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LETTER FROM THE EDITORS

The *Academy of Banking Studies Journal* is owned and published by the DreamCatchers Group, LLC. The Editorial Board and the Editors are appointed by the Allied Academies, Inc., a non profit association of scholars whose purpose is to encourage and support the advancement and exchange of knowledge, understanding and teaching throughout the world. The *ABSJ* is a principal vehicle for achieving the objectives of the organization.

The *ABSJ* has undergone a name change effective with this issue. It was formerly known as the *Journal of Commercial Banking and Finance*. We have changed its name to more closely match its editorial mission, which is to publish theoretical and empirical manuscripts which further the disciplines of banking and institutional finance. The name change resulted in the issuance of a new ISSN, 1939-2230. The former ISSN was 1544-0028. We have retained the numbering sequence for the issues, so this is Volume 6. The journal continues to follow its established policy of accepting no more than 25% of the manuscripts submitted for publication. All articles contained in this volume have been double blind refereed.

It is our mission to foster a supportive, mentoring effort on the part of the referees which will result in encouraging and supporting writers. We welcome different viewpoints because in those differences we improve knowledge and understanding.

Information about the Allied Academies, the *ABSJ*, and the other journals handled by the Academy, as well as calls for conferences, are published on our web site, www.alliedacademies.org, which is updated regularly. Please visit our site and know that we welcome hearing from you at any time.

JoAnn and Jim Carland
Carland Academy

This is a combined edition containing both Volume 6, Number 1, and Volume 6, Number 2

Articles for Volume 6, Number 1

INTERNET BANKING: GOLD MINE OR MONEY PIT?

Paul Nelson, University of Rochester
William Richmond, Western Carolina University

ABSTRACT

This paper explores the impact that implementing internet banking has on a bank's profits, costs and revenues. A production function approach utilizing maximum likelihood estimation procedures is used. We find that internet banking improves bank profits, and that the extent of this impact depends on the number of customers the bank succeeds in getting to adopt it. At lower levels of consumer adoption, profit gains are driven by increased revenues. These revenue improvements, however, taper off until profits are largely unaffected by further consumer adoption. Finally, at a sufficiently high level of consumer adoption, lower costs drive increased profits.

INTRODUCTION

Firms in myriad industries spend millions, even billions, of dollars on Information Technology (IT). In 2001, IT spending topped $527 billion in the US (*CIO Magazine*, November 8, 2002.) and $1.2 trillion worldwide (CIO Magazine, April 12, 2002). The banking industry, for example, invests heavily in IT – increasing investment from 6% of revenues in 2000 to 6.5% in 2001 (Parton, C. & J. Glaser, 2002). However, many bank CEOs are unsure of IT's impact (Vrechopoulos, A., & G. Siomkos, 2002), while others claim that these investments lead to increased services but decreased profits (Ross, J. & P. Weill, 2002). A specific technology – Internet Banking (IB) – has been heralded as both a competitive advantage and a competitive necessity (Dynamicnet, 2001; Vrechopoulos, A., & G. Siomkos, 2002; Retail Banking Research, Ltd., 1996). Accordingly, banks spent 15% of their IT dollars on internet banking in 2002 (Olazabal, N, 2003). Yet, many banks question its profitability (Hoffmann, K, 2003, March). In fact, half of all U.S. banks have no plans to offer internet banking (Orr, B, 2001), with the most common reason given being an unclear return on investment (Parton, C. & J. Glaser, 2002).

This paper utilizes firm level data gleaned from public and proprietary sources to take a detailed econometric look at the profit implications to banks of implementing internet banking. Three questions concerning internet banking are addressed. 1) Does offering IB improve bank profits and are these improvements derived from lower costs and/or increased revenues? 2) Does bank management influence the value of IB through either the decision to be an early-mover or by its ability to get its customers to adopt IB? 3) Does the value of IB change over time?

We find that internet banking does improve bank profits, and that the extent of this impact depends on the number of customers the banks succeeds in getting to adopt it. At lower levels of

consumer adoption profit gains are driven by increased revenues and not by lower costs. These revenue improvements, however, diminish as additional consumers adopt until profits are largely unaffected. Then, after a sufficiently high level of consumer adoption is reached, lower costs do indeed drive increased profits. That is, IB can generate both revenue and cost advantages for those banks that implement it. We also find no evidence of an early-mover advantage, nor do we see that the impact of IB has softened over time.

