Volume 2 **ISSN 1939-4683**

JOURNAL OF COMMERCIAL BANKING AND FINANCE

An official Journal of the
Allied Academies, Inc.

Academy Information
is published on the Allied Academies web page
www.alliedacademies.org

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Whitney Press, Inc.
Printed by Whitney Press, Inc.
PO Box 1064, Cullowhee, NC 28723
www.whitneypress.com

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JOURNAL OF COMMERCIAL BANKING AND FINANCE

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MANUSCRIPTS

EQUITY OWNERSHIP AND THRIFT FAILURES DURING THE S&L CRISIS[1]

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M. Monica Her, California State University, Northridge

ABSTRACT

We use the crisis within the savings and loan industry during the late 1980s and early 1990s to examine the role of equity ownership as a mechanism for resolving the agency conflict between managers and shareholders. The analysis explores the relationship between failure and equity ownership at publicly traded savings and loan institutions and reveals interesting results. The sample consists of savings and loan institutions with ownership data available in proxy statements and covers the period 1983 through 1994. Our focus is on the equity owned by the directors and block holders as a mechanism for protecting the interest of outside shareholders. We differentiate between inside directors, affiliated outside directors and independent outside directors. The data reveals that independent outside directors owned less equity in failed institutions than they did in non-failed institutions. After controlling for age, size, regional economic conditions, type of charter and the regulatory environment in the state that the institution is located we find a non-linear relationship between insider-controlled equity and the probability that an institution failed. These findings suggest that the losses suffered by shareholders due to the failure of savings institutions could, in part, have been alleviated by appropriately structuring how the equity was distributed between insiders and outside shareholders. Therefore, we conclude that incorporating the role of internal governance mechanisms such as equity ownership in the analysis can enrich our understanding of the S&L crisis.

INTRODUCTION

We explore the role of equity ownership as a mechanism for protecting the interest of shareholders during the crisis within S&L industry. According to Fama (1980) equity owned by corporate insiders helps to alleviate agency problems for shareholders if it aligns the interests of insiders and outside shareholders. However, Gorton & Rosen (1995) and Stulz (1988) suggest that equity owned by insiders may also serve to entrench managers, thereby creating a shield against discipline by outsiders. Outside shareholders interest may also be protected by outside holders of large chunks of a firm's shares. These large shareholders are usually institutional investors who are more sophisticated and have a greater incentive to expend the resources necessary to monitor the managers of a firm. To the extent that shareholders in publicly traded thrifts suffered huge losses during the crisis, an interesting question arise as to whether the heterogeneity of equity ownership within the S&L industry had any impact on the survival of these institutions.

To address this question we focus on the period of turmoil within the S&L industry extending from 1983 through 1994, which represents drastic changes and that provides several events for which we can examine the influence of equity ownership on firm survival. Other factors such as fluctuations in interest rates, deregulation, and the condition of regional economies may have contributed to failures but are beyond the control of managers. However, other factors that may have contributed to the failures such as decisions to expand assets and liabilities, the selection and mix of these assets and liabilities, and the decision to leverage up the firm are well within the bounds of managerial prerogatives. As such, this period provides an exceptional opportunity to investigate the relationship between inside equity ownership and the success or failure of savings and loan associations, which may be attributed to the quality of managerial decisions.

We explore the following questions: How effective was equity ownership in resolving shareholder-manager conflicts? Was the presence of unaffiliated blockholders an effective mechanism for representing outside shareholders' interest? To provide answers to these questions, we analyzed a sample of publicly traded S&Ls that should provide opportunities to trigger the intervention by equity owners to preserve the welfare of the firm.

Our analysis reveals that independent outside directors owned less equity in failed S&Ls than they did in non-failed institutions. Similar comparisons for affiliated outside directors show that affiliated outside directors owned more equity in failed than they did in non-failed institutions. The presence of unaffiliated blockholders among the owners of sample firms appears to be related to the probability that an S&L failed. These findings suggest that the distribution of equity ownership between insiders and outside shareholders should be incorporated among the factors to be addressed before we can be confident that the S&L problems are behind us.

These findings contribute to our understanding of the relationship between equity ownership and firm performance, thereby enriching our knowledge of the dynamics within the S&L industry. The sample consists of firms that are actively traded on national exchanges and, therefore, are exposed to the full range of corporate control mechanisms. In addition, the sample is limited to one industry in order to avoid cross industry differences. However, this restriction in no way limits the value of this study, as the role of equity ownership in resolving agency problems in non-financial firms is already well documented (Himmelberg, Hubbard & Palia, 1999; Agrawal & Knoeber, 1996; McConnell & Servaes, 1990; Morck, Shleifer & Vishny, 1988; Shleifer & Vishny, 1986). Furthermore, the use of S&Ls allows us to examine the role of the equity ownership as an alternate explanation for the failures in that industry. Finally, we differentiate between three classes of directors in an industry where dealings with certain outsiders such as attorneys, accountants, investment bankers, and financiers have often been suspected to be less than arms-length. In fact, some accountants and investment bankers have been found culpable in contributing to S&L losses. For example, the nation's four largest accounting firms were the subjects of government inquiries, with each accused of professional misconduct related to S&L failures. According to *The Wall Street Journal* (November 24, 1992, A3), Ernst & Young paid $400 million to settle government claims and the others have settled similar claims. The former president and chief executive officer of the failed California thrift, Columbia Savings & Loan Association, was indicted for improperly obtaining stock-warrants from the investment banking firm, Drexel Burnham Lambert, Inc. The

thrift would eventually be one of Drexel Burnham Lambert's best customers, holding over $4 billion in junk bonds[2].

LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESES

The separation of the ownership from the direct control of corporate resources in a firm creates the basis for the agency problems identified by Berle and Means (1932). The problems arise because managers may have incentives to augment their welfare at the expense of the firm's owners. Therefore, mechanisms have evolved that resolve these agency conflicts. Among these are the structure of managerial compensation (Baker, Jensen & Murphy, 1988; Lewellen, Loderer & Martin, 1987), the managerial labor market (Fama, 1980), managerial stock ownership, the presence of blockholders, and the takeover market (Jensen & Ruback, 1983; Martin & McConnell, 1991). However, in this paper we will focus on equity ownership as a means to resolving manager-shareholder conflicts.

Stock ownership can play an important role in resolving agency problems between managers and shareholders. However, the exact relationship between stock ownership and the alignment of stockholders' and managers' interests is unresolved. According to Baysinger and Butler (1985), Morck, Shleifer and Vishny (1988), McConnel and Servaes (1990), and Byrd and Hickman (1992), the effect of equity ownership on firm performance appears to be non-linear. These findings support the idea of an optimal distribution of equity ownership, with levels of ownership over which interests are aligned or over which managers become entrenched. Alignment of interests is consistent with the widely examined moral hazard hypothesis for insured institutions, but this study focuses on managerial entrenchment and shareholder losses, issues not given much attention in other studies that analyze problems in the S&L industry[3].

Regulators continue to have a great impact on the banking industry, as was quite evident throughout the S&L crisis of the 1980s. The shortcomings of government agencies and their complicity in the S&L crisis is extensively documented by several scholars including Strunk and Case (1988), Barth, Bartholomew and Bradley (1990), Kane (1990), Cordell, MacDonald and Wohar (1993), and Cole and Eisenbeis (1996). Regulatory intervention usually comes after the stage where internal controls such as the influence of equity ownership should have intervened to restrain managerial excesses. Furthermore, there are no regulatory edicts that should prevent equity owners from ensuring that managers pursue policies that protect their interests. The role of these equity ownership is, therefore, quite relevant to a more complete understanding of the problems in the S&L industry.

Moral hazard explanations for the S&L problems assume an alignment of interest between managers and shareholders and so most of the prior studies focuses on losses suffered by claimants other than shareholders. The notion that entrenched managers could expose outside shareholders to excessive risks has been overlooked. In this study, we extend the research that address problems experienced in the S&L industry by exploring the effect of equity ownership and what role it may have played in the crisis. Many of the earlier studies focus on causes not directly related to the internal governance of the institutions. Strunk and Case (1988, 15) list fifteen causes of thrift failure covered in the literature, none of which is related to the role of equity ownership.

The major causes attributed to S&L problems relate to regulation, deregulation, fraud, the economic environment, and supervisory bungling by the regulators. As a consequence, most of the focus is on losses incurred by the insurers who ultimately are the taxpayers. However, based on the sample used in this study, the total market capitalization of the 58 institutions that failed between 1987 and 1994 was approximately $5 billion at the end of 1985, indicating that shareholders also suffered considerable losses, even though these losses are dwarfed by the costs incurred by the insurers. Furthermore, since not all S&Ls failed, it is important to explore whether the structure of equity ownership could have protected shareholders. Thus, it may be possible to associate equity ownership with the survival outcome of S&Ls.

Mitigation of manager-shareholder agency problems through stock ownership is achieved when the level of managerial ownership is within a range where maximizing shareholders' wealth also maximizes the manager's utility. The relationship between equity ownership and firm performance is explored in several studies, including Demsetz and Lehn (1985), Stulz (1988), Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990). Higher concentration of ownership should make the monitoring of managers more economical. Therefore, the shareholders of firms with concentrated ownership are more likely to actively monitor the managers. Demsetz and Lehn (1985) specify a linear relationship between firm performance and ownership concentration, but fail to detect any correlation. Brickley and James (1987) also, using concentration as a measure of ownership, find no evidence of substitution between ownership and regulation for monitoring managers in acquisition and non-acquisition states for a sample of banks. Most of the other studies that link stock ownership to firm performance use non-linear models with managerial, director, and block holder equity ownership to assess the effect of ownership on firm performance.

Stulz (1988), Morck, Shleifer and Vishny (1988), and McConnell and Servaes (1990) have shown managerial ownership structure to be effective in reducing conflicts between managers and shareholders. The relationship between firm performance and equity ownership is non-linear, but the form of the non-linearity is still unclear[4]. The non-linear relationship is consistent with alignment of interest over certain ranges of ownership and entrenchment over the range where managers can reap private benefits at the expense of other shareholders.

Prior research on the effect of outside stock ownership on managerial control focuses on institutional investors and blockholders. The availability of public information for this group of investors is one reason they receive so much attention. Institutional investors are often included as blockholders because of their size. Another reason for the interest in blockholders is the strong incentive they have to actively monitor managers. The size and investment policies, in some instances, make monitoring the most cost effective means of controlling managers by these investors. According to Shleifer and Vishny (1986), unaffiliated blockholders can monitor and control managers through direct negotiation or by facilitating acquisition by outsiders. Even when internal efforts to control managers fail, external control can be made easier by the presence of a blockholder. In a study of the announcement of block trades, Barclay & Holderness (1991) associate increased stock prices with these announcements and increased turnover of top managers following the transaction. This evidence is also consistent with the hypothesis that blockholders can be active

monitors, as most of these trades did not involve increased concentration of ownership, but only a change of the block holder.

In analyzing the effect of stock ownership on firm survival, the stock owned by managers is included as part of inside directors' equity, so our main concern is with insider-controlled equity and the stock ownership by outsiders represented by unaffiliated blockholders. Inside directors' and affiliated shareholders' equity bolsters the managers' standing and so serves as a shield against monitoring and control by outside shareholders. Failed institutions are, therefore, more likely to be the ones with entrenched managers, if poor managerial decisions contributed to the failures. This would be reflected by higher failure rates over a certain range of equity owned or controlled by inside directors.

Unaffiliated blockholders are potentially the single most powerful group of outside shareholders that could influence the behavior of insiders. First, the size of their holdings usually allows these investors to make or influence board appointments. Owners of large blocks of shares may also gain greater access to managers between regular shareholder meetings. Finally, holders of a large portion of the firm's shares can be a catalyst for takeovers, so managers have additional incentives to heed the concerns of these investors. The presence of unaffiliated blockholders among the investors in a firm should, therefore, be a positive force for outside shareholders, thus reducing the probability of failure.

METHODOLOGY

We employ the logistic regression technique to analyze the relationship between the probability of failure and the equity ownership variables. For the regression models the dependent variable is set equal to one if the institution failed between 1983 and 1994 and zero otherwise. The model is:

$$Prob(FAIL=1) = e^{bx}/(1 + e^{bx})$$

where:

b is the vector of parameters estimated and

x is the data matrix of explanatory variables that are hypothesized to explain S&L survival outcome.

The ownership variables include the equity owned by inside and affiliated outside directors to capture the effect of insider-controlled equity on S&L failure, equity owned by independent outside directors, and a binary variable to account for the presence of unaffiliated block holders in the ownership structure of the firm. The control variables include the log of total assets, a binary variable that is equal to one if the institution is located in any of five states (CA, FL, LA, OH, TX) with less restrictions on asset and liability powers of S&Ls and zero otherwise, a binary variable that is equal to one if an institution had a federal charter and equal to zero if it had a state charter, a binary variable that is equal to one if an institution had been established for five years or more in 1985 and equal to zero otherwise, the annual rate of change in the number of new housing permits issued in the 50 states, D.C., or Puerto Rico where the institution is located. Borrowing from

Cebenoyan, Cooperman and Register (1995), we define the five states of California, Florida, Louisiana, Ohio, and Texas with less restrictive asset and liability powers as less regulated.

Size has been shown in several studies to impact firm performance and may be relevant since larger institutions may have less risk exposure, are subject to more public scrutiny, and regulators may be more inclined to delay the closure of larger institutions. We include a binary variable, to differentiate between states with less stringent asset and liability powers and other states. In addition to the difference in the regulation between states, savings and loan associations also differ as to their supervisory agency as the state banking departments supervise institutions with state charter and the Federal Home Loan Bank Board (FHLBB) supervise those with federal charter. Federally chartered institutions also controlled a disproportionate amount of total industry assets, which suggest that on average they are larger than state chartered institutions. One additional firm-specific characteristic, firm age, is captured with a binary variable that differentiates between established firm, that is, those that were five years and older in 1985 and those institutions that were less than five years old. To control for the effect that local economic conditions may have on the failure of an institution, we include a variable that is equal to the annual growth rate in the number of new housing permits issued in any of the 50 states, D.C., or Puerto Rico where the institution is located. The number of new housing permits issued (N_t) in each state, D.C., and Puerto Rico is extracted from the U.S. Statistical Abstract microfiches for each year from 1982 through 1994. The annual growth rate in the number of new housing permits issued is computed as $(N_t - N_{t-1})/N_{t-1}$, for t = 1984, ..., 1994.

SAMPLE SELECTION AND DESCRIPTION OF DATA

We rely heavily on Barth, Beaver and Stinson (1991) to develop our initial sample of 165 publicly traded S&Ls. We tracked these firms from 1983 through 1995 and found that only 49 of these S&Ls survived, either in their original form or as a holding company. The remaining 116 S&Ls either failed, or were acquired by or merged into other firms. Based on information gathered from Lexis/Nexis and the Wall Street Journal Index for each of the 116 S&Ls that did not survive we classified 58 as acquired or merged and 58 as failed. Inspection of all the articles that reported acquisitions and mergers of institutions indicated these institutions were in sound financial condition at the time of the acquisition or merger. For all analysis we combined the acquired and merged institutions and then added these to the institutions that survived. Therefore, non-failed institutions include a total of 107 S&Ls. We classify as failed all institutions that became bankrupt, were taken over by regulators, or were taken over by another firm with the assistance of a government insurance or regulatory agency. None of the sample firms failed from 1983 through 1986 or during 1994. The majority of the failures occurred between 1989 and 1991. The sample was reduced because of availability of ownership data in proxy statements, financial data from the Center for Research in Security Prices (CRSP), Compustat, Compact Disclosure databases, and Moody's Banking & Finance Manual. These sources provide a total of 355 firm-years of data used in our analysis; 286 observations for 73 firms that did not fail, and 69 observations for the 37 failed institutions that remain in the data set. For the failed firms we collected data for only the three most recent years available before failure to capture characteristics of the firms, which are mostly likely to be associated with the failure.

All the directors are classified as inside, affiliated outside, or independent outside directors. Inside directors include all directors who are current and former employees of the institution, and the immediate relatives of these officers. The affiliated director classification was suggested by Baysinger and Butler (1985) and has been used in subsequent research such as Weisbach (1988), Gilson (1990), Hermalin and Weisbach (1991), Byrd and Hickman (1992), Lee, Rosenstein, Rangan and Davidson (1992), and Shivdasani (1993). Some authors used the classification of affiliated outsiders to differentiate these from independent outside directors. Even though the exact definition of affiliated outside and affiliated director differ among the studies, they all seem to capture the essence that this group of directors are somehow different from independent directors and should be analyzed separately. We include as affiliated directors officers of firms or individuals having major business relationships with the institution, financiers and financial professionals, management and financial consultants, and lawyers. All other directors including professional directors, private investors, educators, government officials, members of the clergy, and medical practitioners are classified as independent outside directors. The owners of 5 percent or more of the company's stock are classified as either affiliated or unaffiliated blockholders. We define a block holder as unaffiliated if the holder is not an inside or affiliated director, or has no substantial business relationship with the firm.

We read each proxy statement and recorded equity ownership as the percent of equity held by each category of director. We also recorded the stock holdings of block holders, the age and type of charter for each institution. For those institutions that were acquired or that failed, we include the total assets for the three most recent years prior to the year of acquisition or failure. All total assets data are adjusted by the consumer price indices (CPI) published in the U.S. Statistical Abstracts to reflect constant 1983 dollars. Due to the limitations of our data sources the number of observations for each firm are not equal for either failed or non-failed institutions. The numbers of observations range from one to three for failed institutions and from one to eleven for non-failed institutions. Also the annual data for each firm do not always represent consecutive years.

Table I: Summary Statistics for Sample Data

Summary of total assets and ownership structure data for sample of publicly traded savings and loan institutions during the period 1983 through 1994. A total of 355 firm-years of data is used for all computation except for unaffiliated block holders with 269 firm-years.

	Mean	Std Dev	Median	Maximum	Minimum
Total assets	$4,438.94	$7,499. 53	$1,217.07	$39,026.63	$16.36
Outside directors' equity	2.46%	2.64%	1.39%	9.91%	0
Inside directors' equity	8.35%	11.63%	4.67%	72.39%	0
Affiliated directors, equity	1.37%	3.00%	0.21%	23.6%	0
Insider-controlled equity	9.72%	12.15%	5.61%	73.01%	0.05%
Unaffiliated block holders equity	21.02%	12.52%	19.11%	62.97%	5.07%

The summary of the descriptive statistics for the sample is presented in Table I. The average size of sample firms is $4.44 billion, with a range from $16.36 million to $39.03 billion in total

assets. Independent outside directors held very little equity in these firms, they owned 2.46% of the equity compared to the 9.72 % that is owned by insiders. Based on evidence provided by Williams (1998), we classified as insider-controlled equity, the sum of the equity owned of inside and affiliated directors. Of the stakeholders examined in this study, block holders held the largest equity stakes with an average of 21.02%.

DISCUSSION OF RESULTS

The comparisons between failed and non-failed firms are reported in Table II. It appears the largest institutions were among the ones most likely to survive. Even though the sample is restricted to publicly traded institutions, it includes some relatively small firms. Only the equity holdings of independent outside directors, affiliated directors, and unaffiliated block holders reflected any significant difference between the failed and non-failed institutions. Outside directors held 1.54% of the equity of failed institutions compared to 2.68% for non-failed institutions. These differences are significant at better than the 1 percent level. It appears that outside directors were more effective monitors when they had a direct economic interest, represented by equity ownership in the firm. For affiliated directors the situation is reversed. Affiliated directors of failed institutions held three times the amount of equity in their institutions, as do affiliated directors of non-failed institutions, 2.99% compared to 0.98%.

The effect of inside directors' equity ownership on the failure of S&Ls appears less important than hypothesized, even though insiders appear to hold slightly larger stakes in failed institutions. This finding is not surprising since most of the studies that have linked inside equity ownership to firm performance found the relationship to be non-linear. Only when affiliated directors' equity is included as a part of insider-controlled equity does statistical significance appear in the difference between the ownership of insiders at failed and non-failed institutions. In this case, insiders' equity averaged 12.34 percent (median of 8.62 percent) at failed institutions compared to 9.09 percent (median of 5.34 percent) at non-failed institutions. Support for the equity ownership hypothesis is, therefore, provided by both insider-controlled equity (inside plus affiliated directors' equity).

Consistent with the hypothesis that unaffiliated block holders help to protect the interest of outside shareholders, we find that unaffiliated block holders held significantly less equity in failed institutions. These block holders held 24 percent less equity in failed institutions than their counterparts at non-failed institutions. The difference is significant for both means and medians.

Table II: Directors and Block Holders Equity Ownership

Ownership structure variables for sample of savings and loan associations with proxy statements available on Q Data Corporation microfiche for the years 1983 through 1994. The statistics for failed institutions were computed from data for the three most recent years prior to the year of failure for which data was available. For non-failed institutions the statistics include all available data for the full sample period. We report the sample means and medians (in parentheses). N is the number of firm-years of data used to compute the corresponding statistics. The level of statistical significance are based on difference of means t-test for the means and Wilcoxon rank sum Z-test for medians, and compares the data column 2 to those column 3.

Description	Non-failed institutions	Failed institutions
	N = 286	N = 69
Total assets*	$4,764.75	$3,088.50[c]
	($1,183.24)	($1,424.53)
Outside directors' equity	2.68%	1.54%[a]
	(1.63%)	(0.82% [a])
Affiliated directors' equity	0.98%	2.99%[a]
	(0.11%)	(0.80%)
Inside directors equity	8.11%	9.35%
	(4.60%)	(5.43%)
Insider-controlled equity	9.09%	12.34%[b]
	(5.34%)	(8.62%[a])
Unaffiliated block holders' equity	16.72%	12.64%[b]
	(14.87%)	(7.60%[a])

* Millions
[a] Significant at the 1% level
[b] Significant at the 5% level
[c] Significant at the 10% level.

Table III: Logistic Regressions

Logistic regressions with inside and affiliated directors' equity combined as insider-controlled equity. The dependent variable is equal to 1 if the institution failed between 1983 and 1994, and zero otherwise. The explanatory variables include equity ownership variables, asset and liability powers, firm size, type of charter, firm age, and the effect of local economic conditions. The dollar figures for total assets are adjusted by the consumer price indices to reflect constant 1983 dollars. The local economic condition variable is the percentage change in the number of new housing permits issued or unemployment rate in all 50 states, D.C., and Puerto Rico for each year covered by the sample period. The p-values are in parentheses and are estimated using standard errors that are computed assuming the observations are independent across firms but not between years for each firm.

Variables	Model 1	Model 2
Intercept	-1.9048	-16.6844[c]
	(0.229)	(0.052)
Insider-controlled equity	21.5786[a]	21.1715[a]
	(0.000)	(0.001)
Insider-controlled equity squared	-42.089[b]	-43.2183[a]
	(0.011)	(0.010)
Outside directors' equity	-42.157[a]	-42.7555[a]
	(0.003)	(0.001)
Binary variable = 1 if the firm has unaffiliated block holders and = 0 otherwise	-0.8764[b]	-0.7245[c]
	(0.033)	(0.080)
Binary variable = 1 for firms located in any of 5 states (CA, FL, LA, OH, TX) and = 0 otherwise	-1.2163[a]	-0.8513[c]
	(0.007)	(0.070)
Logarithm of total assets	0.2554	2.3953[b]
	(0.163)	(0.046)
Binary variable = 1 if the institution is federally chartered and 0 if state chartered	2.7223[a]	19.950[b]
	(0.000)	(0.034)
Binary variable = 1 if the institution has been established for 5 or more years and = 0 if less than 5 years	-4.1078[a]	-5.3198[a]
	(0.000)	(0.000)
Interaction term between log of total assets and type of charter		-2.3243[c]
		(0.057)
Annual rate of change in the number of new housing permits issued in the home state of each S&L	-4.5149[a]	-4.4923
	(0.000)	(0.000)
Number of firm-years of data	327	327
Likelihood Ratio (χ^2)	-101.14	-97.26
	(0.000)	(0.000)
Pseudo R^2	0.2939	0.3210

[a] Statistically significant at the 1% level.
[b] Statistically significant at the 5% level.
[c] Statistically significant at the 10 % level.

Next, we conduct a more complex analysis using the logistic regression technique to obtain maximum likelihood estimates. The results are presented in Table III. This model relates the probability that an institution failed between 1983 and 1994 to variation in equity ownership, and a series of control variables. The levels of significance for the estimated parameters in the regressions are based on robust standard errors. These standard errors are obtained from an estimator of the variance-covariance matrix that is associated with White (1980) and Huber (1967). The version of the estimator applied here is presented in Stata and groups the observations by firms; the groups are treated as independent while the observations within each group are not independent.

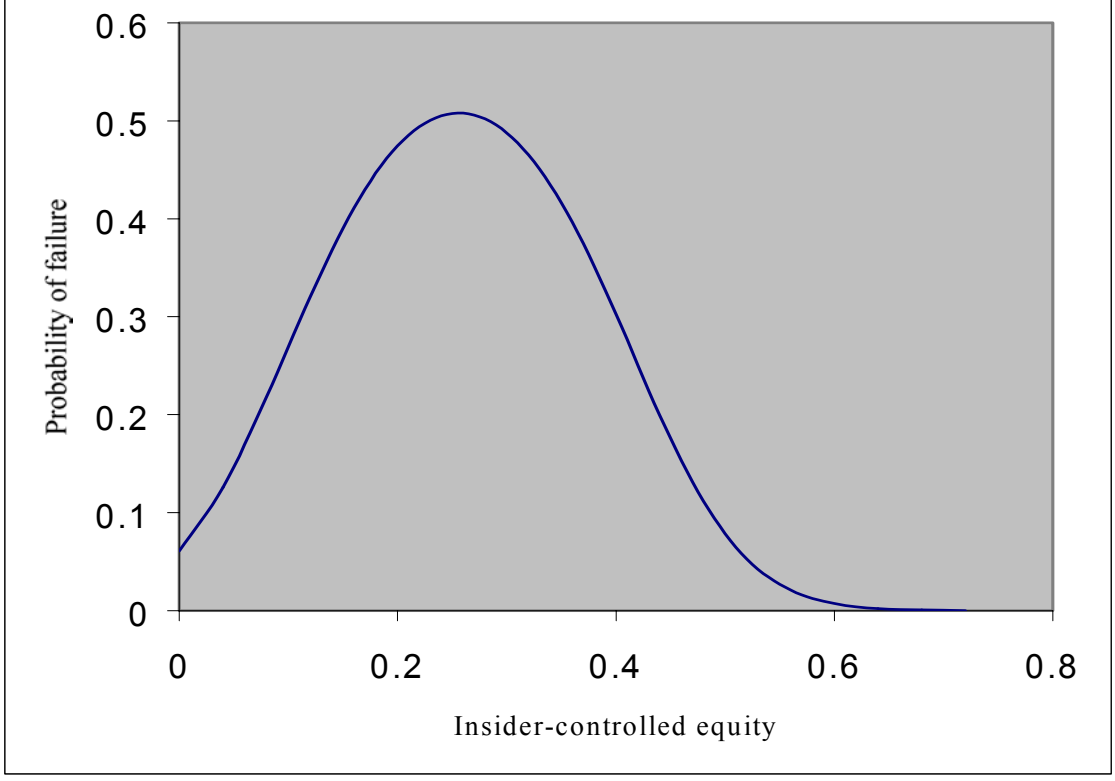
Based on the findings of Morck, Shleifer and Vishny (1988) for the relationship between inside equity and firm performance, we explore the possibility of a non-linear relationship between inside equity and S&L failure. The data for our sample does not fit their specification for the relationship between insiders' equity and S&L failure. A study by Knopf and Teall (1996) also found no support for Morck, Shleifer, & Vishny's specification of the relationship between inside equity ownership and S&L performance. It should be noted, however, that Morck, Shleifer, & Vishny use total board ownership to represent insiders' equity. Similarly, Knopf and Teall (1996) define insider ownership as only the equity owned by managers. The variation in how insider ownership is defined may, in part, explain the differences in the findings. Following McConnell and Servaes (1990) and Gorton and Rosen (1995) we include a quadratic term for insider-controlled equity in the model to capture any non-linearity in equity ownership.

