represent alternative mechanisms for providing the coordination, control, and monitoring required for the efficient allocation of resources. For a given organizational form to survive in the long term, it must provide higher net returns than alternative institutional arrangements.

Among internal organizational structures, the ones tending to predominate over time are those that tend to minimize transaction costs. According to Alfred Chandler (1977) and Oliver Williamson (1967, 1975), the optimal structure from this point of view is the multidivisional form (M-form) as opposed to the older and more traditional unitary form (U-form).<sup>2</sup>

The U-form is a centralized multifunctional organizational structure in which the major active units are functional divisions. That is, there is specialization by function such as production, sales, finance, and research and development, with decisionmaking responsibilities located at the top levels of the organization. The U-form favors the realization of economies of scale and the internal specialization of labor, but as the firm expands this form creates the following set of problems:

- 1) bounded rationality—managers cannot act optimally because they cannot process large volumes of information;
- 2) opportunism—the tendency for managers and employees to engage in behavior benefiting themselves as opposed to stockholders; and
- 3) subgoal pursuit—placing short-term non-profit-maximizing goals ahead of long-term value-maximizing goals.

These problems make it difficult for the firm to achieve global profit maximization. Compared with decentralized structures, the U-form favors a less efficient pyramidal and bureaucratic hierarchy within which capital, labor, and information are allocated. In contrast, the M-form substitutes quasi-autonomous operating divisions for the functional divisions of the U-form. These operating divisions are organized mainly along product, brand, market, or geographic lines. Each of the divisions may subsequently be divided along functional lines to ensure its autonomy or independence from heavy-handed decisionmaking within higher levels of the organization. Under the M-form, strategic decisionmaking occurs in the general or head office, while operating decisions are assigned to the divisions. This structure thus affords the divisions a large degree of autonomy, allowing them to take their own risks in much the same way that an independent firm would. Each division constitutes a quasi-firm (profit center) managed to achieve a specific objective.

The M-form combines the best features of centralization (such as realization of economies of scale) and decentralization (such as providing proper incentives for profit maximization). As such, it creates a superior organizational structure compared to the U-form and the external market. Williamson's hypothesis essentially states that the M-form organizational structure favors goal pursuit and least-cost behavior that is more closely associated with the neoclassical profit maximization hypothesis than does the U-form.

Not surprisingly, Williamson's hypothesis has been subjected to numerous empirical tests. Studies by Armour and Teece (1978), Burton (1988), Cable and Dirrheimer (1983), Cable and Hirohiko (1985), Norton and Pittman (1988), Steer and Cable (1978), Riordan and Williamson (1985), Roberts and Viscione (1981), Teece (1981), and Thompson (1981) are only a few of those providing empirical support. The results favoring the M-form as the least-cost organizational structure have generally proved robust not only across industries, but across countries as well.<sup>3</sup> However, with the exception of the article by Roberts and Viscione, which examines captive finance companies, all of the above studies examined nonfinancial firms. The following sections

lay out a test of aspects of the hypothesis among large U.S. commercial banks.

### **The internal structure of large U.S. banks**

Prior to the early 1970s, large banks operated predominantly with U-form organizational structures. Functional units at the top reported directly to the chief executive officer, whose responsibilities included reconciling functional subgoals and determining strategic directions. Since the U-form performs best in a stable and predictable environment, it is understandable that the U-form was dominant among large banks during this period when the economic and regulatory environments were stable and predictable.

Since the 1970s, changes in these economic and regulatory environments have eroded many of the advantages of the U-form. As a consequence, large U.S. commercial banks have to some extent paralleled the transition from U-form to M-form observed in nonfinancial firms during earlier years.<sup>4</sup> The natural response to the increased competition from nonbank firms and the geographic and product deregulation occurring during this period was for banks to develop explicit marketing functions, thus moving toward the market-oriented structure observed in most large banks today. This market-oriented structure is similar in many respects to the M-form of organization.