The paper proceeds as follows. We begin with a discussion of how internet banking provides value to both a bank and its customers. This discussion produces four hypotheses for investigation. Next, the regression models needed to address our research questions are developed. The data then are described and our empirical findings presented. We conclude with a summary that highlights managerial and academic implications.

VALUE OF INTERNET BANKING

Internet banking is defined as a transaction-oriented system that enables a bank's customers to engage in online banking activities. IB enhances a bank's offerings by providing its customers with 24/7 access to many of its services. The services available through IB can vary but typically include informational account access (view balances and past transactions), funds transfers among accounts at the providing institution, bill payment, bill presentment, and loan application and approval (including credit cards, mortgages and other personal loans).

For the individual consumer or small business, this additional channel offers improved service and convenience. A customer can access their accounts and conduct transactions from home or work at any time, thus saving the time and effort of going to a branch location. For some group of customers, this added convenience will make IB their preferred means of transacting. In such, a bank's implementation of IB provides a reason to switch to that particular bank or remain and, perhaps, do additional business with it.

IB, as with all investments, is expected to increase bank profits by either increasing revenues more than costs or by decreasing costs. Simply put, market forces would not permit continued investment in IB if it did not pay off. Our expectation of higher profits is buoyed by the fact that internet banking was initially heralded as a competitive advantage. As such, banks that implemented IB effectively should have higher profits than those that did not. Later, IB was proclaimed a competitive necessity (Vrechopoulos, A., & G. Siomkos, 2002; Retail Banking Research, Ltd., 1996). If IB is indeed a competitive necessity, then implementing IB is still done to increase profits relative to what would be earned without IB. In either case, banks that have not adopted internet banking should be at a competitive disadvantage (i.e., be less profitable) relative to those that have adopted it.

Bank profits increase through increased revenues and/or decreased costs. Revenues come from two primary sources – interest on loans and fees on services. Offering IB may increase loan

revenue by attracting new consumers to the bank who then go on to use the bank's loan products, such as credit cards, mortgages and installment loans. Additionally, IB may entice existing customers to deepen their relationship with the bank and use more of the banks loan products. In a similar fashion, IB may increase fee revenue by attracting new customers and by encouraging existing customers to use more fee-based services. Banks may even charge for some or all of their IB services. In sum, whether due to increased fees or loans, increased revenues due to IB are linked to level of IB adoption by the bank's customers.

Previous findings support the notion that consumers who use IB are more lucrative. Woodford (Woodford, R, 2001) reports that customers acquired due to implementing IB are likely to generate above average revenues. Hitt and Frei (Hitt, L. & F. X. Frei, 2002) find that customers who use PC banking (which provides similar functionality and benefits to IB) are more profitable than those who do not. In particular, IB customers have significantly higher mortgage and loan balances, and they use twice the number of other financial services products (Woodford, R, 2001). IB users also reflect the demographics coveted by bankers (they have almost twice the household income of people not using IB ($86,000 vs. $47,000)) and such "attractive demographics mean attractive economics"(Olazabal, N, 2003). On the other hand, this reported appeal of IB and PC banking customers is likely enhanced by the time period when the studies were performed. In particular, a diffusion of innovations argument likely is relevant (Horsky, D, 1990; Rogers, E, 1995). Early adopters of an innovation typically have the most interest and willingness to pay for the innovation. Later adopters are typically less inclined toward the innovation. Relative to IB, this implies that customers who adopt IB early on are likely to be the most profitable, and as more and more people adopt IB, the incremental revenue per customer will diminish.

Previous findings also support the notion that IB users are likely to come largely from the bank's installed customer base (Hitt, L. & F. X. Frei, 2002). Furthermore, these customers tend to deepen their relationship with the bank by shifting a greater share of their financial business to the bank. In particular, existing customers who adopt online banking acquire products at a faster rate and maintain higher loan and deposit balances.