The evidence from this sample is consistent with earlier studies that report a non-linear relationship between insider equity and firm performance. The estimated coefficients for the inside equity variables have signs consistent with entrenchment over a certain range of ownership. The estimated coefficient for the insider-controlled equity variable is 21.5876 with a p-value of 0.000 and for the squared term is -42.089 with a p-value of 0.011. This is consistent with the prediction of the entrenchment hypothesis that the probability of failure increases with the level of insider-controlled equity and then declines. We use the estimated coefficients from Model 1 to plot the relationship between insider-controlled equity and the probability of failure at the median for all the other variables. The resulting relationship depicted in Figure 1, shows greater probability of fail when insider controlled equity is between10% and 40%.

The regressions also reveal an interesting relationship between outside directors' equity holdings and the probability of failure. Consistent with lower outside directors' equity at failed institutions, the estimated coefficient is significant and negative which is similar to Shivdasani (1993), who reports that increased ownership by unaffiliated outside directors benefited shareholders. The estimated coefficient for the binary variable representing the presence of unaffiliated blockholders is negative and consistent with the prediction that unaffiliated blockholders should reduce the probability of failure.

The overall evidence from the relationship between equity ownership and the probability of S&L failure reinforces the prior evidence that directors and managers should not be grouped together and classified as insiders. This study there shows that valuable information would be lost, if a distinction is not made between affiliated outside and independent outside directors.

Figure 1:
Relationship between the probability of failure and the proportion of insider-controlled equity



The evidence from the regressions also suggests that the probability that an institution failed was correlated with the control variables. Liberal asset and liability powers could have provided managers with the opportunity to take on excessive risk, and could also have created the opening for managers to indulge in inappropriate behavior. However, the evidence indicates that such activities were not widespread. Instead, the estimated coefficient is negative and significant in both models, suggesting that the probability of failure was lower in states with less restrictive asset and liability powers. This is inconsistent with prior studies (White, 1991, 102; Esty, 1993) that associate S&L problems with increased investment in non-traditional assets and liabilities. Apparently, the opportunity to engage in non-traditional activities, by itself, was not a sufficient condition for thrifts to fail.

Larger institutions were more likely to fail if they were state chartered. The probability of failure at federally chartered institutions was also much less sensitive to differences in firm size. In interpreting the different effect of firm size between federal-chartered and state-chartered institutions it would be useful to note that like for the industry, sample federal institutions were larger than state institutions. In addition, all federal-chartered institutions were insured by the

FSLIC while some state-chartered institutions were not, so any postponement of failure, particularly of larger institutions by federal regulators, would be more likely to affect federal-chartered institutions.

Consistent with the notion that age is a good proxy for firm risk, we find that institutions that were established for at least five years in 1985 were less likely to fail. These institutions were 0.01 percent less likely to fail than institutions that were established for less than five year, significant at better than the 1 percent level.

A positive growth in new housing construction is one sign of a healthy economy. This, however, does not preclude the possibility that growth in the housing sector could represent over-capacity construction. In any case, it is unlikely that over-capacity construction could systematically drive the new housing permits issued growth rate in a less than robust economic environment. The negative estimated coefficient, therefore, suggest that S&Ls were less likely to fail in a thriving economy. The new housing permits issued growth rate appears to be a good proxy for capturing the effect of the local economy on the probability of S&L failure. The role of the regional agricultural, oil and gas, and construction sectors on bank and S&L problems is well documented elsewhere, including Gunther (1989) and Barth (1991).

CONCLUSION

Our investigation of the relationship between S&L failure and the distribution of equity ownership reveals interesting results and expands the number of factors that are associated with S&L failures. We find evidence that insider-controlled equity defined as equity owned by inside directors with plus the equity owned by affiliated outside directors was related to the incidence of failure at publicly traded S&Ls. In addition, independent outside directors held less equity in failed institutions. There is also some support for the notion that unaffiliated block holders represent the interest of all outside shareholders.

Similar to Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990), and Gorton and Rosen (1995), we find a non-linear relationship between insider-controlled equity and the probability of failure for S&Ls. This result is consistent with the entrenchment hypothesis and indicates that the probability of failure was greatest when insiders controlled between 20% and 35% of the outstanding equity. A number of factors beyond the control of the managers such as the type charter and age of the firm and local economic conditions also had some impact on the incidence of failure within the S&L industry.

Overall the evidence suggests that the distribution of equity among the different categories of directors was an important factor in the S&L crisis. The impact of less than arms length dealings represented by the role of affiliated directors also appeared to aggravate S&L problems. Therefore, by incorporating these factors in the analysis we can improve on the prescriptions already in place to deal with regulatory, fraud, and moral hazard problems in the S&L industry.

ENDNOTES

[1] Some of this work was completed while the authors were Ph.D. students at Texas A&M University.

[2] More than two years later The Wall Street Journal (March 11, 1994, p. A2) reported that Thomas Spiegel, the former executive of Columbia Savings, was acquitted of all 55 counts in the 1992 indictment.

[3] Evidence that could be used to support the moral hazard hypothesis is represented by the greater risk taking observed for stock compared to mutual owned institutions reported by Cordell, MacDonald, & Wohar (1993), and Esty (1997a). Esty (1997b) provides an extreme example of the alignment of shareholder and managerial interests in a case study of Twin City, a S&L where the directors and CEO owned 100 percent of the equity of the firm.

[4] Morck, Shleifer, & Vishny (1988) using a linear specification on their data set detected no relationship between ownership structure and firm performance, which is consistent with Demsetz & Lehn (1985). Rather than specify the form of the non-linearity Gorton & Rosen (1995) used a semi-parametric technique and let the data determine the form that the ownership variable enters the model. The results provide evidence consistent with entrenchment that is similar to the other studies that use the parametric specification. Their sample was also robust to the parametric specification.

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DO EFFICIENT INSTITUTIONS SCORE WELL USING RATIO ANALYSIS? AN EXAMINATION OF COMMERCIAL BANKS IN THE 1990s

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ABSTRACT

Commercial banks operating in today's economic system are a far cry from the financial institutions of earlier decades. The traditional definition of a bank as defined by Rose (2002) is "a financial intermediary accepting deposits and granting loans", which at first glance seems fairly mundane. However, modern banks are becoming increasingly technical in both scale and scope. Coupled with the ever-changing landscape of banking is the undeniable fact that for our financial system to remain productive it must be characterized by the virtues of strength and stability. This requires a competent and progressive regulatory system that is accurately able to determine the performance of financial institutions.

Although there is arguably no one correct measure of bank performance, the area of performance measurement can be divided into two rather large streams of research: bank efficiency measures and accounting-based financial ratios. The various statistical methods for measuring bank efficiency are rather new compared to traditional ratio analysis. However, various efficiency techniques are increasingly mentioned in academic studies as a complement to, or substitute for, financial ratio analysis which constitutes such a large portion of the CAMELS rating system utilized by financial institution regulatory agencies in their determination of a firm's safety and soundness.

This paper seeks to determine if the financial ratios and efficiency scores of banks provide much of the same information. That is, do banks with strong ratios also exhibit strong efficiency scores? This is accomplished in a three-stage process. Stage one is the calculation of both alternative profit efficiency scores and cost efficiency scores, using the stochastic frontier approach (SFA), for all banks operating in the United States during the years 1996 and 1999. This model is termed the national model per Mester (1997) due to the fact that all banks, for which sufficient data are available, are used to estimate the desired efficient frontier. Stage two involves the formulation of financial ratios that are, according to previous research, highly correlated with each of the CAMELS rating components. The final stage is the comparison of the results of the first two stages when the population of banks is segmented into thirds, consisting of high, medium, and low performing banks.

As mentioned earlier many studies have proposed the addition of some form of efficiency measure to the current CAMELS rating. With this in mind it is hypothesized that banks which score high using financial ratios will also tend to perform well using more complicated efficiency techniques. The results of this study will be of interest to many parties due to the fact that determining a correct measure of bank performance must take into account the high degree of competitiveness, technical change, customer-base diversity, and other areas of the firm's operating environment.

The findings show that there is a high degree of consistency between banks with strong financial ratios and banks that are rated highly efficient. This is consistent with previous studies by Yeh (1996) and Siems and Barr (1998). The major exception to this claim is found in the profitability ratios category, which is also consistent with Yeh (1996). This result, however, highlights the fact that the more technical efficiency estimation techniques may interpret data in a different manner than researchers and practitioner using traditional financial ratios.

INTRODUCTION

Commercial banks operating in today's economic system are a far cry from the financial institutions of earlier decades. The traditional definition of a bank as defined by Rose (2002) is "a financial intermediary accepting deposits and granting loans", which at first glance seems fairly mundane. However, modern banks are becoming increasingly technical in both scale and scope. Coupled with the ever-changing landscape of banking is the undeniable fact that for our financial system to remain productive it must be characterized by the virtues of strength and stability. This requires a competent and progressive regulatory system that is accurately able to determine the performance of financial institutions.

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LITERATURE REVIEW

While the area of production frontiers was introduced by Farrell (1957), the stochastic frontier, also called the composed error, is relatively new having been introduced by Aigner, Lovell and Schmidt (1977) and Meeusen and van den Broeck (1977). Many of the first papers on this topic were applied to manufacturing data, as were other efficiency methods. Much study has taken place regarding the early problems associated with this method[1]. Stochastic frontier analysis (SFA) is today, however, one of the most popular efficiency estimation techniques due in part to its robustness and relative ease of use.

Among the first to examine the relationship between financial performance, measured by accounting-based ratios, and production performance proxied by efficiency indices, are Elyasiani, Mehdian, and Rezvanian (1994). They find a significant association between financial ratios and bank efficiency and suggest that efficiency analysis should be considered as a supplement to financial ratio analysis by regulatory agencies and bank managers. Their article focuses, however, on large banks and utilizes a rather small sample. Thus, the true nature of the relationship is not explored across a wide variety of banks operating in the U.S. One study which provides a very brief although interesting attempt to integrate the information provided by efficiency measures with that found in CAMELS ratings is by Simeone and Li (1997). This study, which focuses on a limited sample of 35 closed Rhode Island credit unions ranging in asset size from $131 thousand to $338 million, seeks to determine if stochastic frontier analysis (SFA) measures of efficiency would have been useful in identifying and preventing the failure of the aforementioned credit unions. The authors determine that SFA can be considered a good substitute for, or a valid supplement to, the CAMELS rating due to the fact that SFA avoids the subjective and difficult management rating utilized by CAMELS. Another study which examines how financial ratios can be used in conjunction with Data Envelopment Analysis (DEA), an alternative efficiency estimation technique, is performed by Yeh (1996). He seeks to demonstrates how the use of DEA in conjunction with financial ratio analysis can help to aggregate the confusing array of financial ratios into meaningful dimensions that somehow link with the operating strategies of a bank. His study utilizes a rather small sample of six Taiwanese banks over a nine-year period resulting in a total of 54 DEA efficiency scores. Factor analysis is used to classify 12 financial ratios based on their financial attributes so as to aid in the specification of their respective implications and determination as to whether the ratios examined adequately express a firm's financial profile. A comparison is then made regarding the factor scores relative to each group with different DEA efficiencies to allow for an overall comparison. The four factors identified as accounting for approximately 87% of the common variance in the measured ratios are related to capital adequacy, profitability, asset utilization and liquidity. When compared to the high, medium and low DEA groups it is shown that the highest scoring DEA group has the highest scores in the first three factor categories listed above. The conclusion of the article alludes to the fact that if the inputs and outputs are chosen properly, DEA can provide crucial information about a bank's financial condition and management performance and can assist examiners as an early-warning tool in the regulation process.

De Young (1997) explores the challenges and misconceptions of measuring cost efficiency at financial institutions. Situations are illustrated in which accounting-based expense ratios are misleading and show that statistics-based efficient cost frontier approaches often measure cost efficiency more accurately. The author utilizes the stochastic cost frontier (SCF) approach to analyze 1994 data on 9,622 commercial banks. It is concluded that utilizing the SCF in unison with accounting-based ratios allows for a more accurate analysis of a bank's overall cost efficiency. A somewhat similar study by Siems and Barr (1998) uses a constrained-multiplier, input-oriented, DEA model to create a robust quantitative foundation to benchmark the productive efficiency of U.S. banks. It is found that the most efficient banks are relatively successful in controlling costs and also hold a greater amount of earning assets. The more efficient banks also earn a significantly higher return on average assets, hold more capital and manage less risky and smaller loan portfolios than less efficient institutions. Also, it is confirmed that banks which receive higher CAMEL ratings by bank regulators are significantly more efficient. Strong banks (rated as a 1 or 2) are shown to be significantly more efficient that weak banks (rated a 3, 4 or 5). Thus, it is concluded that more efficient banks tend to be higher performers and safer institution. Other studies of interest include Horvitz (1996), Taylor, Thompson, Thrall, and Dharmapala (1997), Thompson, Brinkman, Dharmapala, Gonzalaz-Lima, and Thrall (1997), Berger and Davies (1998) and Kantor and Maital (1999).

As evidenced by the above array of literature, the area of bank efficiency measurement is vast. Many studies have been performed regarding cost, revenue, and profit efficiency. Although studies have been performed which touch on the relationship between efficiency measures, financial ratio performance, and CAMELS ratings, none have been conducted as yet which combine all of these factors in the way of the examination undertaken here.

DATA AND METHODOLOGY

The data used in this study are obtained from the Sheshunoff BankSearch Commercial and Savings Banks database for the years 1996 and 1999, respectively. A sample of all banks for which there is available data is obtained for the two years with 7,514 banks for 1999 and 8,179 banks for 1996. The alternative profit and cost efficiency scores are then calculated. The sample is then decomposed, by efficiency scores, into thirds. The first group is the high-efficiency group and will represent the top one-third of banks, or banks with the highest X-efficiency scores (alternative profit or cost). The second group represents banks in the middle third of efficiency scores and group three includes banks with the lowest efficiency scores. The mean of each financial ratio for banks in each group is also provided. This will allow the determination of whether higher efficiency banks have consistently higher performance in the financial ratio category.

Efficiency Estimation

To provide for more robust findings both alternative profit efficiency and cost efficiency are estimated in this study. The alternative, or nonstandard, profit efficiency model, as given by Berger

and Mester (1997) and Humphrey and Pulley (1997), differs from the standard profit efficiency model in that it measures how efficient a bank is at earning its maximum available profit given its output levels. Alternative profit efficiency is especially useful when there is a violation of at least one of the underlying assumptions of cost and standard profit efficiency. These assumptions include:

(i)	*the quality of banking services has no substantial unmeasured variations;*
(ii)	*a bank can achieve its optimum volume and mix of output, meaning outputs are completely variable;*
(iii)	*a bank cannot affect output price due to perfectly competitive output markets; and*
(iv)	*output prices are accurately measured allowing for unbiased standard profit efficiency estimation.*

It is apparent from the above assumptions that the data used for this study would violate at least assumptions i and ii. Thus, alternative profit estimation is chosen as the profit efficiency measure of choice over standard profit efficiency.

The alternative profit frontier function is:

$$\pi = \pi(y, w, u_\pi, v_\pi), \tag{1}$$

where π represents the variable profits of the bank, y is a vector of variable output quantities, w is a vector of prices for variable inputs, u_π represents profit inefficiency and v_π is random error.

The alternative profit efficiency score for any bank can be calculated once the alternative profit frontier has been constructed. The alternative profit efficiency of bank i is calculated as the predicted actual observed profit of bank i divided by the predicted maximum profit of the best practice bank, i.e., the predicted maximum profit across all banks, adjusted for random error. This calculation is given by the following:

$$Alt\pi Eff_i = \frac{\hat{\pi}^i}{\hat{\pi}^{\max}}, \tag{2}$$

where $\hat{\pi}^{\max}$ represents the predicted maximum profit, associated with the best practice bank, across N banks in the sample and $\hat{\pi}^i$ denotes the predicted actual profit for the ith bank, with i = 1,...,N. The calculated raw profit efficiency scores are then truncated at the top 5 and 10 percent levels, per Berger (1993), so as to eliminate any distortion which may be caused by outliers when the maximum profit is used. The truncated profit efficiency scores can range from 0 to 1 with 1 representing the most efficient bank or the best practice bank. The profit efficiency score represents the percentage

of profits or resources that are used efficiently. Thus, a bank that receives a profit efficiency score of 0.75 is 75% efficient or consequently loses 25% of its potential profits relative to the best practice bank facing similar operating conditions.

A modified intermediation approach is used for the analysis, which views a bank's primary goal as that of intermediating funds between savers and borrowers and uses the dollar volume of various deposit accounts and loan categories as output variables. Input variables include the cost of funds utilized in the process of transferring funds between savers and borrowers. The modification to this approach occurs due to the inclusion of nontraditional activities. Due to increased competition banks are placing increased emphasis on nontraditional activities. Rogers (1998b) finds that bank efficiency measures which do not account for these nontraditional activities as an output tend to understate the true bank efficiency measure.

Considering the aforementioned information, the variables included for analysis include the following:

Input Variables (Cost)	Output Variables (Quantity)
1) Labor	1) Demand Deposits
2) Physical Capital	2) Time and Savings Deposits
3) Time and Savings Deposits	3) Real Estate Loans
4) Purchased Funds	4) Other Loans
	5) Net Noninterest Income

Given the above inputs and outputs, and based on Berger's (1993) similar model specification, the empirical profit frontier model is given as follows:

$$\ln \pi = \alpha + \sum_{j=1}^{5} \beta_j \ln y_j + \sum_{k=1}^{4} \gamma_k \ln w_k + \tfrac{1}{2} \sum_{j=1}^{5} \sum_{l=1}^{5} \beta_{jl} \ln y_j \ln y_l + \tfrac{1}{2} \sum_{k=1}^{4} \sum_{l=1}^{4} \gamma_{kl} \ln w_k \ln w_l + \sum_{j=1}^{5} \sum_{k=1}^{4} \delta_{jk} \ln y_j \ln w_k + \varepsilon_\pi \tag{3}$$

where: j = 1,...,5 outputs,

k = 1,...,4 inputs,

π = total profit

y_j = the amount of output j,

w_k = the input price of k, and

ε_π = the natural residual or total error

If the two components of the disturbance term, u_π and v_π, meet the following assumptions:

$$u_\pi \sim |N(0, \sigma_{u\pi}^2)|, v_\pi \sim N(0, \sigma_{v\pi}^2), \tag{4}$$

then per Jondrow, et.al. (1982) the natural residual, ε_π, will be decomposed into an inefficiency measure, u_π, and random noise, v_π.

Cost efficiency consists of a comparison of an observed bank's cost to a best practice bank's cost in the production of a homogenous output bundle while facing the same operating conditions. The best practice bank is considered to be the minimum cost producer and any deviation from this provides a measure of the observed cost inefficiency. Determining the level of cost efficiency amounts to estimating a cost function which relates variable costs to the prices of variable inputs, the quantities of variable outputs, and allows for the presence of both random error and inefficiency. Such a cost frontier can be written as:

$$C = C(w, y, u_c, v_c) \tag{5}$$

where C measures variable costs, w is a vector of prices of variable inputs, y is the vector of quantities of variable outputs, u_c represents the cost inefficiency factor, and v_c denotes random error. The random error component, v_c, incorporates both a "luck" factor and measurement error which may give rise to high or low costs in the short-run. The cost inefficiency factor, u_c, contains both allocative and technical inefficiencies. Allocative inefficiency results from choosing the wrong input combinations given the relative prices of inputs while technical inefficiency stems from using an excessive quantity of the inputs to produce y. The inefficiency score for any bank, given as bank i, can be calculated once the cost frontier has been constructed. The cost efficiency of bank i is calculated as the predicted cost of the best practice bank, i.e., the minimum predicted cost across all banks, needed to produce a given output quantity, divided by the predicted actual observed cost of bank i, adjusted for random error. This calculation is given, per Berger and Mester (1997), as the following:

$$CostEFF_i = \frac{\hat{C}^{\min}}{\hat{C}^{i}} \quad , \tag{6}$$

where $\hat{C}^{\min}$ is the minimum predicted cost, associated with the best practice bank, across N banks in the sample and $\hat{C}^{i}$ is the predicted actual cost for the ith bank, with i = 1,...,N. The calculated raw cost efficiency scores are then truncated at the top 5 and 10 percent levels, per Berger (1993), so as to eliminate any distortion which may be caused by outliers when the minimum cost (or profit) is used. The truncated cost efficiency scores can range from 0 to 1 with 1 representing the most efficient bank or the best practice bank. The cost efficiency score represents the percentage of costs or resources that are used efficiently. Thus, a bank that receives a cost efficiency score of 0.75 is 75% efficient or consequently wastes 25% of its costs relative to the best practice bank facing similar operating conditions. Descriptive statistics for the banks analyzed as well as cost and profit efficiency estimates are found in Exhibits 2 through 4.

Selection and Calculation of Financial Ratios

Once the efficiency estimates have been calculated the next step of the analysis involves the selection of variables which theoretically correlate to each of the CAMELS rating categories used by examiners. Due to the non-availability of data needed to calculate all of the financial ratios chosen for the analysis, the sample size of banks included in stage two of the study is reduced.[2] The final sample consists of 4,376 banks in 1999 and 5,158 banks in 1996. Exhibit 5 provides various financial ratio means for both years of examination.

The selection of accounting-based financial ratios which accurately represent a bank's CAMELS rating is the most difficult yet meaningful undertaking of the empirical portion of this study for a number reasons. First, CAMELS ratings are proprietary information, which means that only regulatory personnel and researchers with regulatory associations have access to this data. Second, CAMELS ratings are based on a combination of objective and subjective information. Although a large portion of a bank's rating is derived from the analysis of various financial ratios corresponding to a specific CAMELS component, an important aspect of the rating results from examiner subjectivity. Thus, items such as differences among regulatory agencies, examiner experience, and inconsistencies among examination districts arguably have an effect on the ratings received by banks. Finally, empirical literature on this topic is scarce due to the aforementioned proprietary nature of the data. Literature on the financial performance of banks is found in great supply but few researchers have tackled the more elusive CAMELS modeling issue unless they have access to private CAMELS data (see Cole et.al., 1995 and DeYoung, 1998). The problems of a study of this type not withstanding, it is very realistic to conclude that most of the CAMELS categories can be proxied by financial ratios corresponding to the component in question per previous studies by Cole, et al. (1995) and Cole and Gunther (1998).

The one area that meets with a greater degree of subjectivity is the management component (M). A study by DeYoung (1998) suggests that there is a high degree of correlation between the M rating and the overall financial performance of a bank. Other variables such as unit costs and insider loans are shown to be good predictors of the M rating as well. As various financial ratios are used in this study as proxies of the C, A, E L, and S components, the M component will be proxied by the amount of insider loans, overhead expense, and the number of full-time equivalent employees to average assets, which mirrors Gilbert, et. al. (1999). Although in no way a perfect measure of management quality, these variables should provide useful insight into an otherwise unmeasurable rating component.

Financial theory regarding the operation of banking firms provides some insight into the use of certain financial ratios to proxy the six categories of a CAMELS rating. These ratios and their definitions are given in Exhibit 1. Risk-based capital is chosen to represent the capital component. Although there are many other capital measures, the level of risk-based capital is chosen because of the importance regulators have placed on this measure in recent years. The ratios of past due loans, nonaccrual loans, and the allowance for loan and lease loss are chosen to represent asset quality. The three management quality ratios -- insider loans, overhead expense, and the number of full-time employees – are discussed previously. They are expected to exhibit negative relations with profit efficiency. This is fairly self-explanatory in terms of overhead expense and the number

of employees. Banks with lower overhead and fewer employees per million dollars of assets should be more efficient. The amount of insider loans would also be expected to be negatively related to efficiency because a higher proportion of insider loans may indicate closely held or family owned institutions which tend to be smaller and more conservative than other banks. Operating income, return on equity, and noninterest income are chosen to represent the earnings component. All of these are expected to show a positive relation with efficiency since all are directly related to the profits of a bank. Liquidity is represented by liquid assets, jumbo CDs, and core deposits. Bank liquidity is a desirable characteristic in the eyes of regulators. Thus, it would seem pertinent that banks with more liquidity may also be considered more efficient. The final CAMELS category, interest rate sensitivity, is represented by the one year gap. There is no explicit assumption made regarding the relationship of this variable with the efficiency estimate.

EMPIRICAL RESULTS

As given in Exhibits 6 and 7, the comparison of mean financial ratios between high, medium, and low profit efficiency banks provides some unique findings. Exhibit 6 displays the means of the fourteen financial ratios and their differences between high, medium, and low alternative profit efficient groups. It is apparent that the level of risk-based capital (RBC) is much higher for highly profit efficient banks than for medium and low efficiency institutions. The percentage of nonaccrual loans (NONACCRL) is found to be lower, on average, for highly efficient banks with a minimal difference between mid-ranked institutions and a much more pronounced difference between low-ranked banks. Also, the ratios for insider loans (IL), overhead expense (OE), and full-time-equivalent employees (FTE) in highly efficient banks are low relative to the other two groups, with the one exception being low efficiency banks in 1996. A rather interesting finding, which is consistent with Yeh's 1996 study, is that the ratios for every profitability category – operating income (OI), return on equity (ROE), and noninterest income (NII) – display an inverse relationship with profit efficiency scores. That is, the most profit efficient institutions exhibit the lowest profitability ratios and vice versa. This finding is puzzling to researchers trained in the art of analyzing accounting-based financial ratios to determine financial institution performance. However, it does illustrate the difference between ratio analysis and efficiency estimation, but fails to bridge the gap between these two methods. In the liquidity area, highly profit efficient banks display a higher percentage of liquid asset (LA) and core deposit (COREDEP) ratios than their lower rated counterparts. High efficiency institutions also have a more negative one-year gap (ONEGAP), on average, for both years of analysis.