The principal characteristic of the market-oriented structure is the elevation of customer- and market-based departments to top organizational levels. Departments are organized around groups of customers rather than around banking functions: all products and functions necessary to serve a particular group of customers tend to be housed in one department. Examples of such departments include corporate or commercial banking, retail and private banking, and real estate banking. All of these departments report to the chief executive officer. The strategy of the market-oriented bank is essentially to be in the right markets with the right products at the right time.

Compared with the U-form, the market-oriented structure is less centralized, less specialized, and somewhat less formalized.<sup>5</sup> Conflicts are resolved according to the objectives of the bank instead of those of the individual functions, and managers have profit responsibilities. Thus, difficulties in coordination and

control are corrected by means of a more effective incentive system and by the elimination of competition between functional units. These characteristics make decisionmaking in the market-oriented structure more decentralized than it is in the U-form.

As banks shifted to market-oriented structures during the 1980s, they switched from decentralized to more centralized delivery systems. In the centralized delivery system, an agent (i.e., account representative) handles all of the needs of the customer with respect to product and service delivery. That is, the account representative acts as an intermediary between the customer and members of the bank's functional areas producing such services as lending, cash management, and trust, among others. Conversely, in a decentralized delivery system, employees from each functional area call on and service the customer directly.

The switch to centralized delivery systems was motivated by several factors. First, under decentralized systems, banks often did not know overall customer profitability since there was generally limited communication and coordination between functional areas. Second, it was believed that the switch to a centralized delivery system would increase customer perceptions of service quality, since in centralized delivery systems service problems are handled by one individual as opposed to several functional-area specialists. Finally, centralized delivery systems were thought to be a more cost-effective way to service customers.

As noted earlier, the market-oriented structure described above is similar in many respects to the multidivisional M-form. Both of them separate strategic decisionmaking from the decisionmaking of operating divisions (i.e., decentralization), and both have internal controls and incentives that eliminate the problems of opportunism, loss of control, and bounded rationality that characterize the U-form.<sup>6</sup> Thus, the recent transformation in the banking industry parallels that which occurred earlier in other industries.

### **The data**

The data on internal organizational structure used in the analysis were obtained from a survey and follow-up telephone interviews conducted by the Federal Reserve Bank of

Atlanta with the chief operations officers of the 145 largest U.S. commercial bank holding companies for the period October 1990 through July 1991, as listed on the BANK COMPUSTAT tape. Of the 145 banks surveyed, complete data were collected for 118 banks, approximately an 81 percent response rate. The remaining 27 companies either provided incomplete organizational data or were in the process of changing their internal organizational structure.

For each bank in the sample, information was obtained on 1) whether the bank(s) within the holding company operated with internal structures organized around customer or market groups versus functional areas; 2) whether decisions regarding credit administration and the pricing of fee-based services were centralized at the level of the holding company or at the lead bank headquarters; 3) whether the delivery of services to customer or market groups was centralized within a single customer contact unit and provided by account representatives, or provided on a decentralized basis by all units producing the services; and 4) whether back-office operations (accounting, computer facilities, advertising, etc.) were centralized or decentralized.

The survey revealed that all respondents were organized around either customers or markets. Hence, all sample companies exhibited some characteristics of the M-form organizational structure. Table 1 summarizes other results of the survey. As panel A shows, decisions regarding credit administration and the pricing of fee-based services were centralized in approximately 51 percent of the banks. That is, these decisions were made at the holding company or lead bank headquarters level, not at the division or non-lead-bank level. Centralized product and service delivery systems were employed at 64 percent of the banks (panel B). Back-office operations were centralized at 86 percent (panel C). This finding is consistent with the notion that such centralization yields significant scale economies.

Other data needed to conduct the empirical analysis were taken from the BANK COM-

<b>TABLE 1</b>		
<b>Structure of 118 sample commercial banks</b>		
<b>A. Decisionmaking</b>		
	<b>Number of banks</b>	<b>Percent of total</b>
Centralized	60	50.85
Decentralized	58	49.15
<b>B. Delivery systems</b>		
	<b>Number of banks</b>	<b>Percent of total</b>
Centralized	73	64.41
Decentralized	45	35.59
<b>C. Operations</b>		
	<b>Number of banks</b>	<b>Percent of total</b>
Centralized	102	86.44
Decentralized	16	13.56

PUSTAT tapes. Financial data on each sample bank for fiscal years 1989 through 1991 were collected. The average sample bank had approximately \$16.0 billion in total assets and \$1.6 billion in total costs (total non-interest costs plus allocated interest expense).