Bank costs are driven by two primary factors – the cost of money (the interest paid on deposits and other funds) and operating costs (what is paid for IT, buildings, labor, etc). Although IB is unlikely to affect a bank's price of funds, the amount of funds on which it pays interest will increase if IB brings in new customers or leads existing customers to deepen their relationship with the bank by increasing the number of deposit accounts.

IB's impact on operating costs is more complex. As with all IT, there are fixed costs related to the purchase, implementation and maintenance of IB. On the other hand, both total variable cost and fixed cost reductions related to the replacement of the "earlier" technology are tied to how much consumers use IB. Due to the "paper-less" nature of IB and its use of the internet infrastructure, IB transactions likely cost less to perform than do transactions done through an ATM or teller. In fact, a Booze, Allen and Hamilton study (Dynamicnet, 2001; Goldfinger, C., 2003) claims IB has an

expense rate that is 1/3 that of traditional banking, with a per transaction cost of $.01 for IB versus $.27 for an ATM transaction and $1.07 for a teller-facilitated transaction. However, despite a lower per transaction cost, total variable costs may increase if IB, either through more transactions per customer or more customers, results in a significant increase in the total number of transactions. IB also may result in lower fixed infrastructure costs related to, say, the number of tellers or branch banks, if the substitution of IB transactions for offline transactions is sufficiently high. However, incomplete substitution of the earlier technology fits with Sullivan's (Sullivan, R, 2000) finding that banks with IB have higher non-interest expenses.

What this means is that simply installing IB is likely to raise bank operating costs, since fixed IB costs are incurred and no fixed infrastructure or total variable cost reductions are realized. Whether costs increase with increased usage of IB is less clear. As IB transactions replace offline transactions, transaction (variable unit) cost reductions are almost surely realized and infrastructure cost reductions are possible. It follows that at some level of IB usage, a lower total cost is incurred since total variable and infrastructure cost reductions will exceed the fixed costs associated with IB. However, this logic holds the number of bank transactions constant. Increased demand for bank services due to IB means more bank transactions are performed. If this increase is sufficiently large, total variable costs actually rise rather than fall since the cost associated with the increased number of transactions exceeds the cost reduction due to using the less costly IB transactions.

Increased operating expenses are further indicated because the banks we analyze use an IB service provider. Consequently, their variable transaction cost structure is a bit different from that for banks that develop their own IB system, and, therefore, different from what the Booze, Allen and Hamilton report predicts. To implement IB, there is still a fixed, but small, one-time cost for the system in the $20,000 to $40,000 range. Once the system is installed, there is a nominal fixed monthly fee (less than $1000) plus a fee for each IB customer as well as fees for various transactions. The total fee for each customer depends on the services the customer is signed up for (e.g., bill-pay) and how much historical information the bank retains (i.e., it costs the bank more if the bank lets its customers view deposits and withdrawals from two years ago than if the maximum a customer can go back is six months). This fee can range from $2 to $15 per customer per month. Additional fees also are charged for most transactions, including signing up a new IB customer and for a customer making a payment. Inquiries are free. This cost structure makes most of the bank's costs variable. This lowers the risk of implementing IB, but also makes lowering the bank's overall operating costs more difficult.

In sum, given the above discussion, we expect revenues to increase as consumer usage of IB increases, with this positive impact gradually petering out. Due to the use of an ASP (rather than incurring large fixed costs), total costs are expected to rise initially as consumer IB usage increases, with this increase gradually subsiding until eventually scale economies allow costs to decrease. Profits thus are likely to take on an "S-shape" with respect to consumer IB usage. This discussion

of how IB likely influences bank costs and revenues, and, hence, profits, leads to two null hypotheses:

H1: Simply implementing IB has no impact on a bank's costs, revenues or profits.
H2: Greater customer adoption of IB has no impact on bank costs, revenues or profits.

The decision of when to implement IB also may be important to banks given that Porter (Porter, M, 1998) identifies switching costs and reputation as key determinants of whether or not an early-mover advantage exists for technology investments. Each is especially relevant since the time required for the consumer to set up and use an IB account is significant and the perceived risk inherent to anything associated with money is high. Case-based work by Reich and Benbasat (Reich, B. & I. Benbasat, 1990) provides empirical support. They find that being an early-mover significantly impacts the bottom-line of customer-oriented strategic systems. Correspondingly, we propose a third null hypothesis:

H3: Banks that adopt IB early have no cost, revenue or profit advantage relative to banks that adopt IB later.