It is extremely interesting to compare the average asset size of the banks in each category. While many institutions are taking the "bigger is better" attitude the findings of this study are in complete disagreement. The average asset size of highly profit efficient banks is slightly over $212 million, $444 million for banks in the medium efficiency category, and just over $2 billion in the bottom third of efficiency scores for 1999. The numbers from 1996 are similar. This inverse relationship between efficiency and asset size is consistent with previous studies as discussed below.

Exhibit 7, which provides mean financial ratios and their differences between cost efficiency groups, follows a similar pattern to that given in Exhibit 6. One noticeable difference between the

output given in each table is found in the area of profitability ratios. OI shows a direct relationship with the level of cost efficiency for both years. Highly cost efficient banks have the highest ROE for both years. The medium and low efficiency categories are reversed in 1999 but display a positive relationship in 1996. NII is shown to be higher for low cost efficient banks, due possibly to the higher direct costs associated with many noninterest income products. An examination of asset size points to an inverse relationship between asset size and cost efficiency, duplicating the results when profit efficiency is used in Exhibit 6. This inverse relationship between efficiency and size is consistent with those of Bauer, Berger, and Humphrey (1993) and Rogers (1998) but contrasts with the findings of Elyasiani and Mehdian (1995).

CONCLUSION

There is no refuting the fact that banks today are more complicated entities than ever before. The added duties and services, permitted by the passage of laws such as the Gramm-Leach-Bliley Act, place a greater importance on the reliability of regulators to adequately assess a bank's efficiency and financial performance due to the allowance of increased risk-taking scenarios. In turn, the methods regulators utilize to assess the viability and productivity of banks must increase in sophistication to handle the added complexity of today's banking environment.

Furthermore, the areas of accounting-based financial ratios and efficiency are much debated in terms of the best measure of bank performance. While most studies tend to examine the two areas in isolation, this study chooses to merge the areas of bank efficiency and financial ratio performance. It examines the relationship between financial ratios deemed highly correlated with a bank's CAMELS rating and measures of alternative profit and cost efficiency to determine when and if the two should be used in combination, as suggested by previous studies.

The findings show that there is a high degree of consistency between banks with strong financial ratios and banks that are rated highly efficient. This is consistent with previous studies by Yeh (1996) and Siems and Barr (1998). The major exception to this claim is found in the profitability ratios category, which is also consistent with Yeh (1996). This result, however, highlights the fact that the more technical efficiency estimation techniques may interpret data in a different manner than researchers and practitioner using traditional financial ratios.

This study expands on the claim by previous researchers that an efficiency indicator should be added to the current bank rating system used by regulators. However, this study uses only the parametric stochastic frontier efficiency approach. A similar analysis using other parametric and nonparametric techniques would provide more insight into this area.

Furthermore, while a strong introduction to the problem, the research presented in this paper contains only two years of data. The use of a more comprehensive time frame would serve to better justify the results found here. Finally, the choice of the financial ratios used to simulate a CAMELS rating is arbitrary to say the least. As long as the CAMELS system remains proprietary information it is a researcher's best guess as to the accuracy of the ratios chosen to represent a bank's rating. Thus, making the CAMELS rating available to researchers not affiliated with a regulatory agency would greatly enhance the study of this area. This in turn would provide beneficial results to bankers, regulators, and academicians alike.

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Exhibit 1: Financial Ratios Representing Each CAMELS Category

VARIABLE	DESCRIPTION
Capital Adequacy (C)	
Risk-Based Capital (RBC)	Total capital divided by risk-weighted assets
Asset Quality (A)	
Nonaccrual Loans (NONACCRL)	Nonaccrual loans divided by average assets

Allowance for Loan and Lease Loss (ALLL)	Allowance for loan and lease loss divided by average loans and leases
Charge-Offs (COFF)	Charged-off loans and leases divided by average loans and leases
Management Quality (M)	
Insider Loans (IL)	Loans to insiders divided by average assets
Overhead Expense (OE)	Overhead expense divided by average assets
FTE Employees (FTE)	Number of full-time equivalent employees divided by millions of dollars of average assets
Earnings (E)	
Operating Income (OI)	Total operating income divided by average assets
Return on Equity (ROE)	Total income divided by total stockholder's equity
Noninterest Income (NII)	Total noninterest income divided by average assets
Liquidity (L)	
Liquid Assets (LA)	Liquid assets divided total assets
Jumbo CDs (JMBOCD)	$100,000+ time deposits divided by total assets
Core Deposits (COREDEP)	Core deposits plus equity divided total assets
Sensitivity (S)	
1 Year Gap (ONEGAP)	Rate sensitive assets repricing within 1 year minus rate sensitive liabilities repricing within one year divided by total assets

Exhibit 2: Summary Statistics of Total Assets for All Banks Analyzed for 1999 and 1996

All Banks	1999	1996	Difference
Mean	610,219	501,730	108,489
Std. Dev	8,762,162	5,346,773	3,415,389
Minimum	2,306	2,374	-68
Maximum	571,732,000	272,429,000	299,303,000
No. of Obs.	7,514	8,179	-665

Note: Mean, Std. Dev., Minimum and Maximum values are in thousands of dollars.

Exhibit 3: Descriptive Statistics of Variables Used in the 1996 and 1999 SFA Profit and Cost Frontier National Models

Year: 1999 and 1996						
	1999		1996		Difference	
Variables:	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Total Profit[a]	19,758	341,355	14,741	221,818	5,017	119,537
Total Cost[a]	24,570	303,358	21,115	176,773	3,455	126,585
Input Price:			35.14	8.58	4.36	.51
Price of Labor[a]	39.50	9.09	.3747	.3802	-.0275	-.0267
Price of Capital[b]	.3472	.3535	4.15	.63	- .25	.02
Cost of Deposits	3.90	.65	4.92	1.30	- .29	-.18
Cost of Purch. Funds	4.63	1.12				
Output Quantity:			92,243	759,512	-11,861	157,420
Transaction Deposits[c]	80,382	916,932	185,332	1,295,194	47,958	1,557,817
Time & Savings Dep[c]	233,290	2,853,011	133,856	1,065,328	45,878	1,250,548
Real Estate Loans[c]	179,734	2,315,876	182,113	2,237,613	33,453	1,253,847
Other Loans[c]	215,566	3,491,460	9,687	128,553	5,904	85,650
Net Nonint. Income[c]	13,591	214,203				
No. of Observations	7,514		8,179		-659	

Note: [a] Values are in thousands of dollars per full-time equivalent employee
[b] Values are in dollars per dollar of fixed assets
[c] Values are in thousands of dollars

Exhibit 4: Summary Statistics of Profit and Cost Efficiency Estimates Obtained from the National Model

		1999		1996	
		5% Truncation	10% Truncation	5% Truncation	10% Truncation
Profit Efficiency Estimates	Mean	.39722	.48845	.37692	.46221
	Std. Dev	.24424	.26787	.24928	.27488
	Minimum	.00911	.01169	.02568	.03286
	Maximum	1.00000	1.00000	1.0000	1.0000
	No. of Observations	7,514	7,514	8,179	8,179
Cost Efficiency Estimates	Mean	.38818	.47519	.41241	.50248
	Std. Dev	.24573	.27001	.23723	.25842
	Minimum	.01144	.01459	.01451	.01835
	Maximum	1.00000	1.00000	1.00000	1.00000
	No. of Observations	7,520	7,520	8,179	8,179

Exhibit 5: Financial Ratio Summary Statistics for All Banks (1999 and 1996)

	Variable	Mean		Std. Dev.		No. of Obs.	
		1999	1996	1999	1996	1999	1996
All Banks	RBC	14.31	15.19	5.66	5.62	4,376	5,158
	NONACCRL	.45	.49	.62	.63		
	ALLL	1.51	1.62	.68	.77		
	COFF	.43	.50	.70	1.40		
	IL	1.46	1.47	1.55	1.51		
	OE	3.28	3.38	1.30	1.47		
	FTE	.45	.51	.15	.18		
	OI	1.59	1.80	1.10	.87		
	ROE	12.72	13.39	8.12	7.12		
	NII	.95	.99	1.40	1.33		
	LA	12.05	16.35	7.24	8.03		
	JMBOCD	11.98	10.32	6.87	6.28		
	COREDEP	81.86	85.71	9.48	8.44		
	ONEGAP	-19.89	-9.51	14.82	13.96		

Note: Definitions given in Exhibit 1.

Exhibit 6: Mean Financial Ratios and Their Differences Between Profit Efficiency Groups

Financial Ratio	1999 Profit Efficiency Group			1996 Profit Efficiency Group		
	High	Medium	Low	High	Medium	Low
RBC	16.0684	13.8943	12.9874	17.0557	14.6675	13.8520
NONACCRL	.4257	.4263	.4939	.4474	.4922	.5225
ALLL	1.5375	1.4578	1.5238	1.6603	1.5837	1.6151
COFF	.4161	.3732	.5108	.4715	.4310	.5850
IL	1.2717	1.5091	1.6106	1.3092	1.5349	1.5725
OE	3.0026	3.1859	3.6458	3.2681	3.4734	3.3959
FTE	.4327	.4470	.4726	.5134	.5283	.4863
OI	1.3480	1.5524	1.8796	1.5145	1.7719	2.1165
ROE	10.7019	12.6193	14.8520	11.2436	13.4655	15.4630
NII	.6839	.8348	1.3416	.8562	1.0490	1.0610
LA	13.2786	11.5840	11.2977	18.4179	16.1461	14.4770
JMBOCD	11.1514	11.8752	12.9200	10.3052	10.1177	10.5386
COREDEP	84.4736	82.4907	78.6104	86.7131	86.3127	84.1025
ONEGAP	-23.1534	-19.9068	-9.6138	-13.5411	-9.3109	-5.6924
Avg. Asset Size [a]	212,097	444,926	2,192,416	247,769	518,835	1,405,849
Number of Obs.	1,458	1,459	1,459	1,719	1,720	1,719

[a] Asset values are in thousands of dollars

Exhibit 7: Mean Financial Ratios and Their Differences Between Cost Efficiency Groups

Financial Ratio	1999 Cost Efficiency Group			1996 Cost Efficiency Group		
	High	Medium	Low	High	Medium	Low
RBC	15.3240	14.0605	13.5638	15.4356	15.2540	14.8852
NONACCRL	.4145	.4299	.5015	.4287	.4526	.5808
ALLL	1.5164	1.5007	1.5020	1.6316	1.5756	1.6518
COFF	.3484	.3985	.5559	.4601	.4156	.6118
IL	1.3378	1.4816	1.5723	1.3928	1.5017	1.5221
OE	2.7683	3.1968	3.8698	3.1799	3.2833	3.6744
FTE	.3790	.4548	.5186	.4541	.5140	.5599
OI	1.6797	1.5487	1.5517	2.0655	1.8059	1.5313
ROE	12.9354	12.4578	12.7814	15.3146	13.3087	11.5477
NII	.6940	.8212	1.3455	1.0361	.8706	1.0595
LA	11.9697	11.5247	12.6655	16.9137	15.6133	16.5136
JMBOCD	8.7936	11.7745	15.3814	7.2771	9.7341	13.9519
COREDEP	86.2892	82.2179	77.0624	89.5759	86.8843	80.6663
ONEGAP	-19.4278	-20.4290	-19.8191	-8.5785	-9.7551	-10.2112
Avg. Asset Size [a]	292,991	365,338	2,192,467	355,213	371,728	1,445,607
Number of Obs.	1,459	1,459	1,458	1,719	1,720	1,719

[a] Asset values are in thousands of dollars

AN EXPERIMENT USING ABC-BASED VALUE INDEXING FOR BANK SERVICES

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ABSTRACT

This paper outlines a process for improving cost-based data for management decision making regarding services offered by banks. The process described here utilizes the concept of value indexing to relate relative customer preferences for a bank service to the relative cost of providing that service. Determination of this relationship can assist bank management in making decisions regarding which services to eliminate and/or which to enhance as well as to indicate areas for potential cost reductions. While value indexing is not a new concept, the use of activity based costing (ABC) to quantify the cost variable in the equation is a relatively new application. In addition, the inclusion of some metric to address quality (such as value indexing) in cost management models, such as ABC, has been suggested in regard to value engineering. This paper describes the concepts supporting ABC-based value indexing and the results of a simulation case exercise involving bank managers that applies those concepts to bank services.

CHANGES IN BANKING THAT CREATE A NEED FOR BETTER COST DATA

Significant changes in the banking industry in the last fifteen years have created a situation in which banks are now faced with many of the same cost analysis problems traditionally faced by manufacturing firms. The reduction in spreads and the increased competition, both among banks and between banking and other financial services organizations, have produced an environment where bankers must now face the perils and pitfalls of management of the income statement in addition to management of a balance sheet. Banks are deriving more and more of their income from fees for services offered to ever growing customer bases. Bank managers in a previous day may have faced asset management as their primary management activity. Today, however, these individuals increasingly face management of the relationship between service fee revenue and the cost of producing that revenue and may be forced to apply somewhat unfamiliar cost management models to bank operations. However, there is at least one major shortcoming of the traditional models that bankers should avoid in this new endeavor.

OVERHEAD: THE CRITICAL SHORTCOMING OF TRADITIONAL COST MANAGEMENT MODELS

Over the past twenty-five years accountants have recognized a major problem in traditional cost management models. These models generally fall short in accurately addressing overhead costs associated with the production of specific products or services. Traditional models involving allocation of overhead to products inadequately, or sometimes improperly, address the relationships between those costs and the products/services to which they are indirectly but undoubtedly linked. As suggested by Cokins, Stratton, and Helbling (1993), traditional cost models do not mirror the true economics of physical production and resource cost consumption. This shortcoming has become materially acute as overhead costs in total and as a percentage of total cost have dramatically increased in the last twenty years. As long as overhead costs were comparatively small in relation to total cost, allocation-driven inaccuracies in traditional cost management models were not necessarily a significant issue. Given the significance of overhead cost in today's typical cost structure, these inaccuracies are no longer tolerable. In response to this realization, accountants have developed activity based costing (ABC) to correct this problem and overcome the shortcoming of traditional models regarding overhead.

ACTIVITY BASED COSTING

Activity based costing (ABC) is a method of measuring the cost of products and services that allows those costs to be apportioned to the products and services based on the actual activities and the resources consumed in producing those products or services (Turney, 1993). The overall ABC process assigns the cost of resources consumed through the use of resource drivers to the actual activities being carried on in an operation. Resource drivers are the factors that measure the consumption of resources by activities on a causal basis. This linkage establishes a causal-based measure of the physical consumption of resources by activities and permits the quantification of the cost of that consumption by each activity.

ABC recognizes that activities are the sources of products and services. It is consumption of these activities which create products or services. The ABC model, therefore, links activity consumption through activity drivers to products or services (cost objects in the formal ABC terminology). These activity drivers are the measures of the quantitative output of the activities occurring in a process. The concept of activity drivers recognizes that not all activities are consumed by products or services in identical patterns. Consumption may be due to hours or time, transactions, events of differing natures, degree of complexity, or any of a wide variety of patterns. Linking the consumption of activities to products or services through activity drivers allows activity costs to be assigned to products and services based on unique, causal- based consumption patterns.

The final cost measurement element in an ABC model is the quantification of the cost of each output product or service based on the causal relationships between resource and activity consumption by those products/services rather than on arbitrary allocations of costs based on assumed relationships.

The use of ABC in service industries is structurally the same as in manufacturing in that both require that activities be defined, costed, and linked to output. The difference is simply that in the service industry, output is intangible with the element of time being a more important element. The initial step in implementing ABC in a bank involves the development of an ABC-based cost of services that is more precise and accurate than that developed under traditional cost models (Rotch, 1998).

CAUTIOUS USE OF ABC IN COST MANAGEMENT

Cooper (1999) suggests that ABC models can be used as attention focusing devices to address such issues as product profitability and both output mix and activity mix management. In these applications, ABC models serve to identify areas where costs can be cut so as to increase (or produce) profit derived from particular products or services. In this regard, bank management in search of increasing profits from services through the use of cost cutting may apply ABC in their decision making processes. However, ABC used as an attention-focusing device with cost cutting as the objective must be used judiciously.

Dean (1994a, 1) suggests that "appropriately applied, ABC provides a far more accurate portrayal of cost than previous accounting methods" and "is a viable cost estimating technology, as well as a superior accounting technology." However, he cautions that although ABC analysis is used in cost cutting applications such as the identification and elimination of unused capacity (Cooper and Kaplan, 1992), efforts must be involved to ensure that downsizing does not reduce either product or enterprise quality. He suggests that a failure in quality may lead to revenue reductions and may even increase the average cost of a number of activities to the point that the net cost reduction (due to downsizing) is negative. He suggests these possible outcomes based on his argument that "cost and quality are tightly linked with the dynamic stochastic nature of the business system." Linking some measure of quality to the ABC model would, in light of these suggestions, improve ABC as a tool of better cost management.

LINKING ABC COST AND QUALITY IN SERVICES

If ABC models are used to focus attention for cost cutting purposes without regard for factors other than cost, there may be potential detrimental outcomes for an organization. An increased necessity to manage costs more effectively may result in what Roach (1991, 83) refers to as overzealous cost cutting that may produce efficiency over the short haul but result in the firm being "unable to innovate, respond to customers, or provide quality services in the long haul." He also suggests that in the case of services, organizations need some type of accounting framework that identifies which services add the most value and that activity-based managerial accounting is a step in the right direction. Regarding services, Roach suggests that a metric for addressing quality is equally important to one addressing cost even though quality in the service sector is hard to define. He additionally suggests that "in more analytical endeavors, customer feedback [regarding quality] might be useful" (1991, 91).

In order to address quality and potentially include customer feedback, the services sector may benefit from "borrowing" concepts and methods from the field of value engineering that have successfully linked the concepts of quality and cost. As described by Dean (1995b, 1), one of the major tools in this area involves the use of a quality function deployment (QFD) that "links customer defined value to the product and to the processes which bring forth, sustain and retire the product." Quality is allocated to the various aspects of the product and the process to bring forth the product, and this allocated value is used to prioritize and focus efforts on activities that will provide the most quality for the customer (1995b, 1).

A major subactivity involved in value engineering is the determination of a value index for the various components that functionally produce the features offered by a product. In value engineering the effort is directed at analyzing the functions of the various components for the purpose of achieving these functions at the lowest overall cost without reductions in required performance, reliability, quality, etc. As described by Ansari, Bell, Klammer, and Lawrence (1997, 19), a value index "is a ratio of the value (degree of importance) to the customer and percentage of total cost devoted to each component" of a product. Components with a high value index are considered candidates for enhancement since spending is far too little for a feature of the product that is very important to customers. Items with a low value index are candidates for cost reduction or even elimination given that a feature of relatively low preference to customers is a relatively high cost component of the product. In this manner the value index serves to focus attention on both the cost of the features of a product and also the degree to which those features produce a perception of quality in the product.

APPLYING VALUE ENGINEERING TO BANK SERVICES

Value engineering, QFD, and value indexing all have as their goals the enhancement of features of a product that cause customers to perceive that product as a quality product. The objective of all of these methods is, as Dean suggests (1994b), to focus efforts on activities that provide the most quality for the customer. An unstated corollary to this concept is that features that are favored by customers and thereby lead to perceptions of quality should not be eliminated or cut from the product. To eliminate preferred features in the name of cost cutting would potentially reduce the profitability of the firm even though the cost of the product was reduced.

If the service mix offered by a bank is viewed as a set of individual features that cause customers to do business with that bank, then the approach involved in value engineering and QFD for manufactured products is potentially as applicable that service mix. The overall mix of services can be viewed as the "product" and the individual services considered as "features" of that "product." Using the value engineering approach to determine the preferences of customers for individual services in relation to other services can focus attention on which services should possibly be enhanced or those that are candidates for cost cutting or elimination. If a value index for each service offered by the bank can be determined, then management's attention can be focused on those services that are candidates for enhanced spending, reduced spending, or elimination. The use of a value index rather than total cost to focus attention on specific services integrates the concepts of quality and customer perceived value described as of great importance by Dean, Roach, and others.

VALUE INDEXING BANK SERVICES

If "worth" is defined as customer preference for a service, the relative worth or importance of each bank service as part of the overall service mix of the bank can be determined by asking customers to express their preferences for each. This is the type of customer feedback that Roach mentioned as a viable measure of quality. A number of methods such as questionnaires, interview, focus groups, etc. might be used to determine the preferences of customers for each of the services offered by the bank.

An ABC-based analysis would, as discussed previously, provide a cost measure for each service that is more accurate than the cost determined using traditional cost models. The activity cost of each service can be used to determine the cost of each individual service in relation to the cost of all services. Once the relative importance of each service is determined, the value index for that service can be calculated as the ratio of the relative importance of the service to the relative activity-based cost of that service. This ratio will help focus management's attention on the overall value indexed cost structure of the bank's service mix. The value index can serve as an additional data element in management decisions regarding cost cutting, service elimination, and/or spending enhancement. A value index of this type, as suggested by Ansari et. al. (1997) provides information on relative cost and relative importance. In cases where there is a high value index (> 1.0) spending enhancement should be considered given that spending is low in relation to relative customer importance. If the value index is low (< 1.0) there should be some consideration of cost reduction in relation to that item.

THE EXPERIMENT USING VALUE INDEXING FOR BANK SERVICES

Members of upper bank management attending a university sponsored graduate school of community banking participated in a simulation exercise to address the use of ABC-based value indexing for bank services. The simulation involved the use of storyboarding (Cokins, Stratton, and Helbling, 1993) to identify the resources, activities, cost objects (services), resource drivers, activity drivers, and to quantify driver relationships. Given that the group represented a number of different organizations, activities were identified at a higher level than normal when the storyboarding participants were members of a one specific organization. These various elements of the services/activities/resources model, and all subsequent models identified in the experiment, were determined through the storyboarding process using standard ABC approaches. The details and specific measurements of the various elements are not shown here due to space limitations.

The initial step in the experiment required the participants to identify, through the use of storyboarding, a consensus services, activities, and resources model of a hypothetical bank. The services element of the model consisted of the various major services provided by a hypothetical bank to customers. The activities element of the model represented the various activities that had to be carried on in the bank in order to provide those major services. The resources element provided an indication of the various resources of the bank necessary to support those activities. The bank model produced by this step in the exercise is shown in tabular format in Table 1 below.

Table 1: ABC Model: Bank Services		
Resources:	Activities:	Services:
Personnel	Service Accounts	Checking Accounts
Equipment	Service Customers	Savings Accounts
Computers	Service Loans	Loans
Other	Handle Cash	Mortgages
	Produce Reports	Wire Transfers
		Letters of Credit
		Trust Services
		Safe Deposit Boxes
		Certificates of Deposit
		IRAs

Once the elements of the services model were determined, the participants were required to develop a representative consensus of the annual dollar cost of each resource identified by the model. The primary emphasis in this resource cost model is the relative cost of each of the resources as opposed to the absolute cost of each resource. This relative nature of each of these costs is considered adequate and appropriate for the experiment given that all of the consensus values developed in the experiment are relative to one another. For application of the model to a unique bank, the absolute value for each of the various measures would be determinable from general accounting records. The total cost of each resource identified by the participants is shown in the "Total Cost" column of Table 2.

The third step in the experiment involved the participants in identifying the unit-level resource drivers involved in the relationship between each resource and each activity. This was in keeping with the concepts of ABC as described by Cooper (1999). The batch and product, the costs of resources shown in Table 2, represent only those costs that can be assigned to unit-level activities and the services thus produced.

These resource cost drivers represent the means through which the various activities "consume" the resources of the bank. The driver for the personnel resources was identified as the amount of time that bank personnel spend in carrying out the various activities of the bank. Facilities and fixtures cost were assigned using floor space as the resource driver. Equipment and computer resources were assigned based on the relative usage of each of those resources in meeting the demands of each activity identified. Relative amount of time involved in each activity was identified as the resource cost driver for the other resource (primarily related to overhead-type elements). Once each of these drivers and their relative value in relation to each activity were identified, the total cost of each resource was assigned to activities based on the storyboard-identified resource drivers and the cost of each activity accumulated - as seen in the "Activities" columns in Table 2.

Table 2: Resource Cost of Activities						
	Activities					
Resources:	Total Cost ($000)	Service Accounts	Service Customers	Service Loans	Handle Cash	Produce Reports
Personnel	$9,000	$3,000	$4,000	$1,000	$500	$500
Facilities & Fixtures	1,500	200	500	300	300	200
Equipment	700	300	100	100	200	
Computers	1,000	500	100	300		
Other	500		300			200
Total Cost	$ 12,700	$4,000	$5,000	$1,700	$1,000	$1,000

The total cost of each activity was then assigned to the various bank services using the activity driver relationships identified by participants (e.g., number of accounts, number of transactions, number of reports, etc.). The results of this cost assignment are shown in Table 3. Once the activity-based cost of each service was determined, that cost relative to the total cost of all services was calculated. The relative cost of each service is shown in rightmost column of Table 3.

Table 3: Activity Costs ($000) Cost of Services							
	Service Accounts	Service Customers	Service Loans	Handle Cash	Produce Reports	Activity Cost of Service	Relative Activity Cost
Cost:	$4,000	$5,000	$1,700	$1,000	$1,000		
Services:							
Checking Accounts	2,500	2,000		600	150	$ 5,250	0.41
Savings Accounts	1,350	1,500		400	100	$ 3,350	0.26
Loans		800	1,350		200	$ 2,350	0.19
Mortgages		150	350		200	$ 700	0.06
Wire Transfers	25	40				$ 65	0.01
Letters of Credit		20				$ 20	0.002
Trust Services	125	250			150	$ 525	0.04
Safe Deposit Boxes		125				$ 125	0.01
Certificates of Deposit		100			100	$ 200	0.02
IRAs		15			100	$ 115	0.01
						$12,700	1.00

The representative customer preferences for the bank services offered by the banks represented by participants were determined through a questionnaire using a five point scale ranging from not important to extremely important. Table 4 shows the percentage of responses from participants for each category. The responses were then used to calculate the relative preference for each service in relation to all services in a manner similar to that described by Ansari, et. al. (1997).