To facilitate the analysis, I grouped all of the sample banks into seven categories according to their organizational characteristics (see table 2). Table 3 presents selected summary statistics for the sample. Note that there were no banks with organizational form C, and only one with organizational form D. Data from the latter bank were used in the estimation of the cost function but not in the hypothesis tests.

<b>TABLE 2</b>			
<b>Bank organizational forms</b>			
<b>Form</b>	<b>Decision-making</b>	<b>Delivery systems</b>	<b>Operations</b>
A	c	c	c
B	c	c	d
C	c	d	c
D	c	d	d
E	d	c	c
F	d	c	d
G	d	d	c

Note: c = centralized; d = decentralized.

### The econometric model

To examine the impact of internal organizational structure on bank cost and productive efficiency, I used the following cost function:

$$(1) \quad TC = f(Q, P, ORG),$$

where  $TC$  is the bank's total cost of production,  $Q$  is a vector of the products or services produced,  $P$  is a vector of input prices, and  $ORG$  is a vector of inputs that describe the bank's organizational structure.

Three binary organizational variables— $DEC$ ,  $DEL$ , and  $OPER$  (the elements in  $ORG$  in equation 1)—were constructed for each sample firm. The variable  $DEC$  was assigned a value of 1 if a bank used centralized decision-making regarding credit administration and the pricing of fee-based services, zero if these decisions were decentralized. The variable  $DEL$  was assigned a value of 1 if the delivery system within a customer or market group was centralized and provided through an intermediary agent, zero if it was decentralized and provided by agents from functional areas. Finally, the variable  $OPER$  was assigned a value of 1 if back-office operations were centralized, zero if decentralized.

To estimate the cost function in equation 1, the following second-order translog approximation to a multiproduct bank cost function was applied:

$$(2) \quad \ln TC = \alpha_0 + \sum_m \alpha_m \ln P_m + 1/2 \sum_m \sum_n \alpha_{m,n} \ln P_m \ln P_n \\ + \sum_j \beta_j \ln Q_j + 1/2 \sum_j \sum_k \beta_{j,k} \ln Q_j \ln Q_k \\ + \sum_j \sum_m \phi_{j,m} \ln Q_j \ln P_m + \delta_{DEC} DEC \\ + \sum_j \delta_{DEC,j} \ln Q_j DEC \\ + \sum_m \delta_{DEC,m} \ln P_m DEC + \delta_{DEL} DEL \\ + \sum_j \delta_{DEL,j} \ln Q_j DEL \\ + \sum_m \delta_{DEL,m} \ln P_m DEL \\ + \delta_{OPER} OPER + \sum_j \delta_{OPER,j} \ln Q_j OPER \\ + \sum_m \delta_{OPER,m} \ln P_m OPER \\ + \delta_{DEC,DEL} DEC \cdot DEL \\ + \delta_{DEC,OPER} DEC \cdot OPER \\ + \delta_{DEL,OPER} DEL \cdot OPER + \varepsilon,$$

for  $m, n = L, K, I$   
and  $j, k = C\&I, \text{Consumer, R/E, and Other,}$

where

$TC$	= total costs (non-interest costs plus interest expense allocated to loans),
$Q_{C\&I}$	= dollar volume of commercial and industrial loans,
$Q_{\text{Consumer}}$	= dollar volume of consumer loans,
$Q_{R/E}$	= dollar volume of real estate loans,
$Q_{\text{Other}}$	= other bank output,
$P_{\text{Labor}}$	= price of labor (L)
$P_{\text{Capital}}$	= price of capital (K)
$P_{\text{Interest}}$	= interest rate on deposits (I)
$DEC$	= decisionmaking dummy variable, which equals 1 if centralized and zero otherwise,
$DEL$	= system of service delivery dummy variable, which equals 1 if centralized and zero otherwise,
$OPER$	= back-office operations dummy variable, which equals 1 if centralized and zero otherwise, and
$\varepsilon$	= an error term.