A related issue is whether or not the value a bank derives from IB changes over time. A reduction may occur over time as the value that IB generates increasingly goes to consumers in the form of improved quality (more convenience) rather than to the firm as increased revenues or lowered costs (Landuaer, T, 1995; Licht, G. & D. Moch, 1999). This rationale focuses on competitive pressures - as the number of competitors who utilize a technology increases a greater share of the value generated by the technology goes to consumers. A fourth null hypothesis follows:

H4: The impact of IB on costs, revenues and profits does not change over time.

MODEL

To represent the core relationships of profits, revenues and costs with a set of input-output variables, we follow the IS productivity literature and use a Cobb-Douglas functional form with a standard set of input-output variables (Brynjolfsson, E. & L. Hitt, 1999; Lichtenberg, F, 1995). The model's multiplicative nature explicitly allows the influence of each explanatory variable to depend on the levels of the other explanatory variables. More complex functional forms such as the translog (Alpar, P & M. Kim, 1990) and Fourier-flexible (Berger, A. & L. Mester, 1997) also have been used. These forms require the estimation of numerous inter-related parameters that make discussion of

how a particular explanatory variable influences the dependent variable quite difficult. The translog form, for example, involves additional parameters for the squares of each explanatory variable as well as all possible cross-products of these variables. For our model, this would require fifteen additional parameters. The Fourier-flexible form expands the translog model by adding Fourier trigonometric terms as well. Because we have data on only 275 banks, we use the simpler Cobb-Douglas form.

What input-output variables are appropriate depends on the focus of the analysis. The banking efficiency literature focuses on cost and profit (Berger, A. & D. Humphrey, 1997) while the IT productivity literature looks at revenue. We follow the banking literature which predominantly views banks as financial intermediaries that enable the matching of borrowers and lenders. A standard set of input-output variables is used in this literature (Berger, A. & L. Mester, 1997; Rice, T, 2003) and we follow this standard. Hence, the input-output variables are: Quantity or Price of Labor, Quantity or Price of Funds, Quantity or Price of Loans, Quantity or Price of Securities, Physical Capital and Financial Equity Capital. Whether quantities or prices are used depends on whether the cost, revenue or profit function is evaluated (further details are provided in the data section).

Since our interest lies in whether the profit, revenue and cost functions of a bank are influenced by internet banking, we include IB measures related to each of our research questions as explanatory "shift" variables that move the three functions in or out depending upon whether the IB measure has a positive or negative effect.

The influences of potential temporal effects (due to the use of time series data) and bank heterogeneity (due to the use of cross-sectional data) are modeled explicitly through the use of time and market size covariates. Heterogeneity also is dealt with functionally through the use of a random effects model. (A fixed effects model generates results similar in nature to those of the random effects model). The random effects model views the intercept as a random variable with each particular bank's intercept (which remains constant over time) being a random draw from a typically normal distribution (Greene, W, 2003; Hsiao, C, 2003; Wooldridge, J, 2002).

In sum, the profits, revenues or costs of a particular bank *i* at time *t* depend on an intercept term (that is bank-specific due to the random effects formulation), a standard set of input-output variables, a set of IB-related shift variables, time and market size covariates and an random error term. In particular, the dependent variable (profit, revenue or cost) is expressed as:

$$DepVar_{it} = e^{\text{int}_i}\left[\prod_{k=1}^{K}\text{input-output variable}_{ikt}^{\beta_k}\right]\left[\prod_{m=1}^{M}e^{\alpha_m\,\text{IBvariable}_{imt}}\right]\left[\prod_{t=2}^{N}e^{\gamma_t\,\text{time variable}_t}\right]e^{\eta\,\text{market size}_i}e^{\text{error}_{it}} \qquad \textit{Equation (1)}$$

Where int_i is distributed normal with mean mu_{int} and standard deviation $\text{sigma}_{\text{int}}$. An exponential form is used for the IB-related variables since nearly all of them are binary (0/1) in nature and the empirical analysis utilizes the natural log of equation (1).