Table 4:
Relative Customer Preferences for Services

Services:	Not Important 0	Somewhat Important 1	Important 2	Very Important 3	Extremely Important 4	Raw Score	Relative Preference
Checking Accounts				12%	88%	3.88	0.164
Savings Accounts			50%	25%	25%	2.75	0.117
Loans				12%	88%	3.88	0.164
Mortgages			37%	38%	25%	2.88	0.122
Wire Transfers		25%	38%	37%		2.13	0.090
Letters of Credit	63%	25%	13%			0.51	0.022
Trust Services	63%	25%		13%		0.63	0.026
Safe Deposit Boxes		37%	38%	25%		1.88	0.079
Certificates of Deposit			37%	25%	38%	3.00	0.127
IRAs	13%	12%	38%	25%	12%	2.13	0.090
							1.00

The value index for each service identified in the simulation was calculated as the ratio of the relative preference for each service (Table 4) to the relative ABC-based activity cost of that service (Table 3). A value index of approximately 1.0 suggests that for that service relative importance or worth to customers is approximately in line with the relative cost of providing that service. Services with an index far less that 1.0 could represent services that are of little importance to customers in relation to the relative cost of providing those services. These services may indeed represent candidates for cost cutting or even elimination from the service mix. Services with a value index in excess of 1.0 may be services that are of high importance to customers and with relatively low cost. If a bank is considering its various services as potential candidates for cost cutting, those with a high value index should possibly be the last candidates considered. In addition, a service with a high value index might be a candidate for enhanced spending by the bank to potentially increase the overall perceived quality of that service to customers. The value index for each service is shown in Table 5.

Table 5
Value Index for Bank Services

Services:	Relative Preference	Relative Cost	Value Index	Action Implied
Checking Accounts	.164	.40	0.4	Cut Cost
Savings Accounts	.117	.26	0.4	Cut Cost
Loans	.164	.19	0.9	None
Mortgages	.122	.06	2.0	Enhance
Wire Transfers	.090	.01	9.0	Enhance
Letters of Credit	.022	.002	10.8	Enhance
Trust Services	.026	.04	0.7	None
Safe Deposit Boxes	.079	.01	8	Enhance
Certificates of Deposit	.127	.02	6.4	Enhance
IRAs	.090	.01	9	Enhance

The consensus of the participants in this exercise was that the value indexing of services in this manner represents a useful tool for focusing attention on both the cost and the importance of individual services. The participants also stated that the activity-based cost of the services represented a better measurement of service cost than that provided by traditional cost analysis models. However, as suggested by the participants and as recognized in the concepts described in this paper, any decision should be based on as much data as can be accurately and appropriately assimilated by decision makers. For example, a particular service that serves as a "loss leader" might be a totally unacceptable candidate for elimination or even for cost reduction even though it has a very low value index. This is particularly true in the case of checking accounts and savings accounts as shown in Table 5. Both have relatively low value indices but they are essential to other bank operations.

Because the participants in this exercise were all upper level management representing a number of independent community banks, the ABC analysis, as explained, was of necessity accomplished at a very high level for resources and activities. Application of the process described here to a single institution with storyboard participants representing more homogenous areas of operations of the bank and more detailed level of activity and job task knowledge would provide a potentially different model than the one presented here.

SUMMARY

Banks and other service industries are increasingly faced with the necessity of managing costs. A necessary condition for addressing that task is an accurate identification of the cost of the services offered. ABC based cost models are generally recognized as being superior to traditional cost models in providing accurate measurement of cost objects (services in the case of banks). As

suggested by the proponents of value engineering, including a metric related to quality when considering cost issues potentially improves the decision process. The process described in this study proved to be workable in combining the aspects of ABC costing and value indexing into a potentially useful model for improving cost decisions regarding bank services. Extending the concepts outlined here through more formal and rigorous studies may represent a viable avenue for applied business research. The participants in the simulation exercise described here agreed that the process outlined for linking ABC to value engineering through the determination of a quality measure such as a value index would produce a useful and meaningful addition to their data base for decision making.

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RESTRUCTURING COMMERCIAL BANKS IN THE REPUBLIC OF UZBEKISTAN

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ABSTRACT

For the last seven decades as a result of expanding the usage of financial instruments and globalization of world financial and banking systems, the world practice has faced new problems regarding appropriate commercial banks' regulation and their management. This also concerns the economy of Uzbekistan. Before acquiring Independence all bank institutions in Uzbekistan were the part of the banking system of the former USSR. All banks traditionally performed operations on a state budget. The main role of banks was the fulfillment of a social task, sometimes regardless of basic economic principles.

Construction of a new independent state in Uzbekistan began with realization of reforms concerning all fields of the economy including the banking system. At present commercial banks in Uzbekistan, as in many Commonwealth of Independent States (CIS) countries are in stage of reforming. One of the reform's directions is restructuring commercial banks both by forms of property and by their assets. The main object of this program carried out by the Central Bank of the Republic of Uzbekistan is to reorganize the active banks and to create different banking system which meets market requirements.

INTRODUCTION

Before acquiring Independence, bank institutions in Uzbekistan were members of the banking system of the former USSR. A distinguishing feature of the banking system under the centrally planned economy of the former Soviet Union, as well as in many post socialist countries, was that banks traditionally performed operations on a state budget. The main role of banks was the fulfillment of a social task, sometimes regardless of basic economic principles. In other words, the banking system provided state enterprises with loans, almost always on privileged terms without taking into account their profitability or economic efficiency. One of the main reasons for this situation was the absence of any real banking system. The banking system was simply a part of the Ministry of Finance. Financial resources constituted only a book-keeping unit. For example, savings banks provided banking operations for the population and only for some small enterprises. The rest of the banking system was connected with the state sector. Under these circumstances, the banking system played a secondary role and as a result it was underdeveloped. Another distinguishing feature of economic development in Uzbekistan was when the republic, unlike many European or Asian countries, went through the experiment called "jumping from feudalism to

socialism omitting capitalism." Consequently, industrial capacities in the republic remained immature and inefficient.

Many changes have occurred since Uzbekistan acquired its independence eleven years ago. First of all the republic completely changed the basic principles of its development and began establishing its own model of economic development based on the following five principles:

The economy is considered to be separate from ideology.
The Government is the main instigator of all economic transformations.
The domination of law exists in all spheres of life.
Strong social policy exists for carrying out economic transformations.
A step-by-step approach to the market economy is used instead of "shock therapy."

The realization of these market reform principles in Uzbekistan is characterized by the following stages:

The first stage includes the period from 1989 to 1991, when Uzbekistan was a member of the former Soviet Union and began implementing the self-financing approach for the manufacturing sector. By that time the Government had already realized the necessity to refuse the planning and administrative management system and to create equal economic relations with both Russia and other republics. That is why a disintegration of the USSR and reorientation of the economy to a free market economy did not have as much influence on Uzbekistan as it did for some other republics that left the Union. This can be mainly explained by the following: the republic could not fully realize its economic opportunities and it often acted as a source of raw materials in providing the union with cotton fiber, mineral resources, agricultural products, etc. In particular, Uzbekistan cotton was delivered to other republics at a reduced price, and it resulted in an unfavorable redistribution of Uzbekistan's domestic product. The acquired independence gave Uzbekistan an opportunity to conduct its own economic policy. To some extent, the export of cotton helped to compensate for the losses from the crash of the economic relations with the republics of the former USSR.

The period from 1991 to 1992 was a period of searching for Uzbekistan's own way of development. During this period, state experts and scholars investigated the economic models of China, South Korea, Turkey, and Japan which were similar to Uzbekistan due to geographic and economic peculiarities. In addition, research was completed regarding the experiences of countries such as Hungary, Poland, Russia and other post socialist states where the principle of "shock therapy" was applied during the transition to the market economy. However, this method of reforming and liberalizing the economy was unsuitable to Uzbekistan because of the complicated social condition and absence of a developed economic base.

The formation of "The Uzbek model" for economic development started early in the 1993-95 period. During these years the basis of creating a market infrastructure was worked out. This basis consists of the legal base, banking and credit mechanisms, and tax policy. At the same time, a

private sector was gradually being formed. This period is also characterized by the beginning of the privatization of small and medium size enterprises.

By the beginning of the year 2000, the government of Uzbekistan had begun to clarify its economic strategy. In January 2000, the President of the Republic of Uzbekistan expounded upon the programs of liberalization in economics, politics, and in public and social life for the coming five years. As a result, the financial and banking system became more active. The restructuring of the banking system, including the restructuring of commercial banks became the main focus of this program.

THE BANKING SYSTEM OF THE REPUBLIC OF UZBEKISTAN AND ITS RESTRUCTURING PECULARITIES

Uzbekistan is a unique country where the banking system (like in other countries of the former USSR) evolved from the former State Bank, the Construction Bank and the Foreign Economy Bank. The regional branches of the State Bank were monopolists in the banking system of the republic and they performed cash and pay-book service of the national economy. It also gave credits to replenish the economy's circulating capital. The Construction Bank financed the construction industry, while the branches of the Foreign Economy Bank served external transactions of Uzbek enterprises by providing them with foreign currency.

The subsequent reforms in the banking sector led to the creation of a fundamentally new two-tier banking system consisting of the Central Bank of the Republic of Uzbekistan and commercial banks. The first stages of reform were characterized by the creation of big specialized banks owned primarily by state-owned enterprises. This was necessitated by the financing needs of definite sectors in the economy such as textile, agricultural, motor-car industry, etc. However, as worldwide experience proves, the existence of such banks in the economy of any country has a positive effect only in the beginning of the reform process and later unavoidably undermines the banking system if these banks continue to operate in the long-run. This was the situation in Uzbekistan. Gradually, the specialized banks led to the significant restriction of opportunities for attracting financial resources into the banking system. Moreover, the existence of the specialized banks did not provide a diversification of credit and deposit activity in these banks. As of the year 2000, the share of the five biggest banks of total commercial bank assets came to 92%. Since all these banks were either state or state-joint-stock banks there was a big concentration of state ownership in the banking system of Uzbekistan. This could cause financial instability, a threat to liquidity and solvency not only to individual banks but also to the entire banking system.

All these problems highlighted the necessity of restructuring the banking system. It became clear that such reorganization could not be realized without changing the ownership structure of the big joint-stock banks.

The objective of restructuring the banking system, as with all other measures carried out by the Central Bank of Uzbekistan, is the creation of a reliable and stable banking system meeting world standards.

The restructuring of the banking system suggests not only the rehabilitation of problem assets and the recapitalization of banks, but it also deals with the settlement of a number of other problems:

Determination of a restructuring strategy and the demonopolization of the banking system.
Acceptance of appropriate measures for the restructuring of outdated enterprises.
Development of a program to liquidate unsound banks on a break-even basis.
Determination of the optimal approach to the restructuring of problem assets.

The experiences of other countries in economic transition show that restructuring of the banking system is the most effective component of an all encompassing restructuring of the economy and requires the active participation of the government. It is well known that the financial resources of a country are restricted. This is especially true of a country in economic transition. That is why when restructuring the banking system special attention should be paid to the minimization of expenses and the fair allocation of all financial burdens between the government and the bank to be restructured.

Briefly, the suggested stages of restructuring the banking system in Uzbekistan can be characterized as follows:

Conduct an analysis to identify the strategic role played by each of the banks taking into account their social function.
Develop a plan to solve the problem of doubtful assets.
Qualify assets and determine who is responsible for their management.
Determine the likelihood of a bank's future profitability after restructuring and create mechanisms to support banks during this process if needed.
Create a government institution to implement the restructuring plan.
Implement modern management techniques in commercial banks.

The expense of reorganizing a bank must only be incurred if the restructured bank can play an important role in the economy and be efficiently managed by the new owners. It is necessary to perform an analysis concerning soundness of each bank from both the short and long-run perspectives. The determination of a bank's soundness will require an evaluation of its financial condition, administration and staff, and also their readiness to react efficiently to any changes in the economic environment which may affect the bank. The bank's value to the economy can be determined on the basis of its market share, number and location of branches, and specific functions performed by the bank. It is important to have a full assortment of banks meeting the requirements of the economy. However, no one bank should possess any privileges that are not allowed other

banks. The development of sound market competition among the banks will strengthen the entire banking system.

The basic concept of reviving and developing the banking system must contribute to the solution of the two following tasks: first, during the restructuring process, the banking system must continue to provide all the needed banking services; and second, new management methods must be utilized which meet world standards in the areas of technology, accounting, management, supervision and audit.

Another important aspect of restructuring commercial banks is their privatization. The government of Uzbekistan pays special attention to attracting foreign capital into the banking system by selling the state's share in a number of big banks. However, to accelerate the process of privatization it is necessary to completely reconsider the problems concerning the bad credit portfolios of functioning banks. From the theoretical point of view, the existence of problem banks in the economy presents a difficult choice to the government: a) to accept their bankruptcy with the following charter recall (which might have a negative impact on the economy of the country) or b) to invest in their recapitalization and restructuring. On the other hand, the subsidizing of problem banks can be a liability to the government because the customers of problem banks will have an incentive to apply to the government in the event of any financial problems without any attempts to solve these financial problems themselves.

Special attention should be paid to the social role of problem banks. Even in countries with highly developed financial markets, banks remain the center of financial and economic activity, and act as the primary mechanism of monetary policy. In developing countries and countries in transition which do not have highly developed financial markets, banks are usually the only financial institutions which enable the economy to function. Taking into account the role of banks in the economy, the government should undertake measures to reorganize but not bankrupt the system. As international experience indicates, losses from bankruptcy often exceed eight to ten times the cost of reorganization. By itself liquidation of problem banks is the cheapest method of restructuring commercial banks, but it is complicated in its social aspects. For example, thoughtless liquidation of several big banks in 1997-1998 in Indonesia led to the banking crisis.

The restructuring of problem credits is complicated by using collateral or any other type of security in case of the borrower's non-repayment. The procedure of using collateral does not work properly due to the absence of its market value without which it is difficult to set its real value. Besides, the recovery of collateral requires court proceedings which are currently very complicated. Taking into account that the significant part of credit portfolios in big banks (up to 85%) of Uzbekistan make up credits guaranteed by the government, it would be reasonable to use the following method: the state withdraws the deferred credits given under the guarantee of the Ministry of Finance from the bank's balance sheet and transfers them into the restructuring agency and at the same time the government substitutes them for more liquid and reliable assets (for instance state securities or highly liquid corporate securities). In case the credits were given by the bank on a commercial basis they are covered at the expense of the bank's own capital and retained earnings.

The restructuring of commercial banks cannot be successful without carrying out the restructuring of the real sector of the economy. It is explained by the situation where banks, after their recovery, will need a new customer base. Therefore, the restructuring process of commercial

banks as well as of manufacturing enterprises must be carried out simultaneously. Otherwise, after the successful restructuring of the banking system, Uzbekistan may face the situation where banks outstrip the production sector in their development. In this situation all the efficiency of restructuring will come to nothing and after some period of time the country will need to begin the restructuring of commercial banks again having the same problems it faced before.

As of October 1, 2001 in the country of Uzbekistan there were 38 commercial banks with 804 branches. From these 38 banks, eighteen were private banks, four were created in a form of joint-stock bank with foreign investors, two were state banks, and the rest had a mixed form of ownership basically in the form of a joint-stock (private/state ownership). The number of private banks is increasing. At the beginning of 2000 they were ten, by the end of the third quarter there were thirteen, and by the end of that year there were a total of eighteen. At the same time, thirteen foreign banks had representatives in Uzbekistan. Total capital of the banking system for the nine months in 2001 increased by 28.6% and was 355.5 billon sums (842,018,001 USD). The resource base of commercial banks in Uzbekistan for the nine month period increased by 26%. This growth occurred as a result of the 70% increase in the population's deposits. Such confidence in commercial banks on the side of the population was due to the President's Decree "about measures for further liberalization and reforming of the banking system" issued on March 21, 2000. One of the sections of this Decree was the creation of an insurance fund for the protection of the population's deposits. This Fund was opened under the "Omonat Khimoya" fund of Uzbekistan's Banks Association with equity at the rate of 500mln.sum (3.432.415 USD). Basic tasks of this fund are: a) to increase the population's confidence in the banking and financial system, b) to provide insurance protection of deposits, and c) to be invested in reliable, highly liquid, state and corporate securities, and bank deposits. Additionally, strong steps concerning protection of population's deposits was made in 04.05.02 with an acceptance of the Law sighed by the President of Uzbekistan "about guaranties of citizen's deposits protection." According to this Law a special fund was established to protect and guarantee citizen's deposits at all banks in Uzbekistan. The Fund's financial resources and property come from banks' mandatory payments and profits obtained from allocation of its financial resources. Banks are obligated to make two types of payments: beginning one-time payment and quarterly payment. One-time payment is made at the rate of 0.1 percent from the total bank's Equity amount. A quarterly payment is made in accordance with actual balance deposits of citizens per quarter. The total sum of transferred payment from banks must not exceed 0.5 percent from total amount of deposits put in a bank. In case quarterly payments are more than 5 percent from the total amount of deposits in a bank all payments to the Fund are temporary halted.

Research for this article was supported in part by the Junior Faculty Development Program, which is funded by the Bureau of Educational and Cultural Affairs of the United States Department of States, under authority of the Fulbright-Hays Act of 1961 as amended and administrated by the American Council for International Education: ACTR/ACCELS. The options expressed herein are the author's own and do not necessarily express the views of either ECA or the American Councils

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FORECASTING METHODS AND USES FOR DEMAND DEPOSITS OF U.S. COMMERCIAL BANKS

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ABSTRACT

This study reports upon an inquiry into demand deposit forecasting practices of commercial banks in the United States. A survey questionnaire was forwarded to a total of 400 randomly selected banks and 83 usable surveys were returned (a response rate of 20.8%). This study compares and contrasts the survey results based on bank size.

The major findings of this study include: most banks prepare demand deposit forecasts using jury of executive opinion and straight line projection techniques; most banks utilize demand deposit forecasts most often as input for profit plans, followed by strategic plans and cash budget; larger banks are more likely than small banks to use longer time horizon for their forecasts and to develop them frequently.

The similarities and dissimilarities between large and small banks regarding forecasting practices identified in this study impact significantly on how bank managers construct and employ forecasts.

INTRODUCTION

During the past decade, the banking industry has witnessed a multitude of dramatic changes, such as the deregulation of the financial sector, competition from other financial institutions, and new information technology such as the Internet. All of these changes have produced a combined effect, leading to the unprecedented present day competitive market environment. In order to survive in this highly volatile industry, competent forecasting and planning have become vital activities for banks. The managers of these institutions require timely and accurate forecasts of variables such as deposits, loans, exchange rates, and interest rates, in order that they might fulfill their planning and control responsibilities in an effective manner. In essence, all of the major budgeting practices of these institutions are dependent upon the forecasting function.

Given the critical role of the forecasting function, insights into current demand deposit forecasting practices and the possible success of these practices should be of major value to bank management. However, most past studies on forecasting have focused on a cross-sectional analysis (Dalrymple, 1987, 1975; Mentzer & Cox, 1984; Sanders, 1992, 1994). Sanders (1997) has noted that since the management of service organizations is in many ways different from that of manufacturing companies, combining information on forecasting practices in manufacturing and

service firms can only lead to diffused generalizations and is not helpful in understanding practices in a specific industry segment.

Unfortunately, detailed studies of the forecasting methods employed in the banking industry have not been undertaken, although other aspects of the forecasting function, such as developing forecasting models and comparing their accuracies, have been assessed (Ellis, 1995).

In this study the focus is on U.S. commercial banks. It assesses current bank demand deposit forecasting practices and probes into problems that are specific to this environment. The specific objectives are: (1) to explore the uses of demand deposit forecasts; (2) to evaluate forecasting methods and forecasting time parameters; and (3) to examine the criteria used for evaluating forecasting effectiveness and the measures used for forecasting accuracy.

RESEARCH METHOD

Table 1: Sample Characteristics

Volume of Annual Demand Deposit	Frequency	(%)
Below $100 mil.	26	(31.3)
$100 mil. - $500 mil.	31	(37.3)
$500 mil. - $1 bil.	9	(10.8)
$1 bil. - $10 bil.	17	(20.5)
More than $10 bil.	1	(1.2)
Total	83	(100.0)
Years of Respondents Employed with the Banks	Frequency	(%)
Less than 1	1	(1.2)
1 – 3	14	(16.9)
4 – 6	15	(18.1)
7 – 10	11	(13.3)
More than 10	42	(50.6)
Total	83	(100.0)

Age of Banks (years)	Large		Small	
	Frequency	(%)	Frequency	(%)
1 – 10	1	(3.9)	0	(0.0)
11 – 30	1	(3.9)	14	(24.6)
31 – 60	6	(23.1)	5	(8.8)
61 – 100	6	(23.1)	23	(40.4)
Over 100	12	(46.1)	15	(26.3)
Total	26	(100.0)	57	(100.0)

In this study a mail survey was utilized to obtain information about demand deposit forecasting practices in commercial banks. An initial mail questionnaire was developed, based upon questionnaires utilized in previous studies (Dalrymple, 1987, 1975; Giroux, 1980; Mentzer & Cox, 1984; Peterson & Jun, 1999). This preliminary measuring instrument was reviewed by two practitioners from the banking industry and several alterations were produced, based upon their inputs. The final questionnaire was designed and formulized to collect data which could be of value to bank managers.

The survey was forwarded to the presidents of a sample of U.S. banks, requesting them to forward the survey questionnaire to the manager who is responsible for preparing demand deposit forecasts. A total of 400 banks were randomly selected from the Thomson Bank Directory (Thomson Financial Publishing, 1999). Of the responses received, 83 questionnaires were usable. This results in a response rate of 20.8%, which is comparable to similar surveys and can be regarded as an acceptable rate considering the length (seven-page) of the questionnaire.

Table 1 summarizes the characteristics of respondents regarding the approximate size of annual demand deposits, the number of years respondents have been employed with the banks, and the approximate ages of the banks classified by company size: large and small size. In this inquiry a large bank was defined as one with more than $500 million of demand deposits and a small firm as one with less than or equal to $500 million.

The bulk of the respondents were executives whose job titles included chief executive officer, president, vice-president of branch management, forecasting manager, controller, and director of management information systems.

RESEARCH RESULTS

This section considers the key results of the survey. The findings are discussed in order--preparation of demand deposit forecasts, preparation of other types of forecasts, uses of demand deposit forecasts, forecasting methods used, forecast time parameters, criteria for evaluating forecasting effectiveness, and measures of forecasting accuracy.

Preparation of Demand Deposit Forecasts

Table 2 summarizes data on the generation of demand deposit forecasts, based on bank size -- large and small. The table indicates that most of the large banks (84.6%) prepare demand deposit forecasts whereas approximately two-thirds of the small banks (63.2%) develop the forecasts. This is not unexpected since, compared with small banks, larger institutions command more of the financial, technical, and human resources necessary to engage in forecasting programs and are more likely to integrate systematic forecasting systems with their formal planning processes.

Table 2: Preparation of Demand Deposit Forecasts				
	Large Banks		Small Banks	
	Frequency	%	Frequency	%
Yes	22	84.6	36	63.2
No	4	15.4	21	36.8
TOTAL	26	100.0	57	100.0

Preparation of Other Types of Forecasts

The respondents were requested to identify the forecasts they prepared (with the exception of demand deposit forecasts which was addressed in the previous question) from the listing of forecasts set forth in the questionnaire. As shown in Table 3, for large banks, most of the responding companies are developing forecasts on time deposits (92.3%), commercial loans (92.3%), and consumer loans (88.5%). These were followed by short-term interest rate (69.2%) and long term interest rate (57.7%). On the other hand, for small banks, about two-thirds of the banks generate four types of forecasts: in descending order of frequency, commercial loans (77.2%), short term interest rate (66.7%), time deposits (68.4%), and consumer loans (64.9%). From Tables 2 & 3, it is evident that demand deposit forecasts are one of the primary categories for both bank groups.

Table 3: Preparation of Other Types of Forecasts				
Types of Forecasts	Large Banks (n=26)		Small Banks (n=57)	
	Frequency	%	Frequency	%
Time Deposits	24	92.3[1]	39	68.4
Commercial Loan Forecasts	24	92.3	44	77.2
Consumer Loan Forecasts	23	88.5	37	64.9
Short-term Interest Rate Forecasts	18	69.2	38	66.7
Long-term Interest Rate Forecasts	15	57.7	18	31.6
Others	5	19.2	11	19.3
Note: 1. Percentages do not add to 100 % because of multiple answers given.				

Uses of Demand Deposit Forecasts

The respondents were asked to list in order of relative importance the managerial processes in which the forecasts were employed. A total of six categories were elicited: cash budgeting, profit planning, capital budgets preparation, strategic planning, market planning, and personnel planning.

Table 4 presents the frequencies of response to this question for both large and small banks. It indicates that those in each of the two groupings utilize demand deposit forecasts most often, as input for profit plans. This was followed by, in order of descending frequency, profit planning, strategic planning, cash budgeting, and market planning. In addition, three respondents indicated that the forecasts were utilized as input for liquidity management, asset liability management, and loan growth planning, respectively.

Table 4: Uses of Demand Deposit Forecasts

Uses of Forecasts	Large Banks (n=22)			Small Banks (n=36)		
	Rank 1	Rank 2	Total	Rank 1	Rank 2	Total
Profit Plans	15	3	18	17	9	26
Strategic Plans	3	8	11	10	3	14
Cash Budget	3	3	6	7	5	13
Market Planning	1	2	3	1	6	7
Capital Budgets	0	2	2	0	4	4
Personnel Planning	0	0	0	1	1	2

Forecasting Methods

The respondents were asked to identify the major forecasting methods which they employed. They were provided with a listing of 14 forecasting methods. The description of each of the techniques was provided in the questionnaire to prevent respondents from making classification errors, based on nomenclature alone. Those techniques include jury of executive opinion, sales force composite, customer expectations, decomposition, exponential smoothing, moving average, regression analysis, simulation, straight-line projection, Box-Jenkins time series models, expert systems, neural networks, trend line analysis, and life cycle analysis.

In order to gain detailed insights on the degree of usage of the techniques, they were asked to indicate which of these were used regularly, occasionally, or never/no longer used. Respondents were then requested to identify the forecasting time horizons for each of the forecasting methods used, from three categories: less than 3 months, 3 months to 2 years, or over 2 years, and to check their satisfaction levels for the forecasting techniques identified previously from three alternatives: satisfied, neutral, or dissatisfied.

Table 5: Uses of Forecasting Methods

Forecasting Techniques	N=51[1] Regularly	Rank	Occasionally	Never/No Longer used
Judgemental Methods				
Jury of Executive Opinion	36[2] (70.6)[3]	1	8 (15.9)	7 (13.7)
Sales Force Composite	19 (37.3)	3	11 (21.6)	21 (41.2)
Customer Expectations	7 (13.7)	7	23 (45.1)	21 (41.2)
Quantitative Methods				
Straight Line Projection	22 (43.1)	2	7 (13.7)	22 (43.1)
Decomposition	14 (27.5)	4	9 (17.6)	28 (54.9)
Simulation	12 (23.5)	5	9 (17.6)	30 (58.8)
Moving Average	11 (21.6)	6	10 (19.6)	30 (58.8)
Trend Line Analysis	6 (11.8)	8	12 (23.5)	33 (64.7)
Exponential Smoothing	5 (9.8)	9	1 (2.0)	45 (88.2)
Regression	3 (5.9)	10	8 (15.7)	40 (78.4)
Neural Networks	3 (5.9)	10	5 (9.8)	43 (84.3)
Expert Systems	1 (2.0)	12	4 (7.8)	46 (90.2)
Life Cycle Analysis	1 (2.0)	12	10 (19.6)	40 (78.4)
Box-Jenkins Time Series	0 (0.0)	14	0 (0.0)	51(100.0)

Note: 1: Total number of respondents
2: Frequency
3: Percentage (Percentages do not add to 100 % because of multiple answers given.)