In estimating the model in equation 2, I imposed the usual symmetry ( $\alpha_{m,n} = \alpha_{n,m}$  and  $\beta_{j,k} = \beta_{k,j}$ ) and adding-up and homogeneity conditions ( $\sum_m \alpha_m = 1$  and  $\sum_m \phi_{j,m} = \sum_n \alpha_{n,n} = \sum_m \delta_{DEC,m} = \sum_m \delta_{DEL,m} = \sum_m \delta_{OPER,m} = 0$ ).

### Definition of outputs

All bank cost studies encounter the difficulties associated with the definition of output, the appropriate level of aggregation of output, and costs. It is beyond the scope of this article to resolve whether various categories of deposits should be treated as outputs or inputs.<sup>7</sup> For this study, I treated the dollar volume of all deposits as an input. In addition, using a proxy variable, I treated clearing balances and other deposit-related activities as outputs.

Regarding the specific definition of the outputs in equation 2, I used the criterion of value added employed by Berger, Hanweck, and Humphrey (1987) to determine the compo-

**TABLE 3**

## Summary statistics for 118 sample banks

**A. 60 banks with centralized decisionmaking**

Organizational form	Number of banks	Total assets	Total costs
(---billion dollars---)			
A	35	\$11.59	\$0.96
B	24	10.49	0.80
C	0	n.a. <sup>a</sup>	n.a. <sup>a</sup>
D	1	45.60	3.06

**B. 73 banks with centralized delivery systems**

Organizational form	Number of banks	Total assets	Total costs
(---billion dollars---)			
A	35	\$11.59	\$0.96
C	0	n.a. <sup>a</sup>	n.a. <sup>a</sup>
E	26	21.91	2.22
F	12	24.30	2.01

**C. 102 banks with centralized operations**

Organizational form	Number of banks	Total assets	Total costs
(---billion dollars---)			
A	35	\$11.59	\$0.96
B	24	10.49	0.80
E	26	21.91	2.22
G	17	18.45	1.46

<sup>a</sup> Not applicable.

sition of the various output categories. Wholesale loans ( $Q_{C\&I}$ ) were defined as the dollar volume of all commercial and industrial and security loans. Consumer loans ( $Q_{Consumer}$ ) were defined as the dollar volume of credit cards and other personal loans excluding loans secured by residential real estate. Real estate loans ( $Q_{RE}$ ) were defined as all loans secured by real estate. Other bank output ( $Q_{Other}$ ) was included in an attempt to capture off-balance-sheet activities such as loan sales, letters of credit, securitization, and swaps—activities that are becoming increasingly important at U.S. commercial banks. The proxy  $Q_{Other}$  was set equal to annual non-interest income including service charges received on transaction and nontransaction deposit accounts. Finally, securities were excluded from the definition of output, since in markets exhibiting low information costs, banks add only negligible if any value to these assets. The choice of these four

output measures was tempered by the objective of examining multi-product cost attributes within an econometrically tractable model of the banking firm. Hence, it was a maintained hypothesis that for a given output category, a single cost function adequately characterized the production of each of the activities aggregated within that category.

**Input prices**

The price of labor ( $P_{Labor}$ ) was defined as salaries plus benefits divided by number of employees. The price of capital ( $P_{Capital}$ ) was defined as the ratio of occupancy and fixed asset expense to net bank premises. The interest rate on deposits ( $P_{Interest}$ ) was calculated as the interest rate paid on all deposits divided by the sum of all interest-bearing deposits outstanding.