After a log transformation of (1), the average relationship between the dependent variable and the explanatory variables is:

$$\ln\left[DepVar_{it}\right] = \text{int}_i + \sum_{k=1}^{K} \beta_k \ln\left[\text{input-output variable}_{ikt}\right] + \sum_{m=1}^{M} \alpha_m \text{IBvariable}_{imt} + \sum_{t=2}^{N} \gamma_t \text{time variable}_t + \eta \text{market size}_1 + \text{error}_{it} \qquad \textit{Equation (2)}$$

We estimate (2) using standard maximum likelihood procedures with heteroskedasticity-robust standard errors (Wooldridge, J, 2002). It follows that our IB-related research questions are tested by finding out whether or not the α_m parameters of the IB shift variables for the profit, revenue and cost functions are statistically significantly different from zero.

Note that a number of previous banking productivity papers (Berger, A. & D. Humphrey, 1997; Berger, A. & L. Mester, 1999; Rice, T, 2003) investigate an extremal or frontier relationship rather than the "average" relationship developed above. Through Data Envelopment Analysis or Stochastic Frontier Analysis, these papers typically focus on identifying the relative efficiencies of decision making units (e.g., banks). For our data, the stochastic frontier parameter estimates are quite similar to those reported in this paper. Because identifying the efficiencies of particular banks is not the focus of this paper, we describe and estimate the simpler "average" relationship discussed above.

DATA AND METHODOLOGY

To investigate our questions of interest we utilize a combination of public and proprietary data for 275 banks over a fourteen quarter time span (the first quarter of 1998 to the second quarter of 2001). The proprietary data for these banks was obtained from an application service provider offering a broad "product line" of banking services that included IB. These data consist of quarterly measures pertaining to whether or not a particular bank offered IB at that time and, if so, how many IB accounts it had. The publicly available data for these banks are taken from the Reports of Income and Condition (Call Reports) that all banks are required to submit to the FDIC. They are available at the FDIC website. These data include quarterly profit, revenue and cost figures for each bank. The input-output variables are also financial in nature and gleaned from this publicly available source as is the market size covariate. Descriptive statistics are provided in Tables 1 and 2.

The 275 banks analyzed were chosen because they all were clients of the same application service provider that provided the IB data. While not randomly selected, these banks provide a reasonably representative sample from the approximately 7,000 small banks and 9,000 credit unions in the US. The banks analyzed are located in 39 states and cover the full gamut of locales – urban (e.g., New York City), rural (Mebane, North Carolina), small towns (Danville, Virginia) and suburbs (Fairfax, Virginia). Bank size is small with assets ranging from approximately $13 million to $10

billion and the number of direct deposit accounts (DDAs) and savings accounts ranging from 440 to 540,000. Only two of the banks are savings banks – offering only savings accounts and no checking services. While only 35% (97) of the banks in our sample offer IB, all that do utilize IB use the same system, acquired from one of the leading IB service providers. This precludes a potentially key confounding factor – variations in the impact of IB across banks due to functionality differences. No pure e-banks are analyzed.

Table 1: Quarterly Summary Statistics: Public Data for the 275 Sampled Banks

Variable	Minimum	1st Quartile	Median	3rd Quartile	Maximum
Profit	$2,071	$373,606	$809, 881	$1,712,056	$63,831,700
Revenue	$229,083	$1,974,532	$3,855,548	$8,030,471	$242,237,400
Cost	$198,973	$1,560,186	$3,037,931	$6,242,663	$190,320,000
Price of Labor	$3,358	$10,800	$12,835	$14,847	$67,071
Amount of Labor	3	31	54	123	2446
Price of Funds	0.4%	0.91%	1.05%	1.19%	3.2%
Amount of Funds	$10,697,180	$71,026,220	$135,524,000	$273,948,700	$9,635,581,000
Price of Loans	0.2%	1.9%	2.0%	2.2%	5.5%
Amount of Loans	$9,527,000	$88,733,500	$188,576,600	$388,672,600	$9,524,253,000
Financial Eq. Cap.	$1,067,000	$10,898,160	$19,560,830	$42,516,090	$719,323,000
Physical Capital	$59,000	$1,362,691	$295,7528	$7,129,025	$172,556,000
Num of DDAs	1	2,013	5,040	10,429	249,155

While the banks analyzed are small, together small financial institutions hold over a trillion dollars in assets and, hence, constitute a significant business. In addition, to stay competitive with the major money center banks, they must focus on their customer base and offer a competitive set of services. Due to their small size, they also cannot easily absorb losses from poor investments. In such, they provide a window on how other small and medium sized service businesses can compete with larger institutions.