Table 6: Regular Usage of Forecasting Methods by Bank Size

Forecasting Techniques	Large Banks (n =18)		Small Banks (n =33)	
	Percentage	Rank	Percentage	Rank
Judgemental Methods				
Jury of Executive Opinion	61.1[1]	1	75.8	1
Sales Force Composite	38.9	2	36.4	3
Customer Expectations	5.6	9	18.2	7
Quantitative Methods				
Straight Line Projection	38.9	2	45.5	2
Decomposition	38.9	2	21.2	5
Simulation	27.8	5	21.2	5
Trend Line Analysis	22.2	6	6.0	8
Exponential Smoothing	16.7	7	6.0	8
Moving Average	16.7	7	24.2	4
Regression	5.6	9	6.0	8
Expert Systems	5.6	9	0.0	13
Neural Networks	5.6	9	6.0	8
Life Cycle Analysis	0.0	13	3.0	12
Box-Jenkins Time Series	0.0	13	0.0	14

Note: 1. Percentages do not add to 100 % because of multiple answers given.

Table 5 presents the frequencies regarding the usage rates of forecasting methods. The bankers commonly used the following six forecasting techniques on a regular basis for generating demand deposit forecasts: in descending order of frequency, jury of executive opinion (70.6%), straight line projection (43.1%), sales force composite (37.3%), decomposition (27.5%), simulation (23.5%), and moving average (21.6%). In terms of the extent of satisfaction, all those six methods received "satisfied" from more than 50% of the managers who used those techniques. As for the time horizon, all of the six techniques mentioned above were primarily used for developing medium range forecasts with a time horizon of from 3 months to two years, all of which received over 80% of frequency. On the other hand, techniques such as life cycle analysis, expert system, and neural networks are rarely used and Box-Jenkins time series were never utilized by the bankers.

It is evident that the jury of executive opinion is the most popular forecasting technique with the highest satisfaction level (88.6%). This result is consistent with Giroux (1980), in which the dominant forecasting technique used by commercial banks was found to be the "judgmental only" forecasting technique.

Among the quantitative forecasting methods used, straight line projection (43.1%) is the most widely cited, followed by decomposition, simulation, and moving average. These findings are somewhat inconsistent with those of Giroux (1980). In his study, the most widely utilized quantitative technique was multiple regression, followed by ties of multiple equation models and simulation.

With respect to the effect of firm size on forecasting methods used on a regular basis, both the large and small bank groups manifest similar patterns in relation to the forecasting techniques used, the degree of their satisfaction levels, and the forecast time horizons for which each of the techniques are used. Large banks most often deployed, in descending order of frequency, jury of executive opinion (61.1%), sales force composite (39.9), decomposition (38.9%), straight line projection (38.9%), and simulation (27.8%), whereas small banks predominantly employed jury of executive opinion (75.8%), followed by straight line projection (45.5%), sales force composite (36.4%), moving average (24.2%), decomposition (21.2%), and simulation (21.2%) (see Table 6).

Forecast Time Parameters

The questionnaire requested that the respondents specify the forecast time parameters--the horizon (time period covered), the interval (time periods for which data were inputted into the forecast model), and the frequency of preparation for their firms. Table 7 presents the results for the large and small banks. Large institutions use from four to 12 months (40.9%) and from 13 to 24 months (40.9%) of time horizons the most frequently and next from four to five years (18.2%). In the case of small banks, the most frequently employed forecast horizon is from four to 12 months (52.8%) and the second less than one month (33.3%). Hence, it appears that large banks tend to have longer time horizons than their counterparts. This is not unexpected since larger firms tend to formally develop long term forecasts and strategic plans to greater extent than do small banks.

Concerning the time interval, as shown in Table 7, monthly demand deposit figures were the most often used by both of the two groups (for small banks, 55.6%; for large banks, 90.9%) and yearly demand figures were the next most frequently used (for small banks, 30.6%; for large banks, 9.1%). As for forecasting frequency, the largest proportion of the large bank group developed the forecasts monthly (40.9%), and the second largest annually (27.3%) whereas the majority of the small bank group prepared the forecast yearly (61.1%), and next monthly (16.7%) (see Table 7).

Table 7: Forecast Time Parameters				
Time Horizon	Large Banks (n=22)		Small Banks (n=36)	
	Frequency	%	Frequency	%
Less than 1 month	1	4.5	12	33.3
2 - 3 months	1	4.5	3	8.3
4 - 12 months	9	40.9	19	52.8
13 – 24 months	9	40.9	2	5.6
25 – 36 months	0	0.0	0	0.0
4 - 5 years	4	18.2	1	2.8
6 - 10 years	1	4.5	1	2.8
Over 10 years	0	0.0	0	0.0
Time Interval	Large Banks (n=22)		Small Banks (n=36)	
	Frequency	%	Frequency	%
Weekly	0	0.0	0	0.0
Monthly	20	90.9	20	55.6
Quarterly	1	4.5	4	11.1
6 months	0	0.0	1	2.8
Annually	2	9.1	11	30.6
Forecasting Frequency	Large Banks (n=22)		Small Banks (n=36)	
	Frequency	%	Frequency	%
Weekly	0	0.0	0	0.0
Monthly	9	40.9	6	16.7
Quarterly	4	18.2	5	13.9
Semi-annually	3	13.6	3	8.3
Annually	6	27.3	22	61.1
As Needed	1	4.5	0	0.0
Note: Percentages do not add to 100 % because of multiple answers given.				

Criteria for Evaluating Forecasting Effectiveness

The respondents were asked to rank the following five criteria in evaluating the effectiveness of demand deposit forecasts: accuracy, credibility, ease of use, customer service performance, and amount of data required. As shown in Table 8, there is virtually no difference between large and small banks in the relative importance of those evaluative criteria. In turn, the criteria most commonly cited by most of the firms were (in terms of the first and second ranks combined) accuracy and credibility. For the small bank group these were followed by ease of use, customer satisfaction, and amount of data, and for the large bank group, followed by customer satisfaction performance.

Table 8: Criteria for Evaluating Demand Deposit Forecasting Effectiveness

Criteria	Large Banks (n=21)			Small Banks (n=35)		
	Rank 1	Rank 2	Total	Rank 1	Rank 2	Total
Accuracy	11	6	17	21	7	28
Credibility	8	8	16	10	13	23
Customer Satisfaction Performance	2	4	6	3	2	5
Ease of Use	0	0	0	0	8	8
Amount of Data Required	0	0	0	1	2	3

Measures of Forecasting Accuracy

The questionnaire asked respondents to indicate which forecasting error measurements they used. A total of seven accuracy measurements were listed: mean absolute percentage error, mean absolute deviation, mean squired error, deviation, percentage error, forecast ratio, and standard deviation.

As shown in Table 9, large banks primarily employed percentage error (54.5%), forecast ratio (31.8%), and deviation (22.7%), while small banks most frequently employed mean absolute percentage error (33.8%), deviation (30.6%), percentage error (19.4%), and forecast ratio (19.4%). Conversely, mean absolute deviation, mean squared error, and standard deviation, were seldom used by large or small banks.

Table 9: Measures of Forecasting Accuracy				
Accuracy Measurements	Large Banks(n=22)		Small Banks (n=36)	
	Frequency	%	Frequency	%
Percentage Error	12	54.5[1]	7	19.4
Forecast Ratio	7	31.8	7	19.4
Deviation	5	22.7	11	30.6
Standard Deviation	1	4.5	2	5.6
Mean Absolute Percentage Error	1	4.5	12	33.3
Mean Absolute Deviation	0	0.0	1	2.8
Mean Squared Error	0	0.0	1	2.8
None	2	9.1	2	5.6
Note: 1. Percentages do not add to 100 % because of multiple answers given.				

SUMMARY AND CONCLUSIONS

Effective management of funds is essential to the success of financial institutions including commercial banks. Particularly, to optimally control the flow of demand deposits and associated cost structure, and in turn to increase the efficiency in managing both the asset and liability sides of the balance sheet, commercial banks need to forecast their demand deposits accurately.

This inquiry into the demand deposit forecasting practices of the banking industry derived a number of major findings. Demand deposit forecasts are developed by most of the banks surveyed for a variety of important plans such as cash and capital budgets, profit plans, and marketing plans. The most popular forecasting method is jury of executive opinion. This was followed by straight line projection and sales force composite. The majority of the responding managers are satisfied with the performances of those techniques and used them for generating particularly medium range forecasts. Both of the two groups - large and small banks- show similar usage of forecasting methods on a regular basis, but the large banks develop demand deposit forecasts more frequently and for longer time horizon than do the small banks. The majority of the banks most frequently utilize two criteria - accuracy and credibility - for evaluating forecasting effectiveness, and also commonly employ percentage error and forecast ratio for accuracy measurements.

The findings of this study are illuminating in terms of revealing forecasting practices of one specific industry and differences by size of firm. It is recommended that further research be conducted for other forecasting types such as time deposit and interest rates, in an effort to assess the prevalence of the results set forth herein.

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INSIDER TRADING AROUND BANK FAILURES

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ABSTRACT

In this paper we examine insider trading around bank failures. We examine insider trading around four major bank failures that took place in the 1980's. The four failures that are examined are Continental Illinois National Bank and Trust Company, First City Bancorp., First Republic Bank and Mbank. We find that insiders in both the failed bank, as well as non-failed banks, change their trading behavior in the time period surrounding large bank failures. Moreover, we find that insiders in failing banks exhibit different trading patterns than insiders in non-failed banks. We find insiders in the failed bank are larger sellers of their banks stock around the time of the failure than insiders in other banks.

INTRODUCTION

In this paper we examine insider trading around the failure of banks. Between 1980 and 1994, 1,617 banks failed in the United States. This number constitutes 9.14 percent of all U.S. chartered banks. On a total asset basis, the failed banks held 8.98 percent of the total banking system assets (FDIC, 1997). While no geographic area of the United States was immune from the failures, some were hit harder than others. Nearly 60 percent of the failures occurred in 5 states: Texas, Oklahoma, California, Kansas and Louisiana (FDIC, 1997). Despite the economic significance of these bank failures, to date no paper has examined insider trading behavior around bank failures. We examine insider trading around four largest commercial bank failures that took place in the 1980's. The four failures that are examined are Continental Illinois National Bank and Trust Company, First City Bancorp., First Republic Bank and Mbank.

Given the lack of evidence regarding insider trading for banks and other financial institutions, we will discuss the empirical literature on insider trading behavior in non-financial firms. These studies have attempted to answer three important questions: (1) Is insider trading beneficial to capital markets? (2) Do insiders earn excess returns?, and (3) What kind of trading patterns do insiders exhibit relative to significant corporate news announcements? While all of these issues are interesting, our focus is on answering the third question for the banking industry.

Elliott, Morse and Richardson (1984) found evidence that insiders with private information purchased stock in their firms before value increasing announcements and sold stock before value decreasing information releases. Oppenheimer and Dielman (1988) examined insider trading patterns during the twelve months prior to announcements of dividend resumption (omission) and possible abnormal returns associated with such insider trading. They found evidence suggesting that

insiders engaged in extensive net buying (selling) activity prior to dividend resumption announcements (omission). However, these pre-announcement insiders purchases failed to consistently earn excess returns, while pre-announcement insider sales enabled the insider to avoid negative abnormal returns. Furthermore, officers (high-information insiders) were found to earn larger profits than all insiders considered as a broad group.

The literature relating to non-financial firms indicates that the announcements of voluntary liquidations tend to benefit stockholders, whereas the announcement of filing for bankruptcy reduces equity prices. On that basis, Eysell (1991) hypothesized that the announcement of voluntary liquidations would be associated with an increase in insider purchases and that announcements concerning bankruptcy filings would lead to increased insider sales. As expected, when he empirically tested these hypotheses he found that corporate insiders were in fact heavy purchasers prior to liquidation announcements and during the period when the value of firms' stock kept rising. Furthermore, as expected, insiders of firms that eventually filed for bankruptcy were heavy net sellers. Additionally, those with the greatest access to information (high-information insiders) were found to be the heaviest purchasers before liquidation announcements and the heaviest sellers before bankruptcy announcements. These findings indicate that insider trading is prevalent in a manner consistent with the exploitation of private information. In a recent article, Hu and Noe (2001) derive the conditions which allow insiders to trade on their on their own behalf and in a manner which increases shareholder wealth.

Karpoff and Lee (1991) examined the insider trading patterns before new equity offerings. The authors found that insiders are net sellers of their firms' common stock prior to the announcements of new common stock and convertible debt issues. On that basis, they concluded that penalties for illegal insider trading did not deter insiders from using their superior information. Teal (1993) examined insider holdings, as opposed to insider trading, around the failure of savings and loan associations (S&Ls) during the period from June 1977 to March 1991. Teal argues that managers maintain a dual role. In the management role, the manager strives to maximize the value of his salary. In the shareholder role the manager strives to maximize his equity value. He suggests that these objectives often conflict, and consequently, we should expect managers with higher shareholdings to act on behalf of shareholders in general by assuming greater risk in order to increase the value of the deposit insurance option. Consistent with this, he found evidence that the insiders of S&Ls which subsequently failed owned 23.1% of the outstanding equity, compared to only 11.0% for S&Ls that did not fail. Bank failure announcements are generally found to have a negative effect on the stock prices of the failing banks as well as other commercial banks. For example, using weekly data Swary (1986) found that all banks experienced a 3% decline in the value of their common stock in reaction to the Continental Illinois failure. In a similar fashion, Lamy and Thompson (1986) show that all banks experienced a 1% decline in stock value in reaction to the Penn Central failure.

In this paper we examine insider trading around the failure of financial institutions. We examine insider trading around four major bank failures that took place in the 1980's. We begin by discussing the theory related to bank contagion and insider trading. We continue by proposing testable hypotheses and discussing the data and methodology. Next, the test results are presented followed by concluding comments.

THEORY RELATED TO BANK CONTAGION AND INSIDER TRADING

Banks are unique in that a significant proportion of their liabilities are payable at par on demand or at very short maturities. To meet these deposit withdrawals the bank may have to quickly liquidate assets at current market value. While banks are required to hold a small percentage of reserves against transaction or demand deposits, these reserves are not sufficient to meet a massive withdrawal of deposits. To help protect again such a "bank run" the FDIC insures bank deposits up to $100,000. This deposit guarantee, plus the fact that historically the FDIC charged a flat-rate insurance premium regardless of bank risk, encouraged banks to assume increased levels of risk. This moral hazard condition has been well documented in the literature (Kane, 1986). In effect, bank management has been encouraged to take excessive risks which, if successful, benefits bank shareholders as well as bank management. If the risky investments are unsuccessful and the solvency of the bank should be in jeopardy, the FDIC and tax payers will ultimately bare the financial burden. In addition, to prevent a massive run on the banking system, the Federal Reserve and the FDIC instituted a "too-big-to-fail" doctrine which lead to the protection of all liability holders at Continental Illinois banks regardless of amount or type of deposit or indebtedness. The argument put forth at that time was that, should Continental Bank fail, hundreds of other banks with correspondent banking relationship with Continental might also fail. This could then lead to widespread panic or contagion within the banking system that could eventually migrate to non-bank financial institutions. The size of the FDIC insurance fund was felt to be inadequate to deal with such a massive bank run.

Aharony and Swary (1983) make a distinction between pure or industry-specific contagion and firm or bank specific contagion. With industry-specific contagion the market has difficulty differentiating between individual banks and views the banking industry as more or less homogeneous. Given the difficulty that the market has in evaluating the quality of bank assets, in particular private loan contracts, problems at one bank are viewed as a likely problem for all banks and may illicit an irrational response toward the entire industry. With bank-specific contagion an adverse event at one bank is seen as being indicative of problems at other banks which share common characteristics, such as similar types of loan exposures or common product lines. In this case the market reaction is rational in the sense that bank performance is correlated to a common set of industry or macro economic variables. Industry-specific contagion is viewed as being more damaging than bank-specific contagion as it potentially impacts all banks, rather than shifting deposits and loans within the system from weak to healthy institutions. Furthermore, as Kaufman (1994) points out, the news may not be all bad since the failure of a major bank may significantly benefit its competitors. This was certainly the case for First Chicago Bank, the primary competitor of Continental Bank. In reviewing the evidence surrounding a number of major bank failures, Kaufman concludes that bank-specific rather than industry-specific contagion is more likely.

In a recent paper, Bougheas (1999) develops a model of bank contagion and concludes that bank failure alone is not sufficient to induce a "bank run" but must be accompanied by periods of economic instability. In terms of international bank failures, Jayanti, Whyte, and Do (1996) examine several bank failures in Britain and Canada and find no evidence of industry-specific contagion in Britain, while Canadian banks reacted adversely to several domestic bank failures. The

authors conclude that the Canadian stock market primarily may have reacted to new bank regulations proposed immediately following the failures and that deposit insurance by itself may not be sufficient to prevent contagion effects.

Overall, the majority of evidence suggests that bank managers have little to worry about industry-wide contagion effects and may have an incentive to act on insider information relating to an impending bank failure. This inside information may encourage them to sells shares of their own stock prior to a bank failure if they perceive that bank-specific contagion will adversely impact their bank. Conversely, the impending failure may provide an incentive to purchase shares based upon inside information if the failed bank is a major a competitor. As in the case of First Chicago and Continental Bank, it seems likely that in certain cases both effects could be operative. Which effect dominates and leads to either insider net sales or purchases is an empirical question and is the central focus of this research.

TESTABLE HYPOTHESES

We argue that insiders have better information than other market participants regarding both the timing and likely effect of bank failures. Inter-bank payments and credit transactions, plus informal contacts allow insiders in one bank to be aware of problems occurring in other institutions. This is private information that generally would not be available to other market participants during the same time frame. Furthermore, insiders in healthy banks are in a better position to evaluate both the extent and ultimate consequences of the problems at troubled institutions and determine more accurately how their bank will be affected. Thus, its seems likely that insiders of non-failed banks might view the consequences of another bank failing quite differently than the general market. For example, if the general market has trouble differentiating between banks, a major bank failure might be perceived as a negative announcement impacting all commercial banks. On the other hand, insiders at the non-failed bank may view the failure of a competitor as an opportunity to obtain additional business. Based on this private information, in comparison to less informed investors, we expect that bank insiders will have an incentive to trade their own shares based on their perception of the impact of the impending failure of other another bank. An increase in insider purchases indicates that insiders view the failure as having a net positive impact. Insiders would treat the reduction in price caused by other market participants trading as an opportunity to purchase shares at a bargain. A reduced level of purchases or net selling by insiders would suggest that insiders are less optimistic about the impact of the failure on their bank than are other market participants. In this case, insiders would view the lower than expected decline in price as an opportunity to sell their shares at a high price.

THE DATA AND METHODOLOGY

The four largest bank failures that took place between 1982 and 1989 are identified from the annual reports of the FDIC on failed institutions. We selected these four failures because they were markedly larger than other failures that took place during that time period. First City, the smallest of the four banks examined, was nearly twice as large as the next largest failed commercial bank

(FDIC, 2002). Because of their size, a more pronounced insider reaction is expected within the failed bank as well as in non-failed banks around the time of the failure. The four banks and selected information about the banks are provided in Table 1 (FDIC, 2002). In order to analyze the insider trading in other banks, a listing of national commercial banks is obtained from Standard and Poor's Compustat Data Files. All banks denoted as a national commercial bank, commercial bank, or commercial bank - not chartered are selected. Data regarding the open market trades of insiders in these banks is obtained from the Ownership Reporting System Master File compiled by the US Securities and Exchange Commission (SEC). Insider trading data is collected for the three years prior and the one year subsequent to each failure.

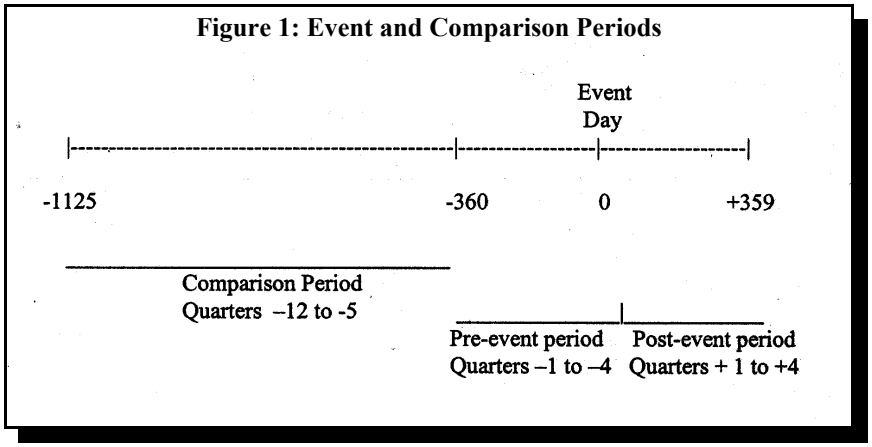
Table 1: Bank Failure Summary Information

Bank	State	Data of Failure	Total Deposits	Total Assets	Failure Type
Continental Illinois	IL	July 26, 1984	28,580,214,000	39,956,956,000	Assistance Transaction
First City Bankcorp	TX	April 20, 1988	9,275,170,000	12,374,490,000	Purchase and Assumption
First RepublicBank	TX	July 29, 1988	19,946,416,000	31,277,123,000	Purchase and Assumption
Mbank	TX	March 29, 1989	11,937,990,000	15,640,651,000	Assistance Transaction

This table shows the four largest bank failures that occurred between 1982 and 1989 along with summary statistics about the failed bank.

More specifically, we examine insider trading in the time period surrounding the failure. In any event study, it is necessary to define and event period. Loh and Rathinasamy (1995) select a six-month event period in their study of insider trading around dual class recapitalizations. Gosnell, Keown, and Pinkerton (1992) find that the level of insider selling increases over the final 5 months leading to the first public bankruptcy announcement of OTC firms. Sanders and Zdanowicz (1992) examine takeovers and find that target firm insiders know of impending takeovers as much as 542 days and on average 79.1 days prior to the first public announcement. In this paper, the "pre-event" period is defined as the four quarters prior to the failure (Quarters -1 to -4). The "post-event" period is defined as the four quarters subsequent to the event period (Quarters +1 to +4). In order to estimate how the failure has impacted the direction and extent of insider trading, an eight-quarter insider trading "comparison period" is identified which includes the two years just prior to the beginning of the pre-event period. These timeframes are selected to be consistent with the previous literature as well as to best utilize a limited amount of data available. While we use these timeframes, tests are conducted in a quarterly fashion, thereby permitting the identification of anomalies that occur at other time intervals. Figure 1 illustrates these definitions:

Figure 1: Event and Comparison Periods



In order to differentiate the behavior of large volume insiders from small volume insiders, two measures of insider behavior are incorporated into the analysis. The "number of transactions" approach for measuring insider behavior is based on the number of trades that insiders made, regardless of size. Of interest here is the proportion of insider trades that were sales. On the other hand, the "shares traded" approach is based on the actual number of shares traded. Of interest is the net number of shares traded by insiders that were sales. This combination of measures is similar to that of Loh and Rathinasamy (1995) and Hirschey and Zaima (1989). Other measures have been suggested by Penman (1985), however, he finds no appreciable difference in the predictive ability of the measures.

THE EMPIRICAL RESULTS

The first step in the analysis is to compare the number of individual insider sales transactions as well as the total number of shares traded in each of the eight quarters surrounding the bank failure date to the number of insider sales transactions in the comparison period. In order to perform the analysis a dummy variable is assigned to each trade indicating whether the transaction represents a purchase or a sale. Trades that involve a sale of shares are assigned a value of 1,while trades that involved a purchase of shares are assigned a value of 0. A t-test is used to determine if the proportion of sales transactions for each of the eight event quarters is significantly different from the proportion of sales transactions during the comparison period. Given the small number of transactions in certain quarters, a similar test is performed for both one-year pre- and post- event periods.

Consistent with the literature which indicates that geographic proximity and differences (or similarities) in bank regulation may play an important role in insider behavior, each of the above mentioned tests are performed on the following two test samples and reported in Table 2. Panel A in Table 2 reports the results of a sample of non-failed banks located outside the state in which the failed bank is located. Panel B reports the findings for the sample of non-failed banks located within the same state as the failed bank.

The series of t-tests discussed above are then estimated for each of the two samples and for each of the four bank failures. Thus a total of 8 sets of statistical tests are made. The first two of the following four analyses compare the proportion of insider sales transactions and the average net size of these transactions between various groups of non-failed banks during various time periods. The final two analyses compare the proportion of insider sales transactions and the average net size of these transactions between the set of failed and non-failed banks during the same time periods.

Proportion of Sales Transactions: Non-failed Bank Comparisons

As mentioned above, the results of the first set of tests based upon the proportion of insider sales transactions or trades are presented in Table 2. In each of the two panels, insider trading at non-failed banks in various geographic categories (e.g., out-of-state and within-state) is being compared at different points in time as measured by the four bank failure event dates. In Panel A of Table 2, the results of the test on the out-of-state sample of non-failed banks are presented. To illustrate, examining the Continental Illinois bank failure, during the comparison period there were a total of 4,408 insider trades reported nationwide and 27.86% of them were insider sales. On the other hand, during quarter +1 of the post-event period there were a total of 749 insider trades of which approximately 20.96% were sales. This reduction in the proportion of sales suggests that on an out-of-state basis, insiders had become more optimistic about the effects of the Continental failure than other market participants, hence the reduction in share sales. A t-test on the difference in these proportions is significant at the one percent level. This procedure is then repeated for each of the remaining seven pre- and post- event quarters as well as for the one-year pre- and post-failure periods. The latter results indicate a reduction in the proportion of sales in both periods relative to the comparison period but a slight recovery during the post-event period.

In general, similar reductions in the proportion of insider sales are found in other event quarters surrounding the Continental Bank failure. Comparable results are presented for First Republic and First City banks. However, during two quarters both before and following the failure of Mbank, bank insiders nationwide increased the proportion of times they sold shares, suggesting that insiders were less optimistic about the effects of the Mbank failure on their own bank than was true for the other three bank failures. Overall, the evidence suggests that insiders in non-failing banks changed their trading behavior around bank failures, although the direction of the change is not identical for each failure.