**Total costs**

Total costs ( $TC$ ) were defined as total non-interest costs plus allocated interest expense. Interest expenses are included since data limitations require that the output metric be defined in terms

of dollars of loans and deposits instead of by the number of accounts. Allocated interest equaled the product of the ratio of total loans to earning assets times total interest expense. The allocation of interest was necessary because securities are not specified as outputs, and many banks incur substantial interest costs in financing their securities portfolio. The output/cost specification described above is consistent with the intermediation approach to examining bank costs; it is preferable when the issues being examined concern the economic viability of banks.

**Hypotheses regarding organizational form**

The variables  $DEC$ ,  $DEL$ , and  $OPER$  were used to test several hypotheses regarding the impact of organizational form on costs (efficiency).

The first question was whether organizational factors help explain bank cost structures.

Testing this hypothesis involved determining if the coefficients associated with the organizational structure variables in equation 2 were jointly equal to zero. That is, for each organizational variable  $i$ , ( $i = DEC, DEL$ , and  $OPER$ ):

$$(3) \delta_i = \delta_{i,j} = \delta_{i,m} = \delta_{i,h} = 0.$$

The second hypothesis related to the impact of centralization on costs. With the parameter estimates from equation 2, the hypothesis can be stated as

$$(4) \partial \ln TC / \partial ORG_i = \delta_i + \sum_j \delta_{i,j} \ln Q_j + \sum_m \delta_{i,m} \ln P_m + \sum_h \delta_{i,h} ORG_h = 0.$$

This equation measures the percentage increase in total costs ( $TC$ ) resulting from centralization of the  $i$ th organizational variable holding outputs, prices, and other organizational variables constant.

For the multiproduct firm, ray scale economies ( $RSCE$ ) were measured by

$$(5) RSCE = \sum_i \partial \ln TC(Q) / \partial \ln Q_i,$$

where  $TC(\bullet)$  is the cost function,  $Q_i$  represents the outputs specified in equation 2, and  $Q$  is the vector of outputs. If  $RSCE$  equals 1.0, production of  $Q$  exhibits constant returns to scale, whereas  $RSCE$  less than (greater than) 1.0 indicates increasing (decreasing) returns to scale.

The third hypothesis concerned the impact of centralization on scale economies and can be stated as

$$(6) \partial RSCE / \partial ORG_i = \sum_j \delta_{i,j} = 0.$$

This equation measures the impact of centralization of the  $i$ th organizational variable on scale economies holding outputs, prices, and other organizational variables constant.

### Empirical results and implications

Full information maximum likelihood (FIML) was used to jointly estimate the model in equation 2 with factor input share equations. Using Shepard's lemma, the share equations are given by  $\partial \ln TC / \partial \ln P_m = S_m$ , for  $m = L, K$ , and  $I$ , where  $S_m$  is the  $m$ th input's share of total costs. Since the coefficients in the share equations are a subset of those in the cost function

in equation 2, joint estimation should result in more efficient estimates. However, since  $\sum_m S_m = 1$ , the capital share is dropped from the joint estimation to avoid singularity.<sup>8</sup>

Likelihood ratio tests were conducted to test the hypothesis given in equation 3 regarding the significance of the organizational variables in explaining total costs. The chi-square statistics for  $DEC$ ,  $DEL$ , and  $OPER$  were 28.41, 46.42, and 32.54, respectively. All test statistics were significant at the .01 level. These results suggest that the organizational variables were significant in explaining the structure of bank costs as specified in equation 2.

### Impact of centralization on costs

Table 4 reports the tests of the hypotheses in equation 4. For each test, the impact of centralization with respect to a given organizational variable was evaluated holding constant quantities, prices, and other organizational variables. Quantities and prices were set equal to their geometric means for the overall sample. In this way, variations in costs were attributed to differences in organizational forms. For each test, the organizational forms associated with the null and alternative hypotheses are given. Because some groups lacked sufficient membership, two out of four tests were conducted for centralized decisionmaking, two out of four for centralized delivery systems, and one out of four for centralized back-office operations.

#### Decisionmaking

The results in table 4, panel A suggest that a change to centralized decisionmaking significantly increased costs relative to decentralized decisionmaking. For a bank with centralized delivery systems and operations, a change from decentralized to centralized decisionmaking increased costs by 3.68 percent (significant at the .10 level). For a bank with decentralized delivery systems and centralized operations, a change from decentralized to centralized decisionmaking increased costs by 9.57 percent (significant at the .01 level). In no case did a switch to centralized decisionmaking decrease costs. Both of these findings appear to be economically significant considering that the average bank's costs equal \$1.4 billion and assets equal \$16 billion. For the average sample bank, a 3.68 (9.57) percent increase in total costs would be associated with

**TABLE 4**

**Impact of centralization on total costs**

**A. Impact on total costs from centralized decisionmaking**

Organizational structure underlying null hypothesis  
(Organizational structure underlying alternative hypothesis)

Test number	Centralized decisionmaking	Centralized delivery systems	Centralized operations	Number of firms	Test statistic
1	yes	yes	yes	35	3.68%*
	(no)	(yes)	(yes)	26	(2.07%) <sup>a</sup>
2	yes	no	yes	24	9.57%***
	(no)	(no)	(yes)	17	(2.64%) <sup>a</sup>

**B. Impact on total costs from centralized delivery systems**

Organizational structure underlying null hypothesis  
(Organizational structure underlying alternative hypothesis)

Test number	Centralized decisionmaking	Centralized delivery systems	Centralized operations	Number of firms	Test statistic
3	yes	yes	yes	35	0.68%
	(yes)	(no)	(yes)	24	(2.36%) <sup>a</sup>
4	no	yes	yes	26	6.53%***
	(no)	(no)	(yes)	17	(2.27%) <sup>a</sup>

**C. Impact on total costs from centralized operations**

Organizational structure underlying null hypothesis  
(Organizational structure underlying alternative hypothesis)

Test number	Centralized decisionmaking	Centralized delivery systems	Centralized operations	Number of firms	Test statistic
5	no	yes	yes	35	-3.97%**
	(no)	(yes)	(no)	24	(1.85%) <sup>a</sup>

<sup>a</sup>Standard error.

\*, \*\*, \*\*\* Significant at the .10, .05, and .01 levels, respectively.

a reduction in return on assets of 21 (55) basis points, using a marginal tax rate of 34 percent. Given that the average sample bank's return on assets averaged approximately 60 basis points from 1989 to 1991, these effects are of great economic significance.

**Delivery of services**

The results in table 4, panel B indicate that for banks with centralized decisionmaking and operations, a change from a decentralized to a centralized service delivery system had no significant impact on costs. For banks with decentralized decisionmaking and centralized operations, centralization of the service delivery system increased costs by approximately 6.53 percent (significant at the .01 level). In neither case did the results suggest a reduction

in costs. This is in contrast to the notion discussed above that centralizing a service delivery system will produce cost savings. However, these results and those above should be interpreted with caution, since other motivations for centralizing (such as improving the analysis of customer profitability or the quality of service) may be at work.

**Back-office operations**

The results in table 4, panel C suggest that for a bank with decentralized decisionmaking and centralized service delivery systems, centralizing back-office operations reduced costs by approximately 4 percent (significant at the .05 level). This finding is consistent with previous research which reports fairly large scale economies for back-office operations (see

Hunter and Timme 1986, for example). Hence, one would expect banks to centralize back-office operations in order to capture these scale economies.

#### Impact of centralization on scale economies

Using the parameter estimates from equation 2, the estimated scale economies for a bank with decentralized decisionmaking, delivery systems, and back-office operations equalled 0.945 (significant at the .05 level). This indicates increasing returns to scale, on average, for this class of bank. This result is consistent with the findings of Hunter and Timme (1986) and Hunter, Timme, and Yang (1990). Those studies examined scale economies for large U.S. banks but did not include organizational variables of the type included in this study.

Table 5 reports tests of the impact of centralization on scale economies, the hypothesis given by equation 6. The test statistics for a bank with centralized decisionmaking, delivery systems, and operations were -0.0040, 0.0260, and -0.0023, respectively. None of the test statistics was significant at standard confidence levels. These results imply that centralization did not have a significant impact on scale economies, although it did have a significant impact on bank costs. It appears, then, that cost inefficiencies dominate the effects of scale economies in explaining variations in bank costs.