In Panel B, the in-state non-failed banks test results are presented. Given that the number of insider trades is quite small for certain quarters, the aggregate one-year pre- and post- event comparisons are undoubtedly more reliable. The results for Continental Bank indicate a significant increase in the proportion of net sales during the one-year post-event period. For First Republic Bank the results are similar during both the pre- and post-event period, with a modest decrease in the proportion of net sales. On the other hand, Mbank reported a substantial decline during the post-failure period. First City Bank reported a dramatic drop in the proportion of net sales during the pre-failure period, followed by a significant recovery during the post-failure period. Thus, once again there is evidence of a change in trading behavior around the time of a bank failure.

Table 2: Analysis of Insider Trading in Event Quarters relative to Insider Trading in the Comparison Period Using the Transactions Methodology

	Panel A: Out of State Non-Failed banks				Panel B: In-State Non Failed Banks			
Q	C. I.	F. R.	M. B.	F. C.	C. I.	F. R.	M. B.	F. C.
CP N	4408	5556	7676	4633	78	184	175	173
PS	0.2786	0.2527	0.1998	0.2614	0.1795	0.4325	0.4286	0.5087
-4 N	648	1226	881	915	13	17	14	8
PS	0.2531	0.1631	0.2111	0.1956	0.6923	0.2353	0.5714	0.5000
T	1.39	7.43***	-0.78	4.50***	-3.66***	2.41**	-1.00	0.04
-3 N	659	1365	757	926	11	31	15	19
PS	0.2352	0.1055	0.2483	0.2192	0	0..3226	0.4667	0.2632
T	2.43**	14.49***	-2.96***	2.80***	4.10***	1.97*	-0.28	2.22**
-2 N	754	961	914	1525	8	14	27	32
PS	0.2599	0.2206	0.2495	0.0852	0.1250	0.3571	0.5185	0.2813
T	1.07	2.2**	3.30***	18.28***	0.41	1.08	-0.86	2.55**
-1 N	728	851	962	1006	12	12	15	16
PS	0.1676	0.2009	0.1954	0.2018	0.1667	0.6667	0.2667	0.375
T	7.20***	3.47***	0.33	4.19***	0.11	-1.10	1.31	1.02
-1to-4	2790	4409	0.3560	4443	44	74	71	76
PS	0.2283	0.1649	0.2242	0.1636	0.2727	0.3649	0.4648	0.3158
T	4.82***	10.87***	2.91***	11.48***	-1.15	2.09**	-0.51	2.93***
1 to 4	2936	3525	4302	3521	53	74	61	72
PS	0.2333	0.2267	0.1934	0.2247	0.3208	0.3784	0.2951	0.4306
T	4.39***	1.28	0.85	3.85***	-1.81*	1.88*	1.91*	1.12
1 N	749	762	884	902	18	19	16	9
PS	0.2096	0.2848	0.276	0.1929	0.2222	0.5789	0.375	0.5556
T	4.22***	-1.85*	-4.85***	4.68***	-0.39	-0.60	0.41	-0.26
2 N	640	1055	870	735	7	21	14	22
PS	0.2109	0.2000	0.246	0.2667	0.4286	0.381	0.2143	0.6364
T	3.87***	3.87***	-3.01***	-0.30	-1.20	1.09	1.79*	-1.14
3 N	868	823	1069	999	21	26	20	19
PS	0.2465	0.2272	0.1637	0.2272	0.2857	0.2692	0.45	0.3684
T	1.99**	1.62	2.96***	2.32**	-0.97	2.46**	-0.18	1.17
4 N	679	885	1479	885	7	8	11	22
PS	0.2636	0.2644	0.1346	0.2192	0.5714	0.2500	0	0.2273
T	0.82	-0.73	6.54***	2.75***	-1.90	1.52	11.42***	2.84***

In this table trading in the event quarters is compared to trading in the comparison period using the transactions methodology. N is the number of insider trades. PS is the proportion of trades that were sales; CP indicates the comparison period. T is the test statistic for the two-sample T-test. *** indicates significance at the 1 percent level , ** indicates significance at the 5 percent level and * indicates significance at the 10 percent level. I.D. indicates that there was insufficient data to perform the test.

Number of Share Transacted: Non-Failed Bank Comparisons

In this analysis we test for differences in the average number of shares traded. We do this by creating an index of purchases/sales. The index is created by multiplying the number of shares traded by +1 if the transaction is a purchase and by -1 if the transaction is a sale. Thus a purchase of 100 shares is given an index value of +100 and a sale of shares is given a index value of -100. A positive index value indicates that in the aggregate share purchases exceeded share sales. A negative total indicates the opposite. As before, a t-test is performed to determine if there is a significant difference between the average size of net sales or purchases between the comparison period and the each individual event quarter, as well as over the one-year pre- and post-event periods.

The test results for the average net number of shares traded are presented in Table 3. Generally, the tests show little change in insider trading around the time of the failures for the out-of-state sample of non-failed banks. However, there is evidence to suggest a change in insider trading patterns among in-state non-failed banks. This result is perhaps not surprising, since one would expect that in-state banks would be affected more by a failure than out-of state banks. For example, in the case of Continental Illinois the average number of shares for in-state bank trades was +1,404, indicating that the number of purchases exceeded the number of sales. During the four pre-event quarters (-1 to - 4) the balance starts to shift in the direction of either an increase in insider sales or a large reduction in the size of net purchases. During the four post-event quarters (+1 to + 4) the average net number of shares traded is now negative for quarters 2,3 and 4, indicating a significant shift towards insider selling. A comparison of the one-year pre- and post-failure periods dramatically illustrates these results as of the number of net shares purchased declines from approximately 519 to 91. An even more drastic shift takes place for First Republic and First City as large net purchase positions during the comparison period shift towards sizeable net sale positions during the pre- and post-periods. At the same time, there is a noticeable reduction in net sales during the post-event period relative to the pre-event period.

The reader will notice a marked difference between the results from the proportion of insider sales and the average number shares traded approaches. Recall that the proportion of insider sales treats each trade equally, regardless of the number of shares involved. The average net number of shares traded assigns those transactions that involve a larger number of shares more importance in the analysis. Thus, the differing results are an indication that insiders behave differently based upon the volume of shares that they trade.

Table 3: Analysis of Insider Trading in Event Quarters relative to Insider Trading in the Comparison Period Using the Shares Traded Methodology

	Panel A: Out-of-State Non-Failed Banks				Panel B: In-State Non-Failed Banks			
Q	C. I.	F. R.	M. B.	F. C.	C. I.	F. R.	M. B.	F. C.
CP N	4408	5556	7676	4633	78	184	175	173
SH	-2337	1427.2	60.19	1671.8	1403.8	-749.3	191.57	-648
-4 N	648	1226	881	915	13	17	14	8
SH	265.15	97.40	157.46	219.11	372.5	660.71	-8.5	8
T	-0.31	1.03	-1.38	0.94	2.71***	-2.70***	1.05	-1.59
-3 N	659	1365	757	926	11	31	15	19
SH	541.04	293.63	99.64	56.40	2545	465.74	-156.9	564.84
T	-0.34	0.88	-0.50	1.04	-0.60	-2.77***	1.82	-2.30**
-2 N	754	961	914	1525	8	14	27	32
SH	527.96	95.06	61.6	230.24	-179.3	7.79	-65.81	575.06
T	-0.34	1.03	-0.04	0.93	2.13**	-1.88*	1.26	-2.65***
-1 N	728	851	962	1006	12	12	15	16
SH	927.7	119.08	255.35	191.12	92.5	-4.67	867	-170.3
T	-0.38	1.01	-0.94	0.95	2.05*	-2.03**	-1.41	-1.02
-1to-4	2790	4409	3560	4443	44	74	71	76
SH	574.15	161.74	145.52	180.72	518.84	347.61	123.32	348.99
T	-0.34	0.98	-1.32	0.96	1.13	-2.96***	0.35	-2.40**
1to4	2936	3525	4302	3521	53	74	61	72
SH	3527.2	513.11	662.48	249.17	90.70	223.08	145.93	152.56
T	-0.68	0.69	-2.33**	0.92	1.49	-2.73***	0.26	-1.98**
1 N	749	762	884	902	18	19	16	9
SH	2818.2	70.12	1633.6	130.31	720.28	-41.16	252.81	129.78
T	-0.59	1.05	-1.34	0.99	0.35	-2.04**	-0.24	-1.89*
2 N	640	1055	870	735	7	21	14	22
SH	2205.8	234.35	106.99	83.47	-348.9	-106.1	383.07	-91.18
T	-0.52	0.91	-0.45	1.02	2.38**	-1.73*	-0.89	-1.40
3 N	868	823	1069	999	21	26	20	19
SH	7632.4	1778.4	722.92	48.46	-87.62	640.08	-181.1	-122.13
T	-1.08	-0.19	-1.95*	1.05	2.33**	-3.15***	1.76*	-1.24
4 N	679	885	1479	885	7	8	11	22
SH	306.95	50.15	365.15	734.49	-533.7	359.5	283.18	643
T	-0.31	1.06	-3.75***	0.59	2.66**	-2.52**	-0.54	-2.59**

In this table trading in the event quarters is compared to trading in the comparison period using the shares traded methodology. N is the number of insider trades. SH is the mean number of shares traded; CP indicates the comparison period. T is the test statistic for the two-sample T-test. *** indicates significance at the 1 percent level , ** indicates significance at the 5 percent level and * indicates significance at the 10 percent level. I.D. indicates that there was insufficient data to perform the test.

Proportion of Transactions Approach: Failed Bank vs. Non-Failed Bank Comparisons

The comparisons presented in Table 4 employs the proportion of sales transactions approach in a manner analogous to the tests performed in Table 2 except that we are now comparing failed banks with non-failed banks. We perform significance tests for each of the four failing banks. Due to the limited amount of available data and the close time proximity of the three Texas bank failures, we combine the Texas bank failures into a single sample (labeled ALLTX). The event day for the combined Texas sample is the time period from April 20, 1988 (the date that First City Bank failed) to March 29, 1989 (the date that Mbank failed). The pre-event quarters and comparison period are defined relative to April 20,1988, while the post-event quarters are defined relative to March 29,1989. (Note: because of the sampling procedures employed the total number of observations in the three Texas failures may not equal the total number of observations in the combined test).

The values for N1, N2, PS1, and PS2 are found in Table 2. Table 4 simply tests for a statistically significant difference between PS1 and PS2, using N1 and N2 degrees of freedom. In Panel A, insider trading in the failed bank is compared to insider trading in non-failed banks nationwide. In the comparison period and in both the pre- and post- event periods, Continental Illinois consistently had a higher proportion of insider sales compared to the national proportion (the once exception being quarter - 4). For example, in the comparison period, the proportions were 50.7% and 27.7% for Continental and the sample of nationwide banks, respectively. The proportions of sales for failed and non-failed banks for the one-year pre-event period are 34.9% and 22.9%, respectively. For the post-event period the proportions are 47.8% and 23.5, respectively. In general, insiders at the failed banks were more frequent sellers than insiders at non-failed institutions.

The trading differences have a greater degree of statistical significance during the post- event period, suggesting that the dominance of insider selling increased somewhat after the failure event. In Panel B, trading in the failed bank is compared to trading in non-failed banks in the same state. The results are somewhat similar indicating that insiders at Continental were more likely to be selling share compared to insiders at in-state non-failed banks, although the results are not as statistically consistent. A similar set of results for the combined set of failed Texas banks is observed but here the trading differences are statistically significant.

Table 4: Comparison of Insider Trading in the Failed Bank to Insider Trading in Non-Failed Banks using the Transactions Methodology

	Panel A: Nationwide Non-Failed Banks					Panel B: In State Non-Failed Banks				
Q	C. I.	F. R.	M. B.	F. C.	ALLTX	C. I.	F. R.	M. B.	F. C.	ALLTX
CP N1	69	I.D.	41	3	5	69	I.D.	41	3	5
PS1	0.5072		0.4146	0.6667	0.20	0.5072		0.4146	0.6667	0.20
N2	4486		7851	4806	4809	78		175	173	176
PS2	0.2769		0.2049	0.2703	0.2705	0.1795		0.4286	0.5087	0.5114
T	3.78***		2.69**	1.19	-0.35	1.70**		-0.16	0.47	1.53
-4 N1	17	I.D.	I.D.	I.D.	6	17	I.D.	I.D.	I.D.	6
PS1	0.1176				0.1667	0.1176				0.1667
N2	661				923	13				8
PS2	0.2617				0.1983	0.6923				0.500
T	-1.75*				-0.19	-3.69***				1.32

Table 4: Comparison of Insider Trading in the Failed Bank to Insider Trading in Non-Failed Banks using the Transactions Methodology

	Panel A: Nationwide Non-Failed Banks					Panel B: In State Non-Failed Banks				
Q	C. I.	F. R.	M. B.	F. C.	ALLTX	C. I.	F. R.	M. B.	F. C.	ALLTX
-3 N1	21	13	I.D.	I.D.	23	21	13	I.D.	I.D.	23
PS1	0.4286	0.9231			0.6522	0.4286	0.9231			0.6522
N2	670	1396			945	11	31			19
PS2	0.2313	0.1103			0.2201	0.00	0.3226			0.2632
T	1.76*	10.50***			4.22***	3.87***	5.23***			2.68**
-2 N1	15	1	9	I.D.	14	15	1	9	I.D.	14
PS1	0.5333	0	1		.7143	0.5333	.	1		0.7143
N2	762	975	941		1557	8	14	27		32
PS2	0.2585	0.2226	0.2572		0.893	0.1250	0.3571	0.3171		0.2813
T	2.05*	.	52.11***		4.98***	2.23**	.	4.91***		2.91***
-1 N1	10	I.D.	1	I.D.	7	10	I.D.	1	I.D.	7
PS1	0.30		.		0.2857	0.300		1		0.2857
N2	740		977		1022	12		15		16
PS2	0.1676		0.1965		0.2045	0.1667		0.2667		0.375
T	0.86		.		0.44	0.70		.		-0.40
-1 to -4	63	14	10	I.D.	50	63	14	10	I.D.	50
PS1	0.3492	0.8571	1.00		0.5600	0.3492	0.8571	1.00		0.5600
N2	2834	4483	3631		4519	44	74	71		76
PS2	0.2290	0.1682	0.2289		0.1662	0.2727	0.3649	0.4648		0.3158
T	1.97*	7.09***	110.59***		5.54***	0.84	4.39***	8.98***		2.75***
1 to 4	46	1	10	I.D.	10	46	1	10	I.D.	10
PS1	0.4783	1.00	1.00		1.00	0.4783	1.00	1.00		1.00
N2	2989	3599	4363		4364	53	74	61		62
PS2	0.2349	0.2437	0.1948		0.1948	0.3208	0.3784	0.2951		0.2903
T	3.25***	.	134.27***		134.30***	1.60	.	11.97***		12.21***
1 N1	4	I.D.	6	I.D.	6	4	I.D.	6	I.D.	6
PS1	0.25		1		1.00	0.25		1		1.00
N2	767		900		901	18		16		17
PS2	0.2099		0.2778		0.2775	0.2222		0.3750		0.3529
T	0.16		48.35***		48.41***	0.10		5.00***		5.42***
2 N1	16	1	2	I.D.	2	16	1	2	I.D.	2
PS1	0.3750	.	1		1.00	0.3750	.	1		1.00
N2	647	1076	884		884	7	21	14		14
PS2	0.2133	0.2035	0.2455		0.2455	0.4286	0.381	0.2143		0.2143
T	1.28	.	52.10***		52.10***	-0.23	.	6.90***		6.90***
3 N1	20	I.D.	1	I.D.	1	20	I.D.	1	I.D.	1
PS1	0.5500		1		1.00	0.55		1		1.00
N2	889		1089		1089	21		20		20
PS2	0.2475		0.1690		0.169	0.2857		0.45		0.45
T	2.63**		.		.	1.73*		.		.
4 N1	6	I.D.	1	I.D.	1	6	I.D.	1	I.D.	1
PS1	0.6667		1		1.00	0.6667		1		1.00
N2	686		1490		1490	7		11		11
PS2	0.2668		0.1336		0.1336	0.5714		0		0.00
T	1.89		.		.	0.33		.		.

In this table, insider trading in the failed bank is compared to insider trading in the non-failed banks using the transactions methodology. N1 and N2 are the number of insider trades in the failed bank and non-failed banks respectively. PS1 and PS2 are the proportion of trades in the failed bank and non-failed banks that were sales respectively. T is the test statistic for the two-sample T-test. *** indicates significance at the 1 percent level. ** indicates significance at the 5 percent level and * indicates significance at the 10 percent level. I.D. indicates that there was insufficient data to perform the test.

Average Number of Shares Approach: Failed Bank vs. Non-Failed Bank Comparisons

The final comparison presented in Table 5 is based on the average number of shares traded by insiders in a manner analogous to the tests performed for Table 3. In the case of Continental Bank for both the comparison period and quarter -4 the average number of shares sold per trade was positive indicating that the number of purchases exceeded the number of sales. The reverse was true for the nationwide sample of non-failed banks for the comparison period. During the remaining three pre- event periods the average number of shares sold turns negative for Continental indicating that insider sales were growing. The same was true of Continental during the post- event period although the results were generally not statistically significant. For the entire pre-event period, the average net number of shares (66) is close to zero. Compared to the post-event period where the average net number of shares traded (-605) is decidedly negative. For the Texas banks and general and Mbank in particular, the average number of net sales increases dramatically between the one-year pre- and post-event periods.

Table 5: Comparison of Insider Trading in the Failed Bank to Insider Trading in Non-Failed Banks using the Shares Traded Methodology

	Panel A: Nationwide Non-Failed Banks					Panel B: In State Non-Failed				
Q	C. I.	F. R.	M. B.	F. C.	ALLTX	C. I.	F. R.	M. B.	F. C.	ALLTX
CP N1	69	I.D.	41	3	8	69	I.D.	41	3	8
SH1	452.3		-1283	81.67	70.87	452.3		-1283	81.67	70.88
N2	4486		7851	4806	4806	78		175	173	173
SH2	-2272		63.12	1588.3	1588.3	1403.8		191.57	-648	-648
T	0.32		-3.11***	-0.95	-1.01	-0.87		-3.21***	1.15	1.73*
-4 N1	17	I.D.	I.D.	I.D.	6	17	I.D.	I.D.	I.D.	6
SH1	2700.8				138.33	2700.8				138.33
N2	661				923	13				8
SH2	252.61				217.28	-372.5				8.00
T	1.35				-0.76	1.70				0.79
-3 N1	21	13	I.D.	I.D.	23	21	13	I.D.	I.D.	23
SH1	-1100	-166.8			-2424	-1100	-166.8			-2424
N2	670	1396			945	11	31			19
SH2	573.94	297.45			66.62	2545	465.74			564.84
T	-3.39***	-6.86***			-3.63***	-1.97*	-2.19**			-3.86***
-2 N1	15	1	9	I.D.	14	15	1	9	I.D.	14
SH1	-1053	100	-1569		-74.21	-1053	100	-1569		-74.21
N2	762	975	941		1557	8	14	27		32
SH2	520.54	93.81	5794		237.32	-179.3	7.78	-65.81		575.06
T	-2.86***	.	-3.63***		-4.71***	-1.38	.	-3.22***		-2.50**
-1 N1	10	I.D.	1	I.D.	7	10	I.D.	1	I.D.	7
SH1	-286.7		-861		140	-286.7		-861		140
N2	740		977		1022	12		15		16
SH2	914.16		264.74		185.46	92.5		867		-170.3
T	-1.77*		.		-0.28	-0.76		.		1.01
1-to-4	63	14	10	I.D.	50	63	14	10	I.D.	50
SH1	66.02	-147.8	-1499		-1100	66.02	-147.8	-1499		-1100
N2	2834	4483	3631		4519	44	74	71		76
SH2	573.29	164.81	145.09		183.55	518.84	347.61	123.32		348.99

Table 5: Comparison of Insider Trading in the Failed Bank to Insider Trading in Non-Failed Banks using the Shares Traded Methodology

	Panel A: Nationwide Non-Failed Banks					Panel B: In State Non-Failed				
Q	C. I.	F. R.	M. B.	F. C.	ALLTX	C. I.	F. R.	M. B.	F. C.	ALLTX
T	-0.88	-5.27***	-3.99***		-3.57***	-0.62	-2.95***	-3.82***		-372***
1to4	46	1	10	I.D.	11	46	1	10	I.D.	11
SH1	-604.6	-50	-3040		-2755	-604.6	-50	-3040		-2755
N2	2989	3599	4363		4363	53	74	61		61
SH2	3466.3	507.14	655.26		655.26	90.99	223.08	145.93		145.93
T	2.09**	.	-3.35***		-3.27***	-0.54	.	-2.96**		-2.86**
1 N1	4	I.D.	6	I.D.	7	4	I.D.	6	I.D.	7
SH1	-11.5		-1243		-1051	-11.5		-1243		-1051
N2	767		900		900	18		16		16
SH2	2768.9		1609		1609	720.28		252.81		252.81
T	-1.07		-2.36**		-2.20**	-0.29		-3.61***		-3.15**
2 N1	16	1	2	I.D.	2	16	1	2	I.D.	2
SH1	-704.9	.	-3122		-3122	-704.9	-50	-3122		-3122
N2	647	1076	884		884	7	21	14		14
SH2	2178.2	-12132	111.36		111.36	-348.9	-106.1	383.07		383.07
T	-0.79	.	-3.66		-3.66	-0.11	.	-3.93		-3.93
3 N1	20	I.D.	1	I.D.	1	20	I.D.	1	I.D.	1
SH1	-481.4		-5000		-5000	-481.4		-5000		-5000
N2	889		1089		1089	21		20		20
SH2	7450		706.32		706.32	-87.62		-181.1		-181.1
T	-2.25**		.		.	-1.54		.		.
4 N1	6	I.D.	1	I.D.	1	6	I.D.	1	I.D.	1
SH1	-1144		-11700		.	-1144		-11700		-11700
N2	686		1490		1490	7		11		11
SH2	298.17		364.54		364.54	-553.7		283.18		283.18
T	-1.24		.		.	-0.49		.		.

In this table, insider trading in the failed bank is compared to insider trading in non-failed banks using the shares traded methodology. N1 and N2 are the number of insider trades in the failed bank and non-failed banks respectively. CP indicates the comparison period. SH1 and SH2 are the mean number of shares traded in the failed banks and non-failed banks respectively. T is the test statistic for the two-sample T-test, ***, **, and * indicate significance at the 1, 5 and 10 percent levels respectively. I.D. indicates that there was insufficient data to perform the test.

CONCLUSIONS

In this paper we examine insider trading around the failure of financial institutions. We examine insider trading around four major bank failures that took place in the 1980's. The four failures that are examined are Continental Illinois National Bank and Trust Company, First City Bankcorp., First Republic Bank, and Mbank. We find that bank insiders changed their trading behavior in the time period surrounding these large bank failure announcements relative to a comparison time period. Insider trading patterns suggest that bank insiders are generally more optimistic than other insiders around the time of large bank failures. We find that large volume insiders behave differently than small volume insiders. Small volume traders appear to react more strongly to the bank failure than large volume insiders. We find that insiders in banks which are located in the same state as the failing bank behave differently than insiders in out-of-state banks around the time of a failure. Finally, we find that insiders in failing banks trade differently than

insiders in non-failed banks. Insiders in the failed bank are larger sellers of their banks stock around the time of the failure than insiders in other banks.

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CONSOLIDATION IN THE BANKING INDUSTRY AND THE VIABILITY OF SMALL COMMERCIAL BANKS: X-EFFICIENCY AND BANK SIZE

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ABSTRACT

The relaxation of geographic restrictions on the branching activities of U. S. commercial banks has resulted in numerous predictions about the future composition of the industry. Most predict some degree of consolidation, reducing the total number of commercial banks. As a result, the future of small banks is unclear. In this paper, stochastic cost and profit frontiers are constructed to estimate X-efficiency for small banks and their future competitors. Small bank X-efficiency is estimated relative to a frontier shaped to fit their prospective competitors, efficient, larger banks. The results imply that small banks are more cost efficient but less profit efficient.

INTRODUCTION

The advent of the Riegle-Neal Interstate Banking and Branching Efficiency Act has relaxed historical geographic restrictions on banks, contributing to the trend of consolidation in the U. S. commercial banking industry. The prospect for such extensive change has led researchers to speculate about the future composition of the banking industry. Forecasts predict that a small number of large banks will control most financial assets in the industry, but many small banks will still survive (Berger, Kashyap & Scalise, 1995; Moore, 1995). The asset size composition of the industry has received much attention recently due to the concern that small business lending might decline if banks consolidate (Berger et al., 1998; Peek & Rosengren, 1998; Strahan & Weston, 1998). In fact, these studies have found that small business lending may not decline. They find evidence against the hypothesis that small business lending will decline as banks become larger. If small banks' presence in credit markets is reduced, then there may be an impact on the availability of credit to small borrowers. Petersen and Rajan (1994) find that the availability of credit is increased when a firm has close ties with its lender. If consolidation results in the disappearance of these lenders, then some loans may cease to have positive net present values and not be made.

One area of research that is relevant to the viability of small banks in a consolidating industry is that of efficiency. When new geographic markets are opened to allow more competition, inefficient banks will be forced to improve or be driven out of the industry by relatively more efficient, larger banks. Previously protected small banks could also be acquired by expanding banks, especially if de novo branching is not permitted. Hence, comparisons of X-efficiency in different bank size classes should reveal some information on the ability of small banks to compete with larger banks. Given standard approaches of X-efficiency estimation used with banks, such a

comparison is not that meaningful. As noted by Berger (1993), because of the preponderance of small banks in any nationwide data sample of banks, the estimated frontier tends to fit small banks better, resulting in higher efficiency scores compared to larger banks. For this reason, comparing small banks with larger institutions is problematic. As a result of consolidation, small, medium, and large banks will in some cases share the same market even though they do not share the same technology. Hence, to provide a useful comparison between small banks and their future competitors, X-efficiency needs to be measured relative to efficient banks in larger size classes. Under this framework, more meaningful comparisons can be made between small banks and their potential competitors as the banking industry consolidates.

This paper attempts to make such comparisons. Following the procedure introduced in Mester (1997), frontiers for different size classes are estimated separately. Using the distribution free approach of Berger (1993), cost and profit X-efficiency of small banks are compared to medium and large banks. The results suggest that even after adjusting the frontiers for size classes, small banks still tend to be more cost efficient than large banks, but less profit efficient than some medium-sized banks. This suggests that while many small banks will be able to compete with larger banks in terms of costs, they may not be as profitable as the industry consolidates.