#### Conclusions

This article provides empirical evidence on the impact of internal organizational structure on bank costs. Specifically, I examined the impact of centralized versus decentralized decisionmaking, product and service delivery systems, and back-office operations on bank costs and productive efficiency. The analysis used average data from a sample of 118 large U.S. commercial banks for the years 1989 through 1991. The results can be summarized as follows. First, centralized decisionmaking tended to increase costs. Second, centralized service delivery systems either increased or had an insignificant impact on costs. In no

Test number	Organizational structure	Test statistic
6	Centralized decisionmaking	-0.0040 (1.29)
7	Centralized delivery systems	0.0260 (2.27)
8	Centralized operations	-0.0023 (1.41)

Note: Standard errors in parentheses.

case did centralized service delivery systems reduce costs as envisioned by proponents of centralization. Third, centralized back-office operations significantly reduced costs. This latter result is consistent with the existence of scale economies in bank back-office operations such as accounting, computing, and advertising.

These results provide new insights into the determinants of bank cost and efficiency characteristics, highlight the importance of organizational variables in financial firm production, and point to the need to incorporate these variables into future bank efficiency studies. The results do not, however, answer numerous questions as to why a bank would adopt an organizational form which (according to the evidence) increases costs. In this regard, several further approaches would appear promising. First, it may be useful to examine the impact of organizational structure on other measures of performance (such as profits, return on assets, or risk-adjusted holding period returns) and on bank risk. Second, insight can be obtained from examining the effects of organizational forms in a dynamic framework. Since this article examines data covering only three years, we cannot know if the results characterize banks in a state of transition, where the full benefits of the selected organizational forms would not be fully recognized, or banks operating in steady state.

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## NOTES

<sup>1</sup>Among the many noted contributors to the field of organizational economics, I draw heavily on the works of Beckmann (1960), Chandler (1977), and Williamson (1967, 1975).

<sup>2</sup>Williamson actually describes a range of organizational forms in his 1975 book. These include the corrupted H-, U-, and M-forms, and variations of these.

<sup>3</sup>In these studies, firm internal organizational structure is classified into categories such as the U-form or M-form, among others. This classification is entered as a regressor in an equation relating some performance characteristic (profitability, efficiency, etc.) to firm and market characteristics generally thought to be determinants of performance.

<sup>4</sup>The discussion in this section draws heavily on Channon (1986) and Donnelly and Skinner (1989).

<sup>5</sup>Certain activities may remain centralized where definite economies of scale are thought to exist, such as accounting or computing. Thus, movement towards less specialization among employees, i.e., requiring that they have knowledge of various functional areas as well as the needs of the customer, does not necessarily imply that the organization loses much in the way of productive efficiency

<sup>6</sup>While the market-oriented structure has essential features of the M-form, the two are not exactly equivalent. This is because the M-form evolved in the manufacturing sector. Perhaps the best way to describe the market-oriented structure is as the financial-sector equivalent of the M-form.

<sup>7</sup>Hunter, Timme, and Yang (1990), examining the largest U.S. commercial banks, provide separate estimates of bank cost characteristics, treating deposits first as outputs and then as inputs. Holding product mix constant and treating deposits as outputs, they observe returns to scale which are roughly constant for the average sample bank, generally mild diseconomies of scale for the larger banks (\$3 billion to \$25 billion in total assets stated in 1986 dollars), and rather large diseconomies for the largest banks (more than \$25 billion in assets) when analyzed on a subgroup basis. Holding product mix constant and treating deposits as inputs, they find significantly increasing scale economies for banks up to \$5 billion in assets and constant scale economies for banks with assets between \$5 billion and \$10 billion. Banks with assets between \$10 billion and \$25 billion are found to exhibit mild diseconomies, while the largest banks with more than \$25 billion in assets exhibit significantly large diseconomies of scale.

<sup>8</sup>Maximum likelihood estimates are invariant to which one of the share equations is dropped from the joint estimation.

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