THE CONSOLIDATION OF THE BANKING INDUSTRY

Historically, states have placed geographic restrictions on the branching activities of commercial banks in the U. S. (For a more detailed summary of geographic restrictions on commercial banking, see Kaufman (1995, pp 373-377)). As noted by Kane (1996), these restrictions were implemented and have persisted to protect local markets from outside competition. Branching restrictions varied among states, with the most stringent limiting banks to only one office. The restrictions also applied to banks with national charters. The National Bank Act of 1864 did not address the ability of national banks to branch. They were effectively limited to only one office. National banks could not branch unless they had previously operated as a state chartered bank with branches and then converted to a national charter. The McFadden Act of 1927 permitted national banks to open branches within the same city, as long as branching was allowed in the state. It was not until the Banking Act of 1933 that national banks were given the same rights to branch within a state as state chartered banks.

Multibank holding companies evolved to circumvent geographic restrictions on banking. A bank could operate in different markets through multiple subsidiaries all owned by the same parent holding company. However, in 1956, the Douglas Amendment to the Bank Holding Company Act made it illegal for a holding company to open a bank or purchase an existing bank in a state which did not permit it. States effectively prohibited interstate banking by holding companies until 1978, when Maine started allowing out-of-state holding companies to operate banks in their state. Since then, interstate banking through multibank holding companies has spread as various reciprocity agreements and regional compacts have been enacted.

The removal of geographic restrictions took a major step forward with the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 (IBBEA). IBBEA permits banks to acquire banks in other states, consolidate subsidiaries of the holding company into one bank, and

open de novo branches across state lines (States can elect to "opt out" of the consolidation provision and have to "opt in" to allow de novo branching in their state. Kane (1996) constructs a rent-seeking model to examine the selection of regulatory regime in this application.). IBBEA would effectively permit a single bank to branch nationwide without having to work through a holding company.

The passage of IBBEA has resulted in much speculation on the potential impact of the removal of geographic restrictions on the composition of the U. S. banking system. In a study of banking in the 1980's, Rose and Wolken (1990) find that affiliation with a geographically diversified bank holding company does not provide a long-term comparative advantage over small, independent banks. This result suggests that many small banks will survive the consolidation process. Berger, Kashyap, and Scalise (1995) conduct a simulation to assess the effect of nationwide banking on the distribution of banking assets and the number of banks. Their model predicts that within five years after nationwide banking is implemented, the share of banking held by banks with less than $100 million in assets will be cut in half, and there will be about 4,000 fewer banks. Per-capita, these numbers are comparable to California that has always permitted unlimited branching to its state banks.

Analysis of consolidation has addressed the impact on efficiency. Hughes et al. (1996) examine bank holding companies involved in interstate banking. They find that geographic expansion moves inefficient banks closer to the efficient frontier in both risk and return dimensions. The wave of bank mergers in recent years has resulted in a number of studies that look for changes in efficiency after mergers. In an investigation of megamergers, Berger and Humphrey (1992) found that of the megamergers of the 1980's, 55 to 72 percent of the acquiring banks were more efficient than the acquired banks. However, despite these potential efficiency gains from mergers, the scale diseconomies actually reduce overall efficiency. On average, they find no significant cost efficiency benefits resulting from megamergers. The result changes as profit efficiency is considered. Akhavein, Berger, and Humphrey (1997) find that although there was no significant increase in cost efficiency, profit efficiency did improve on average from megamergers. While costs may not improve, the merged banks were able to shift their output into more profitable areas.

These two studies on megamergers point to the usefulness of estimating both cost and profit efficiency. The benefits to consolidation may not be restricted just to cost savings. Revenues may also be enhanced as merged banks can shift resources into more profitable areas. Akhavein, Berger, and Humphrey (1997) suggest that there may be benefits due to diversification. As a bank grows in size through mergers, its potential customer base also expands. This diversification may result from the larger geographic base for the same products or the new types of products now profitable because of increased size. By estimating profit in addition to cost efficiency the full impact of consolidation can be measured.

The following is an attempt to apply cost and profit efficiency to small versus larger banks and examine the viability of small banks in a consolidating market. In the empirical analysis that follows, small banks refer to those with total assets less than $100 million. These banks are compared to different classes of medium and large banks with minimum size of at least $100 million. If small banks are inefficient relative to larger banks, then consolidation should result in a significant drop in the number of small banks. Conversely, if small banks tend to be more efficient, then many should survive and compete with their larger competitors.

A MODEL OF COST AND PROFIT EFFICIENCY

The distribution free approach is used to estimate cost and profit efficiency. Separate cost and profit frontiers are estimated for a panel of banks assuming that X-efficiency is constant over the sample period. Each bank is assigned an efficiency score ranging over [0,1], with the most efficient firm receiving a score of 1.

The cost frontier is structured to allow the comparison of the actual cost of producing a particular bundle of outputs to the minimum cost necessary to produce that same bundle. Here X-efficiency is the deviation from minimum cost. The cost frontier is given by the following:

$$C = C(y,w, u_C, v_C) \qquad \textit{Formula (1)}$$

where:

C = *costs*
y = *vector of output quantities*
w = *vector of input prices*
u_C = *cost inefficiency*
v_C = *random error*

The cost inefficiency component, u_C, raises costs above minimum costs. Each bank in the sample can be assigned an efficiency score, *CostEFF*, which is equal to the ratio of minimum predicted costs to actual predicted costs.

The profit frontier is constructed according to the alternative or nonstandard approach used by Berger and Mester (1997) and Humphrey and Pulley (1997). While the standard profit frontier treats output prices as exogenous, expressing profits as a function of the prices of inputs and outputs, the alternative specification takes output quantities as exogenous:

$$Pr = Pr(y,w, u_C, v_C) \qquad \textit{Formula (2)}$$

where:

Pr = *profit*
u_{Pr} = *profit inefficiency*
v_{Pr} = *random error*

In this case, u_{Pr} represents how much profits could be augmented by efficient production. Given the estimation of Eq. (2), each bank can be given an efficiency score, *ProfitEFF*, which is equal to the

ratio of actual predicted profits to maximum predicted profits. In practice, Eqs. (1) and (2) have identical explanatory variables with costs and profits as dependent variables, respectively.

This alternative specification for the profit frontier is preferred when banks have some degree of market power. The issue of market power can be important in considering small banks. Many small banks may operate in markets protected from competition previous to consolidation. In addition the quality of output may vary across banks allowing some to charge higher prices. In this situation, a specification that allows endogenous prices for bank output seems appropriate. The price of bank output is also difficult to measure accurately. For these reasons, the alternative profit frontier is used in this paper.

For the purposes of analyzing efficiency and bank size, Eqs. (1) and (2) are estimated using a nationwide sample of banks and various subsets of the entire sample. This approach has also been used in Mester (1997) for the estimation of frontiers in different Federal Reserve districts. The National model consisting of all 12 districts combined into one sample was rejected in favor of the District model that allows the efficient frontier to vary across each district. When the full sample of banks is used, small banks tend to dominate the sample, forcing the frontier to reflect the attributes of efficient, small banks. Herein, the frontiers are estimated separately for subsets of medium and large banks as well. Efficiency scores are then assigned to small banks according to the frontiers of medium and large banks. This provides for a more suitable comparison of efficiency between banks of different sizes. By constructing estimates of efficiency in this manner, small banks can be more accurately compared to their efficient counterparts and future competitors as branching restrictions are removed.

EMPIRICAL ESTIMATION

For the estimation of the frontiers in Eqs. (1) and (2) above, the familiar translog specification was selected using five outputs and four inputs. The only difference in the two frontiers is the dependent variable.

Given the translog specification, estimates of cost and profit efficiency are constructed for bank i according to the following:

$$CostEFF_i = u_C^{min} / u_C^{i} \qquad \textit{Formula (3)}$$

$$ProfitEFF_i = u_{Pr}^{i} / u_{Pr}^{max} \qquad \textit{Formula (4)}$$

where:

u_C^{min} = *minimum cost inefficiency factor*
u_C^{i} = *cost inefficiency for bank i*
u_{Pr}^{max} = *maximum profit inefficiency factor*
u_{Pr}^{i} = *profit inefficiency for bank i*

Measuring relative efficiency using the minimum cost or maximum profit inefficiency factor may distort estimates due to outliers. Following Berger (1993), truncated versions of the *u*'s are constructed to reduce the impact of outliers. For this study, the top 5 percent of banks are considered fully efficient.

The data used in the estimation are taken from the Reports of Income and Condition, also known as "Call Reports." A panel was constructed of annual data from 1991-1996. The six year time series has been found to be appropriate for estimating efficiency with the distribution free approach. DeYoung (1997) finds that a six-year time series is long enough to allow random error to balance out, but still short enough to assume that inefficiency is unchanging over time. A balanced panel of 8,386 banks was constructed of banks with nonmissing observations over the entire time series. The use of a balanced panel is associated with some costs. Although an acquiring bank in a merger would be included in the sample, an acquired bank would be left out due to a lack of nonmissing data after the merger, leading to a survivorship bias. However, it would also be difficult to interpret estimates from these banks if they were included since the random error would have had less time to cancel out of the residual term used in the distribution free approach. Outputs and inputs were selected according to the intermediation approach. Outputs consist of demand deposits, time and savings deposits, real estate loans, and all other loans. Inputs used were labor, physical capital, deposits, and purchased funds. For each of the inputs, prices were computed as the ratio of total expenditure on that input to the quantity of that input.

As discussed above, cost and profit frontiers are estimated with different subsamples of the data set according to size. First, for comparability, a frontier is estimated for the entire sample. As in Mester (1997), this specification is called the National model. Then, frontiers are estimated separately for five subsets comprised of banks with total assets of less than $100 million, $100 million to $300 million, $300 million to $500 million, $500 million to $1 billion, and over $1 billion. Collectively, these frontiers are called the Size model (The National model is a restricted version of the Size model which does not allow the frontier to vary across the five different size classifications.).

Following the distribution free approach, after estimating each frontier an average residual is computed for all banks, including those omitted from the frontier estimation. The average residual is the difference between actual cost (profit) and the efficient level of cost (profit) predicted by the frontier. Once the average residuals are computed, efficiency scores can then be calculated as in Eqs. (3) and (4). The resulting efficiency scores can be used to compare efficiency across different size classes.

Table 1 presents the estimates of mean cost and profit efficiency. The results reported in Tables 1 and 3 were computed with a 5 percent truncation of the residuals. Here, the best 5 percent of the sample are considered fully efficient (Standard errors of the estimates of cost and profit efficiency were computed using bootstrapping techniques as outlined by Simar 1992). In all cases, as shown in tables 1 and 3, mean efficiencies were significantly less than one). The estimates in columns 1 and 3 are computed using the entire data sample for estimation of the frontier (the National model). Mean efficiency across all banks is reported as well as the mean efficiency across each of the five subsamples. At small banks, mean cost efficiency is 74.4 percent while mean profit efficiency is 77.5 percent. For the other four subsamples, mean efficiency ranges from 70.8 to 72.3

percent for costs and from 68.9 to 76.3 percent for profits. As expected, small banks are on average more efficient than medium and large banks. In columns 2 and 4, estimates of mean efficiency are reported for each of the subsamples (the Size model). For these estimates, five separate frontiers were estimated, one for each subsample, and then mean efficiency was computed for each group. Inspection of the estimates yields the same conclusion as before. Small banks have higher mean cost and profit efficiency, 76.3 and 77.6 percent respectively, than their larger counterparts with cost efficiency ranging from 49.5 to 65.9 percent and profit efficiency ranging from 69.4 to 76.4 percent. A series of specification tests were conducted to compare the National model to the Size model. For each year, an F-statistic was computed to test the null hypothesis that the frontier is the same across all size classes. The results given in Table 2 suggest that for both cost and profit frontiers, the null hypothesis can be rejected, implying that the Size model is more appropriate.

Table 1

Mean Efficiency (percent)	Cost		Profit	
	(1)	(2)	(3)	(4)
Data Sample (total assets)	National Model	Size Model	National Model	Size Model
All Banks	73.45[a]	*****	76.64[a]	*****
	(0.303)	*****	(0.0984)	*****
0 - $100 m	74.35[a]	76.33[a]	77.49[a]	77.55[a]
	(0.309)	(0.392)	(0.100)	(0.179)
$100 m - $300 m	72.11[a]	62.62[a]	76.17[a]	75.72a
	(0.323)	(0.686)	(0.085)	(0.445)
$300 m - $500 m	71.67[a]	65.90[a]	76.34[a]	76.40[a]
	(0.515)	(1.31)	(0.125)	(2.23)
$500 m - $1 b	72.26[a]	49.50[a]	74.98[a]	69.40[a]
	(0.645)	(1.96)	(0.143)	(3.28)
over $1 b	70.77[a]	59.65[a]	68.88[a]	72.43[a]
	(0.516)	(0.948)	(0.124)	(2.56)

[a] Significantly different from 100 percent at the 5 percent level, two tailed test.

Table 2: National Model vs. Size Model		
Null Hypothesis: The frontier does not vary across size classes.		
Year	Cost	Profit
1991	63.22	33.44
1992	66.54	31.19
1993	88.19	20.64
1994	74.63	22.63
1995	45.48	25.53
1996	17.94	31.85
Note: critical value for F36,8206 .1.62, at a 99 percent significance level		

In an attempt to compare small banks to their potential competitors, small banks were also evaluated using the efficient frontiers of medium and large banks. The results from this procedure are reported in Table 3 for cost and profit efficiency. Five different frontier models were estimated including the National model and the four size classes with total assets above $100 million. Columns 1 and 3 report mean efficiency at small banks when evaluated at the respective frontiers. For example, when small banks are measured relative to the efficient banks in the $100 to $300 million size class, mean cost efficiency at small banks is 65.2 percent. The mean efficiency of the banks comprising the frontier sample is given in columns 2 and 4.

The results for cost efficiency imply that even when compared to the efficient frontier of larger banks, small banks are more cost efficient on average. Although mean efficiency at small banks declines relative to mean efficiency for the small bank size class (76.3 percent, from Table 1), mean efficiency is significantly higher than mean efficiency of each of the larger size classes. The results differ for profit efficiency. Using the same procedure for comparison, small banks are found to be more profit efficient, on average, than banks with $100 to $300 million and over $1 billion in total assets. This finding is reversed when small banks are compared to banks with total assets between $300 million and $1 billion; small banks are less efficient than these banks on average.

The results comparing small banks to banks with $300 million to $1 billion in total assets suggest that when the efficiency of small banks is estimated relative to the frontier of medium- sized banks, small banks are more cost efficient but less profit efficient. The advantages to operating at a small scale appear to be reflected in costs, not revenues. At the same time, the benefits to large scale production seem to be evidenced in higher revenues rather than reduced costs. At least some of the advantages to these medium sized banks must be through greater diversification of earnings. Since these banks have a broader customer base, they face a more diverse set of revenue sources and can hence shift resources into more profitable areas. Small banks, in contrast, are less likely to be able to take advantage of these opportunities. However, small banks can be more cost efficient,

especially in local markets due to low cost information resulting from ongoing customer relationships. Although this study does not consider specific mergers, these results appear to correspond with the two studies on mergers mentioned above (Berger & Humphrey, 1992; Akhavein, Berger & Humphrey, 1997). These studies found that increasing bank size through mergers provided benefits through enhanced profit efficiency, not cost efficiency.

Table 3

Mean Efficiency (percent)	Cost		Profit	
	(1)	(2)	(3)	(4)
Frontier Sample	Small Banks[b]	Frontier Banks	Small Banks[c]	Frontier Banks
All banks	74.35[a]	73.45[a]	77.49[a]	76.64[a]
	(0.309)	(0.303)	(0.100)	(0.0984)
$100 m - $300 m	65.20[a]	62.62[a]	77.38[a]	75.72[a]
	(0.683)	(0.685)	(0.460)	(0.445)
$ 300 m - $ 500 m	68.78[a]	65.90[a]	74.30[a]	76.40[a]
	(0.958)	(1.31)	(2.26)	(2.23)
$ 500 m - $1 b	52.66[a]	49.50[a]	65.69[a]	69.40[a]
	(1.04)	(1.96)	(3.29)	(3.28)
over $1 b	63.84[a]	59.65[a]	75.60[a]	72.43[a]
	(0.838)	(0.948)	(2.63)	(2.56)

[a] Significantly different from 100 percent at the 5 percent level, two tailed test.
[b] For each frontier sample, mean cost efficiency for small banks is significantly different from mean cost efficiency for the frontier banks.
[c] For each frontier sample, mean profit efficiency for small banks is significantly different from mean profit efficiency for the frontier banks.

As stated above, the results differ when small banks are compared to the largest banks (over $1 billion in assets). On average, small banks are more cost and profit efficient when evaluated relative to the most efficient large banks. Interpreting these results is quite difficult, however, since large banks derive a greater share of income from various fee generating activities. The output from these activities is not measured in the frontier specification used to compute the estimates in Table 3. As shown by Rogers (1998), cost and profit efficiency tends to be understated when these activities are not included as part of bank output. This problem would tend to be more serious for large banks, implying that the differences between the two groups (4.2 and 3.1 percent for cost and

profit efficiency, respectively) are understated, and possibly even negative. The frontiers could be re-estimated allowing for output from fee generating activities. However, such a specification would not be very helpful either. Small banks cannot realistically produce large quantities of this output, and large banks are not likely to expand these activities greatly by moving into markets with small banks. For this reason, comparing small banks to large banks would still be problematic. Neither approach adequately compares small banks to the largest banks. It must be noted that heterogeneity in the cost and profit function may be due to more than just differences in size. Differences in product mix, geographic markets, and organizational form, to name a few, might also account for differences in X-efficiency. Nevertheless, it does appear that size may proxy for some of these factors.

Overall, the results indicate that when compared according to relative X-efficiency, many small banks are viable competitors in the banking industry. Although small banks may not be as profitable, they are more efficient with respect to costs. Banks should be able to continue to compete with larger competitors as geographic restrictions are relaxed. This outcome supports the predictions mentioned above on the number of banks after consolidation. While the number of banks will decline, we will still observe a significant quantity of small banks after consolidation.

CONCLUSIONS

In the above analysis, cost and profit frontiers were constructed to provide estimates of efficiency for banks for five different size classes. Three methods were used to compute these estimates. First, the National model that uses all banks to construct the frontier was estimated, resulting in an efficiency score for each bank. Mean efficiency was then computed for each of the five size classes. Next, using the Size model, a separate frontier was estimated for each size class, allowing for the computation of mean efficiency in each size class from the efficiency score assigned in each individual frontier. In a specification test, the National model was rejected in favor of the Size model. Lastly, using the frontiers estimated in the Size model, efficiency scores were assigned to small banks based on the efficient frontiers of each of the other four size classes. Under this procedure, small banks do not dominate the data sample, allowing for a comparison of small banks to their efficient competitors in larger size classes. The results of the National and Size model both suggest that small banks are more cost and profit efficient, on average, than medium and large banks. When small banks are evaluated using the efficient frontiers of medium and large banks, small banks are still found more cost efficient, but are less profit efficient, on average, than medium sized banks. Overall these results imply that small banks may be more cost efficient, but not necessarily more profit efficient. This supports predictions about the post-consolidation composition of the banking industry that forecast a reduced but still significant presence of small banks. Many small banks that are relatively more efficient should still survive.

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FINANCIAL MARKETS AND RETAIL CONSTRUCTION CYCLES

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ABSTRACT

Capital markets, interest rates and real estate construction may reflect interrelated cyclical activity. Does a cycle exist for retail construction? If so, is it stable (convergent) across MSAs? Do national business cycle movements in capital markets and interest rates have a significant influence on retail construction? If so, are capital market variables important for the retail cycle?

This paper presents evidence of a convergent retail construction cycle across 58 metropolitan statistical areas (MSAs). After removing the effects of local MSA level variables, household formations, retail sales and short-term autocorrelation, the residuals are analyzed for cyclical behavior. The retail construction cycle is then modeled as a function of capital markets. The overall explanatory power of the local MSA level variables and capital markets is then analyzed. While significant, the explanatory power of the capital market variables is found to be slight compared to the local MSA level variables.

INTRODUCTION AND LITERATURE

It is not universally accepted that specific activities such as retail construction have a cycle of their own. It can be argued that time series data with apparent cycles may be nothing more than chance happenings (Markridakis, Wheelwright & Hyndman, 1998). At the macro-economic level it is generally believed that the US economy has a business cycle (Reilly, 1985; Ritter, 1995). A business cycle is a wavelike or oscillating pattern about the secular trend (Mendenhall & Sinich, 1993). Granger and Newbold (1977) argue that when a series is plotted through time it may appear smoother than white noise. The autocorrelation or smoothness can be the effect of sums of cosine waves in the data that form a linear cycle model. Cycles can be two to ten years or longer in length and are not always a function of the overall business cycle (Bowerman & O'Connell, 1987).

Supply modeling for real estate markets has continued to progress over the last 14 years, and there are standard products available from information specialists. Early supply models built upon the foundation laid by Rosen (1984), who presented a model for office stock integration with new construction, vacancy rate, and rent. Wheaton (1987) extended Rosen's work adapting econometric models to national office building time series data. Born (1988), Grenadier (1995), Clapp, Pollakowski, and Lynford (1992) have developed models for the office market and real estate cycles. Real estate cycle estimation is important for investors and real estate professionals. Tsolacos (1999) states that "Quantitative studies of retail property developments are very useful to real estate

professionals because the output of this work can be incorporated into the information set that analysts use to form expectations about cyclical trends of new retail development".

Capital markets, interest rates and the real estate construction cycle may be interrelated. During periods when real estate financing is readily available at low interest rates overbuilding may occur reducing rents, increasing vacancy rates and increasing the risk of defaults on mortgages. The property manager should consider the relationship between lease duration and timing within the real estate cycle. During the bottom of the cycle when rents are at a low point it would be inadvisable to sign long-term leases at the current rent level.

Benjamin, Jud and Winkler (1998a) propose that modeling retail supply is important for academics and professionals. They conclude that retail sales are related the demand for retail space but that demand and supply are inelastic. Benjamin et. al. conclude that interest rates do not have a significant impact on retail supply. Benjamin, Jud and Winkler (1998b) model individual MSA's retail supply adjustment as a function of retail sales and interest rates. Benjamin et. al conclude that supply adjustments are inelastic in the short run in relationship to retail sales and elastic in the long run. Scott and Judge (2000) argue that property investment values are influenced by the development cycle.

There is evidence that bank lending patterns change over time and may follow cycles. The Federal Reserve Bank 1997, Nugent (2001), and the Kulish (2001) report that banks change lending standards over time. The changing lending standards make it easier or more difficult for developers to obtain loans. Asea and Blomberg (1998) concluded that banks lending standards systematically vary over a cycle. They also use national unemployment rates as a proxy for national lending standards. Within a regional analysis of lending, unemployment becomes a local market measure. The empirical question remains as to the robustness of this role of unemployment to lending at the local level.

Henneberry's 1999 study showed that there are cycles in office building construction in England. Additionally, Henneberry argues that the cycles are convergent due to mature capital markets and at the same time divergent based on regional factors. Tsolacos (1999) used a single series from 1985 to 1996 and modeled retail construction starts as a function of consumer spending, rents, and yield levels using a VAR model. Tsolacos (1999) concluded that there are retail construction cycles in England, but that the cycles are not convergent in relationship to national investment markets. Scott and Judge (2000) analyzed a series from 1956 to 1996 and concluded that there is a retail property value cycle in Great Britain with a cycle length of 7.8 years Hudson-Wilson and Pappadopoulos (1999) concluded that there are real estate cycles and they are linked to capital markets. Hudson-Wilson and Pappadopoulos also concluded that real estate cycles are divergent across markets and that traditional modeling techniques fail to recognize these cycles. Hudson-Wilson and Pappadopoulos contend that real estate cycles are a key factor missing in the estimation of default risk for commercial mortgage-backed securities (CMBS). Lawson (1998) proposes that there are retail real estate cycles and that different cities and different types of retail have different cycles.

The purpose of this study is to: 1. Show there is evidence of convergent cycles in retail construction, and 2. Model the retail construction cycle as a function of capital markets. Panel data will be used to model 58 MSA's time series for a period of 27 years each. A series length of 27 years

would normally be far too short to estimate autoregressive functions and evaluate potential cycles. A cross-sectional/time-series regression model (panel data) using all 1566 observations preserves the integrity of the time series structure. This will allow for time series analysis and cycle estimation in a relatively short time series.

DATA

The dependent variable in this study is retail supply (RS). RS is gross retail construction, in square feet, for 58 metropolitan statistical areas (MSAs) for the periods 1970 to 1996. The data is comprised of 58 time series of 27 periods each, for a total number of 1,566 observations. The retail supply data was obtained from FW Dodge.

There are two kinds of independent variables used to model retail construction, local MSA level and capital market variables. The local variables vary by both MSA and by year. The capital market variables vary by year, but are the same for all MSAs in a given year. The capital market variables are non-farm, non-residential loan balances outstanding for the United States and Other Areas (CB) as reported for commercial banks by the FDIC.

CB has been adjusted to 1996 dollars (ACB). The second capital market variable is the prime interest rate (Prime) as reported by the Federal Reserve Board. Both ACB and Prime are measured as first differences

The first local independent variable is households (HH) by year, by MSA. Households are the number of families in a MSA. Households are used in this model instead of population. Retail expenditures such as televisions, furniture, drapes, etc. maybe more closely related to the household units, instead of the individuals within the households. Household data was obtained from Woods and Poole.

The second local independent variable is retail sales (Sales) by MSA, by year, adjusted to 1996 dollars. Retail sales were obtained from the US Department of Commerce, Bureau of Economic Analysis. Descriptive statistics for all variables are shown in Table 1.

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Table 1: Descriptive Statistics

Variable	Mean	S.D.	Min	Max
RS	1,864.82	1,506.23	98.90	11,105.50
ACB	186.93	78.98	93.97	315.99
PRIME	9.42	3.16	5.25	18.87
HH	724.23	626.74	99.13	3,331.78
SALES	29,803.93	28,348.95	6,377.87	212,629.70

METHODOLOGY

A cross-sectional/time-series regression (panel data), shown in equation 1, is utilized in this research (Hsiao, 1986). Ambrose and Nourse (1993) used this methodology to analyze capitalization rates.

$$y_{it} = \sum Bx_{it} + E_i + M_t + N_{it} \quad (1)$$

for,

$i = 1$ to 58
$t = 1$ to 27

x is the vector of independent variables
B is the vector of regression coefficients
E_i is the individual effect
M_t is the time effect
N_{it} is the random error term

One advantage of the cross-section/time-series regression model for panel data is that the regression parameters are estimated with all 1566 observations, whereas a yearly index of the 58 MSAs would have only 27 observations. Indexing would also eliminate the ability to test for differences in response by MSA. Pooling all 1566 observations without regard to time period would remove the possibility of incorporating lagged relationships in the model.

The fixed effects model also provides tests for response differences relative to time (M_t) or individual MSA (E_i). These tests involve partitioning the residuals of the linear regression equation by year and by MSA and performing an ANOVA on the partitioned residuals to test for main effects relative to time period or MSA (Hsiao, 1986). A finding that time period is significant in the residuals would indicate that the mean response across MSAs differs by year. On average for all 58 MSAs, the model would systematically over-predict in some years and under-predict in others. A pattern in the residuals based on time period may be evidence of a cycle.

A finding that individual or MSA effects are significant would indicate that some MSAs have higher or lower retail construction starts (after regressing out the effects of the independent variables) relative to other MSAs regardless of the time period. This could be an indication that the model is divergent across MSAs.

Each MSA's retail supply exhibits a positive trend over time. The time series methodology used in this paper, (see methodology), requires that all variables be transformed to stationary series. A stationary series is defined as a time series with a constant mean and variance (Vandaele, 1983; Fuller, 1976). Using a stationary series avoids problems with spurious correlations. To obtain a stationary series, first differences of retail supply (DRS) were obtained. Since the data set has 58 time series the individual and average observations were analyzed for stationarity.

The mean and variance of the series now appear constant, satisfying the conditions of a stationary series. The auto-correlation in the series will be discussed in the results sections to follow. The first differences of RS represent the new retail space added each year.

The household series exhibit varying degrees of positive trend over time. First differences (DHH) were obtained to transform HH to a stationary series. The DHH represents the net change in households each year within an MSA. Retail sales also show trends within each MSA. First differences of sales, (Dsales) are used to transform sales to a stationary series

RESULTS

Total retail construction, shows upward trends with no distinct cyclical pattern. DRS, shows autocorrelation but no distinct repeating cycle. To determine if DRS is cyclical the effects household formations (DHH), retail sales (Dsales) and short-term autocorrelation will be regressed out of DRS. Then the residuals of the DRS model will be analyzed to determine if there is a cycle present (Bails & Peppers, 1993; Markridakis et.al, 1998).

The first step in developing the regression model is to observe the autocorrelation and partial auto-correlation function to determine the autoregressive structure for DRS.

The autocorrelation function and partial autocorrelation function show that lags of DRS up to 6 periods may need to be included in the model. The Ljung-Box Q-statistic, significant at the 1% level, confirms the DRS series is not white noise.

After the autoregressive structure of the dependent variable is determined, the independent variables, DHH and Dsales, are added to the model. During this process the objective is to achieve white noise in the residuals. The regression model shown in equation 2 is the result.

$$DRSt = 216.24 + .082DSale_{t-1} + 12.09DHH_t + 13.16DHH_{t-1} + .57DRS_{t-1} + .07DRS_{t-2} + .16DRS_{t-6} \quad (2)$$
$$(4.3)^{*} \quad (5.7)^{*} \quad (2.6)^{**} \quad (12.4)^{*} \quad (1.7)^{***} \quad (6.3)^{*}$$

$R^2 = .677$

where,

t statistics are shown in parenthesis

* significant at the 1% level.

** significant at the 5% level

*** significant at the 10% level

The Ljung-Box Q test, significant at the 10% level, indicates that the residuals may not be white noise. The autocorrelation function and partial autocorrelation function for equation 2 indicate that the residuals for equation 2 are white noise.

Equation 2 confirms Benjamin, Judd and Winkler (1998) findings that there is a relationship between retail sales changes and retail construction. Benjamin, Judd and Winkler findings suggested that this relationship lagged on average 8.1 years, varying from 2 to 20 years by MSA. Our results using the cross-sectional/time-series regression model with first differenced variables show intermediate lags of retail sales are not significant. Longer lags, six to 9 years, are statistically

significant, but have a negative coefficient and almost no observable impact on the R^2. The model also indicates that household formations play a significant role for predicting retail construction starts.

Dokko, Edlestein, Lacayo and Lee (1999) found that when developing a model for income and value cycles that each MSA had its own cycle and required its own estimation (the cycle was divergent across MSAs). The significance of the regression coefficients in equation 2 using all 58 MSAs simultaneously indicates that the relationships are to some degree stable across MSAs for retail construction. If the relationship between DRS and the independents changed by MSA the coefficients would not be statistically significant in the cross-sectional/time-series regression.

To determine if there is a long-term cycle in retail construction, the residuals from equation 2 were averaged by year. The yearly average is based on a yearly sample size of 58, one data point for each MSA in the study.

This analysis also indicates that a cycle does exist for the residuals and is stable (convergent) across MSAs. If each MSA were on an independent cycle (divergent) the residuals by year would have been random and cancelled each other out resulting in a mean residual of zero for each year. This finding is confirmed by the ANOVA model for the residuals of the cross-sectional/time-series regression (equation 2) shown in Table 2.

Table 2: Analysis of variance for the residuals from equation 2.

Source	SOS	DOF	Mean Square	F	Sign. Level
INDIV	48658409.29	57	853656.30350	1.246	0.107
TIME	71027746.38	20	3551387.31938	5.184	0.000
JOINT	119686155.68	77	1554365.65828	2.269	0.000
ERROR	780955504.23	1140	685048.68793		
TOTAL	900641659.92	1217			

The ANOVA indicates the residuals are not significantly different by MSA but are significantly different by year. The convergent cycle confirms the findings of Henneberry (1999) and Hudson-Wilson and Pappadopoulis (1999). The cycle length is approximately 8-10 years the same as found by Scott and Judge (2000). Low points of the construction cycle are in the early 1980's and 1990's. High points of the cycle are in the late 1970's, mid 1980's and mid 1990's.

Prior studies such as Tsolacos (1999), Benjamin, Jud and Winkler (1998), Henneberry (1999), and Hudson-Wilson and Pappadopoulis (1999) have suggested that retail construction cycles may be influenced by capital market variables. The second objective of this research is to determine if the retail construction cycle, observed in the residuals of equation 2, is influenced by capital market variables. To model the retail construction cycle the average residual from equation 2 serves

as the dependent variable. The independent variables are U.S. commercial banks non-farm, non-residential loan balances adjusted to 1996 dollars (DACB) and the prime rate (DPrime), both in first difference form. Both variables are the same by year for each MSAs. The resulting regression is shown in equation 3.

$$AvgRes_t = -23.27 + 9.44DACB_t - 7.57DACB_{t-2} - 37.05DPrime_{t-2} \quad (3)$$
$$(2.32)^* \qquad (2.14)^* \qquad (1.79)^{**}$$

* significant at the 5% level
** significant at the 10% level

$R^2 = .498$

Where,
DACB = First differences of commercial bank portfolios
DPrime = First difference of the prime interest rate

The R^2 for equation 3 indicates that 50% of the retail construction cycle can be explained by two capital market variables. The convergent retail construction cycle is inversely related to changes interest rates on a lagged basis. The model also indicates that when banks increase their outstanding loan balances there is an increase in retail construction followed by smaller lagged reduction in retail construction two years later. The conclusion can be drawn that to the degree there are national lending and interest rate cycles they are influencing the retail construction cycle.

Having established that there is a convergent retail construction cycles influenced by capital markets, the next step is determine the relative importance of the retail construction cycle driven by capital market variables versus the local MSA level variables in equation 2. This is accomplished by adding the U.S. commercial bank portfolio and prime rate variables to the cross-sectional/time-series regression. The results are shown in equation 4 and reported fully in Table 3.

$$DRS_t = 146.87 + .03DSale_{t-1} + 11.55DHH_t + 14.62DHH_{t-1} + .54DRS_{t-1} + .09DRS_{t-2} + .14DRS_{t-6}$$
$$(2.0)^{**} \quad (2.5)^{**} \quad (3.1)^* \quad (12.0)^* \quad (2.4)^{**} \quad (5.7)^*$$

$$12.03DACB_t - 7.89DACB_{t-2} - 56.85DPrime_{t-2} \quad (4)$$
$$(4.9)^* \qquad (4.0)^* \qquad (4.3)^*$$

$R^2 = .694$

where,
t statistics are shown in parenthesis
* significant at the 1% level.
** significant at the 5% level

Table 3: Regression Results				
Variable	Coeff	Std Error	T-Stat	Signif
Constant	146.867	53.068	2.767	0.005
DASALES{1}	0.032	0.016	2.021	0.043
DHHOLDS	11.549	4.585	2.519	0.012
DHHOLDS{1}	14.623	4.696	3.114	0.002
SUPPLY{1}	0.544	0.046	11.961	0.000
SUPPLY{2}	0.091	0.038	2.376	0.017
SUPPLY{6}	0.138	0.024	5.688	0.000
DACB	12.033	2.459	4.893	0.000
DACB{2}	-7.889	1.980	-3.982	0.000
DPRIME{2}	-56.847	13.175	-4.315	0.000
R^2 = 0.694				

The results show that the relationship with the national financial variables remains the same when the model is simultaneously estimated across all 58 MSAs. The results also indicate that the impact of the capital market variables is incremental. All the local MSA level variables from equation 2 remain statistically significant with only small changes in the coefficients.

The Ljung-Box Q test, autocorrelations and partial autocorrelations for the residuals of equation 4 now indicate that the residuals are white noise. In other words, the cycle in the residuals has been removed by adding the capital market variables to the model.

The additional predictive power of the retail construction cycle can be determined by comparing the R^2 of equation 2 and 4. This provides a measure of the importance of the capital market variables and thus the retail construction cycle. By adding the capital market variables driving the retail construction cycle to the model the R^2 only increases from .677 to .694. This would indicate that although there is retail construction cycle influenced by national bank lending and interest the additional explanatory power of the capital markets is minimal compared to local variables such as local retail sales, house hold formations, and short term construction trends. The cross-sectional/time-series model was also estimated with only the capital market variables. The variables were all significant in the resulting equation. The R^2 for the equation was only .059 confirming the minimal impact of the capital markets on MSA level retail construction starts.

Another check for robustness can be found by examining the impact of recessionary periods upon the estimation. Asea and Bloomberg (1998) use monthly data and find that changes in lending standards have a more profound effect on the economy during an expansion than a contraction. For annual data at the MSA level the use of recessionary dummy variables while significant do not change the nature of the results and add little to improve the explanatory power of the model.

To further verify that the results are robust each of the capital market variables was regressed against the local variables including all possible time lags of the local variables implied by equation 4. Each of the local variables was then regressed against the capital market variables and all possible time lags of the capital market variables implied by equation 4. Using the resulting R^2 from the equations a variance inflation factor was then calculated for each independent variable. The results are shown in Table 4.

Table 4

Variable	R^2	VIF
DACB	.17	1.21
DPRIME	.03	1.03
DHHOLDS	.01	1.01
DASALES	.24	1.31

The VIF's are all close to one indicating that the model does not have a significant amount of multi-colinearity between the local and capital market variables.

CONCLUSION

This paper has presented evidence that there is a convergent cycle in retail construction. The retail construction cycle may be obscured by the effects of differing levels of growth in factors such as retail sales and household formations within each MSA. After the effects of varying growth rates and short term autocorrelation in the individual MSA have been regressed out a distinct convergent cycle appears. The cycle length estimated by this research is 8 years confirming the cycle length observed by Scott and Judge (2000).

If the cyclical fluctuations observed are random it is unlikely that the cycle would have remained consistent across 58 time series. If the cycle observed were simply random behavior in the time series it is more likely that with a sample size of 58 the cycle should average out to a mean residual of zero by year. It has been shown that the residuals are significantly different from zero by year.

Having determined that there is an underlying convergent cycle in retail construction the cycle timing can be analyzed. The bottom of the cycle is in the early 1980's and 1990's. This coincides with the last two recessions in the US economy. The retail construction cycle can be explained by capital markets, bank lending and interest rates. The impact of the capital markets is incremental but has little additional explanatory power for predicting retail construction at the MSA level.

When predicting MSA level retail construction the local market conditions are key to understanding retail construction. MSA level retail sales changes, MSA level household formations, and MSA level short-term trends in retail construction provide 98% of the explanatory power in this analysis.

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DATA APPENDIX

RS - Retail Supply - Gross Retail Construction.
DRS - First differences of retail supply.
$DRS_t = RS_t - RS_{t-1}$

CB - Commercial Balances - non-residential loan balances outstanding for the United States and Other Areas as reported for commercial banks by the FDIC.
ACB - Commercial Balances adjusted to 1996 dollars.
$DACB_t = ACB_t - DACB_{t-1}$

PRIME - the prime interest rate as reported by the Federal Reserve Board.
$DPrime_t = Prime_t - Prime_{t-1}$

HH - Households are the number of families in a MSA.
DHH - Net change in households each year within an MSA.
$DHH_t = HH_t - HH_{t-1}$

Sales - Retail sales by MSA, by year, adjusted to 1996 dollars.
Dsales - First differences of sales.
$Dsales_t = Sales_t - Sales_{t-1}$

DEVELOPING A COMPREHENSIVE PERFORMANCE MEASUREMENT SYSTEM IN THE BANKING INDUSTRY: AN ANALYTIC HIERARCHY APPROACH

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ABSTRACT

Developing a meaningful performance measurement system in a service organization such as a commercial bank is a challenging task for management because we must focus on results rather than activities because their outputs are hard to define. In addition, it is better to use multiple guidelines, including nonfinancial as well as financial criteria, to measure performance in the new dynamic business environment after recent deregulation.

The objective of this study is to provide a practical model for a comprehensive performance measurement system that incorporates strategic success factors in the banking industry. The model proposed in this study will have a broader set of measures that incorporate traditional financial performance, such as return on assets, as well as nonfinancial performance, such as the quality of customer service. Using Saaty's Analytic Hierarchy Process (AHP), the model will demonstrate how multiple performance criteria can be systematically incorporated into a comprehensive performance measurement system in a banking company.

INTRODUCTION

The objective of this study is to design a practical model for a comprehensive performance measurement system that incorporates strategic success factors in the banking industry. A performance measurement system proposed in this study can be used to evaluate top managers of a main bank or managers of a branch office.

Performance measurement should be closely tied to goal setting of an organization because it feeds back information to the system on how well strategies are being implemented (Chan & Lynn, 1991; Cheng & Li, 2001). A balanced scorecard approach (Kaplan & Norton, 1992) is a hot topic currently in this area, but it does not provide systematic aggregation of each level as well as different levels of managers' performance for the overall company. In other words, there is no systematic linkage between financial and non-financial measures across different levels of management hierarchy. A traditional performance measurement system, which focuses on financial measures such as Return on Assets (ROA), however, may not serve this purpose well for middle or lower level managers in the new competitive business environment either.

The model proposed in this study will have a broader set of measures that incorporate traditional financial performance measures such as return on assets and debt to equity ratio as well as nonfinancial performance measures such as the quality of customer service and productivity.

Using Saaty's Analytic Hierarchy Process (AHP) (see Saaty, 1980; Harker & Vargas, 1987), the model will demonstrate how multiple performance criteria can be systematically incorporated into a comprehensive performance measurement system. The AHP enables decision makers to structure a problem in the form of a hierarchy of its elements according to an organization's structure or ranks of management levels and to capture managerial decision preferences through a series of comparisons of relevant factors or criteria. The AHP has been applied recently to several business problems (e.g., divisional performance evaluation (Chan & Lynn, 1991), capital budgeting (Liberatore et al., 1992), and real estate investment (Kamath & Khaksari, 1991), marketing applications (Dyer & Forman, 1991), information system project selection (Schniederjans & Wilson, 1991), and activity-based costing cost driver selection (Schniederjans & Garvin, 1997)). The AHP is relatively easy to use and its commercial software is available. This study will be the first analytical and comprehensive performance evaluation model to cover a broader base of measures in the rapidly changing environment of today's banking industry. The following section presents background. The third section discusses methodology. The fourth section presents a numerical example. The last section summarizes and concludes this paper.

BACKGROUND

Recent Research Topic Guide from Institute of Management Accountants lists "performance measurement" as one of top priority research issues. Therefore, this project will be interesting to bank administrators as well as managerial accountants.

With unprecedented competitive pressure from non-banking institutions, deregulation and the rapid acquisition of smaller banks by large national or regional banks, the most successful banks in the new millennium will be the ones that adapt strategically to a changing environment (Calvert, 1990). Current management accounting literature has emphasized using both financial and non-financial measures as performance guidelines in the new environment (e.g., Chan & Lynn, 1991; Rotch, 1990). However, most studies don't propose specifically how we should incorporate these financial and non-financial factors into a formal model.

The performance measurement system proposed in this study is the first formal model applied using the AHP in the banking industry to cover a wide variety of measures while providing operational control as well as strategic control. The AHP can incorporate multiple subjective goals into a formal model (Dyer & Forman, 1991). Unless we design a systematic performance measurement system that includes financial as well as non-financial control factors, there may be wrong behavior by employees because they misunderstand the organization's goals and how they relate to their individual performance.

Compared with previous evaluation methods, the model proposed in this study will have advantages such as flexibility, continuous feedback, teamwork in goal setting, and computational simplicity. To be used for any business performance measurement, a well?designed model must be flexible enough to incorporate a variety of measures while retaining major success factors. The AHP model is flexible enough for managers to adjust its structure to a changing business environment through an iterative process of weighing goals. This flexibility will allow a company to improve its performance measurement system continuously. Through the iterative process of goal comparisons,

management could get continuous feedback for the priority of goals and work as a team. The possible real time control is of importance in the competitive business environment we are facing today.

METHODOLOGY

The Analytic Hierarchy Process (AHP) collects input judgments in the form of a matrix by pair wise comparisons; i.e., two criteria are compared at one time. The experience of many users of this method supports use of a 1 to 9 scale for pair wise comparisons to capture human judgment while the scale can be altered to fit each application (Saaty, 1980).

A simple example will be provided to explain how AHP operates. Consider the situation where a senior executive has to decide on which of three managers to promote to a senior position in the firm. The candidate's profiles have been studied and rated on three criteria: leadership, human relations skills and financial management ability. First the decision maker compares each of the criteria in pairs to develop a ranking of the criteria. In this case, the comparisons would be:

- Is leadership more important than human relations skills for this job?
- Is leadership more important than financial management ability for this job?
- Are human relation skills more important than financial management ability for this job?

The response to these questions would provide an ordinal ranking of the three criteria. By adding a ratio scale of 1 to 9 for rating the relative importance of one criterion over another, a decision maker could make statements such as "leadership is four times as important as human relations skills for this job," "financial management ability is three times as important as leadership," and "financial management ability is seven times as important as human relations skills." These statements of pair wise comparisons can be summarized in a square matrix. The preference vectors are then computed to determine the relative rankings of the three criteria in selecting the best candidate. For example, the preference vectors of the three criteria are 0.658 for financial management ability, 0.263 for leadership, and 0.079 for human relations skills.

Once the preference vector of the criteria is determined, each of the candidates can be compared on the basis of the criteria in the following manner:

- Is Candidate A superior to Candidate B in leadership skills?
- Is Candidate A superior to Candidate C in leadership skills?
- Is Candidate B superior to Candidate C in leadership skills?

Again, rather than using an ordinal ranking, the degree of superiority of one candidate over another can be assessed. The same procedures can be applied to human relations skills and financial

management ability. The responses to these questions can be summarized in matrices where the preference vectors are again computed to determine the relative ranking of the three candidates for each criterion. Accordingly, the best candidate should be the one who ranks "high" on the "more important" criteria. The matrix multiplication of preference vectors of candidates on evaluation criteria and the preference vector of evaluation criteria will provide the final ranking of the candidates. In this example, the candidates are ranked A, B and C. This example provides the usefulness of the AHP for setting priorities for both qualitative and quantitative measures (Chan & Lynn, 1991).

We could apply the same procedures to a bank. Based on the hierarchical structure of a banking institution, the relative weights of criteria at each level of managers are derived by AHP. Here the relative importance of performance measures can be defined as a performance index with respect to each alternative (i.e., criterion, service, or branch office). For example, derive the relative weights of financial and nonfinancial criteria at the highest management level through the pair wise comparisons of criteria. Next, the relative weights of middle level performance criteria with relation to each top-level criterion are to be computed then enter these relative weights into a n x n matrix format. Finally, this matrix is multiplied by the relative weights of criteria of the top management level. The same procedures can be applied to the next lower level management. This AHP approach could link systematically the hierarchical structure of business performance measurement between different levels of organizational structures.

Consider a local bank where market share and return on assets are two important criteria in performance evaluation. If the AHP generates their weights as 0.4 and 0.6, respectively, it is reasonable to conclude that return on assets affects the bank's performance one and a half times higher than market share. The weights can be used as a measure for allocating future resources in products or branch offices. Assume the bank has two types of services, commercial loan and mortgage loan. If the AHP generates relative weights as 0.8 and 0.2 (i.e., the performance of commercial loans is four times higher than mortgage loans), then this may provide a good reason for top management to invest resources in the commercial loan market four times higher than the residential loan market.

The use of the AHP for multiple criteria situation is superior to ad hoc weighing because it has the advantage of forcing the decision maker to focus exclusively on the criteria at one time and the way in which they are related to each other (Saaty, 1980).

A model could be built using a microcomputer program called Expert Choice so that the model can be applied to any bank easily.

A NUMERICAL EXAMPLE

This section presents a numerical example for a commercial bank. The Commercial Omaha Bank (COB) is a local bank that specializes in commercial loans. Their headquarters is located in Omaha, Nebraska and they have several branch offices throughout rural areas of Nebraska. The top management of COB realized that the current measurement system is not adequate for their strategic performance management and identified the following measures based on the hierarchy of the

organization for their new performance measurement using AHP. These measures are shown in Table 1.

Table 1: New Performance Measures

Level of Organization		
High	Middle	Low
Financial Measures	Return on Assets	Income to Interest Expenses
	Debt to Equity	Service Charges
		Interest Revenue
Nonfinancial Measures	Market Share	Growth of Deposits
	Productivity	Default Ratio
	Quality	Customer Satisfaction

The OCB uses financial criteria such as return on assets and debt to equity and non-financial criteria such as market share, productivity, and quality of service. At the lowest management level, income to interest expense, service charges, interest revenue, growth of deposits, default ratio, and customer satisfaction. Each computing step of the AHP is discussed as follows.

First, non-financial and financial criteria are computed and the result is entered in a vector:

$$W_t = (0.5, 0.5)$$

Next, the mid-level management is considered. The relative weight of mid-level performance criteria with relation to each top-level criterion is to be computed. Here, the local relative weights are computed.

For the non-financial criteria,

$$A^{1}_{m} = \begin{bmatrix} 1 & 3 & 4 \\ 1/3 & 1 & 3 \\ 1/4 & 1/3 & 1 \end{bmatrix}$$

Here the market share is estimated to be three times more important than productivity and four times more important than the quality of service. Productivity is estimated to be three times more important than the quality of service. From this result,

$$W^{1}_{m} = (0.608,\ 0.272,\ 0.120)$$

For each weight computation, an inconsistency ratio (gamma) was computed and checked for the acceptance level. If gamma ≤ 0.1, it is acceptable. For this example, it is acceptable since gamma = 0.065. If it is not acceptable, the input matrix should be adjusted or recomputed.

For the financial criteria, ROA is estimated to be three times more important than debt to equity ratio. Therefore,

$$W_m^2 = (0.75, 0.25).$$

The global relative weights of the criteria are:

$$W_m = (0.5, 0.5) \text{ x } \begin{bmatrix} 0.608 & 0.272 & 0.120 & 0 & 0 \\ 0 & 0 & 0 & 0.75 & 0.25 \end{bmatrix} = (0.304, 0.136, 0.060, 0.375, 0.125).$$

Here the global relative weights of market share, productivity, quality of service, ROA, and debt to equity ratio are 30.4%, 13.6%, 6%, 37.5%, and 12.5%.

Let's move to the lower level managers. Income to interest expense, service charges, interest revenue, growth of deposits, default ratio, and customer satisfaction are criteria at this level. For market share,

$$A_0^1 = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1/2 & 1 & 2 & 3 & 4 & 5 \\ 1/3 & 1/2 & 1 & 3 & 4 & 5 \\ 1/4 & 1/3 & 1/3 & 1 & 3 & 4 \\ 1/5 & 1/4 & 1/4 & 1/3 & 1 & 3 \\ 1/6 & 1/5 & 1/5 & 1/4 & 1/3 & 1 \end{bmatrix}$$

For simplicity of presentation, the local weights are arranged in the order of income to interest expense, service charges, interest revenue, growth of deposits, default ratio, and customer satisfaction:

$$W_0^1 = (0.367, 0.238, 0.183, 0.109, 0.065, 0.038).$$

Here the local weights with relation to market share are 36.7%, 23.8%, 18.3%, 10.9%, 6.5%, and 3.8% respectively.

For other criteria at one level higher, the local weights can be calculated in the same way. These are:

$$W_0^2 = (0.206, 0.163, 0.179, 0.162, 0.143, 0.146);$$
$$W_0^3 = (0.155, 0.231, 0.220, 0.103, 0.169, 0.122);$$
$$W_0^4 = (0.307, 0.197, 0.167, 0.117, 0.117, 0.094);$$
$$W_0^5 = (0.266, 0.133, 0.164, 0.159, 0.154, 0.124).$$

For the next step, the global relative weights of lower level management criteria as:

$$W_0 = (0.304, 0.136, 0.060, 0.375, 0.125) \times \begin{bmatrix} 0.367 & 0.238 & 0.183 & 0.109 & 0.065 & 0.038 \\ 0.206 & 0.163 & 0.179 & 0.162 & 0.143 & 0.146 \\ 0.155 & 0.231 & 0.220 & 0.103 & 0.169 & 0.122 \\ 0.307 & 0.197 & 0.167 & 0.117 & 0.117 & 0.094 \\ 0.266 & 0.133 & 0.164 & 0.159 & 0.154 & 0.124 \end{bmatrix}$$

$$= (0.297,\ 0.199,\ 0.176,\ 0.125,\ 0.112,\ 0.089).$$

Finally, relative importances of lower level performance measures are 29.7%, 19.9%, 17.6%, 12.54%, 11.2%, and 8.9%, respectively. Note that financial measures are integrated with non-financial measures in the scaling process. The OCB can extend these performance measures into the next lower level of each product using the same method.

SUMMARY AND CONCLUSIONS

A performance measurement system should incorporate non-financial as well as financial measures to foster strategic success factors for a bank in the new environment. Generally, a good performance measurement system should monitor employees' behavior in a positive way and be flexible enough to adapt to the changing environment. To motivate employees, a bank should communicate performance information of an individual employee in relation to overall business goals. This characteristic of performance measurement requires a significant amount of feedback both between and within levels, and corrective actions in the practice of accounting information (Nanni et at., 1990).

The AHP model proposed in this study is flexible enough to incorporate the "continuous improvement" philosophy of today's business environment by changing weighting values of measures. In addition, the integrated structure of AHP allows group performance evaluation, which is a buzzword for "teamwork" in today's business world. The iterative process of getting input data in the AHP procedure also help each manager as well as employee to aware the importance of strategic factors of each performance measure of the bank.

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