Quarterly data act to both help and hinder estimation. On one hand, statistical significance is improved since the number of observations is increased. More importantly, quarterly data allow more precise measurement of when a bank adopts IB and how quickly customers adopt it. Due to the rapid adoption and change rates insipient to all things internet-related, a good deal of information would be lost with yearly data. On the other hand, the quarterly data are inherently more volatile than annual data causing model fit to degrade and making statistically significant findings concerning IB less likely. A standard technique with such time series data is to account for potential time effects through the inclusion of time-related variables. We allow maximum flexibility through

the use of thirteen binary quarter variables – one for each quarter (Q2 through Q14). A binary variable for the first quarter of 1998 (Q1) is excluded to avoid identification problems.

Table 2: Quarterly Summary Statistics
Proprietary Data for the 275 Sampled Banks

	Number of Banks by Customer Adoption Level and Quarter													
Number of IB Adopters	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14
1-99	0	0	0	7	12	25	18	19	21	19	17	15	9	19
100-199	0	0	0	0	4	2	5	6	8	10	9	9	11	10
200-299	0	0	0	0	1	1	6	3	4	8	9	5	4	4
300-399	0	0	0	0	2	1	2	6	2	5	4	10	9	8
400-499	0	0	0	0	1	0	4	3	5	4	8	5	5	10
500-749	0	0	0	0	0	1	3	6	6	8	10	13	13	14
750-999	0	0	0	0	0	1	3	0	5	7	6	8	5	6
1000-1249	0	0	0	0	0	0	0	3	1	1	5	5	8	3
1250-1499	0	0	0	0	0	0	0	1	3	2	2	3	2	9
1500-1999	0	0	0	0	0	0	0	1	0	2	4	6	5	1
2000-2499	0	0	0	0	0	0	0	0	2	0	0	1	2	3
2500-3299	0	0	0	0	0	0	0	0	0	0	0	1	4	4
3300-4999	0	0	0	0	0	0	0	0	0	3	1	0	1	1
5000-9999	0	0	0	0	0	0	0	0	0	0	2	3	2	4
10000+	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Total Number of Banks with IB	0	0	0	7	20	31	41	48	57	69	77	84	81	97
Average Number of IB Accounts at Banks with IB	na	na	na	22	105	96	239	333	412	519	677	819	1082	1109
Total Number of Banks with or without IB	210	206	206	198	194	188	187	188	190	193	192	187	188	190

The cross-sectional nature of our data causes additional "noise" that must be accounted for. This bank heterogeneity necessitates using a random effects model rather than a simple regression model. Furthermore, potential business environment differences due to market size differences are

explicitly modeled using a covariate. Market size is measured using a Metropolitan Statistical Area (MSA) binary variable. This is part of the FDIC demographic data on banks and classifies a bank as being located in a metropolitan area (MSA=1) or not (MSA=0).

All fourteen quarters of data are available for 154 of the banks. The other banks have shorter time periods due to mergers, failures and start-ups during the 3½ year period analyzed. Since the estimation techniques used are appropriate for unbalanced panel data, we use the entire data set.

We follow the banking literature (see (Berger, A. & D. Humphrey, 1997) for a survey) in defining quarterly bank profits, revenues and costs as well as the input-output variables particular to each. Cost equals operating cost plus interest expense (including the cost of purchase funds and deposits). Revenue includes income from loans and securities plus fee (non-interest) income. Profit is revenue minus cost. Since the profit, revenue and cost data cover a significant time span, we adjust for changes in the value of the money (inflation). We use the Consumer Price Index (CPI) for this. These definitions view the bank as a financial intermediary. In such, the bank's primary role is as a broker between fund providers and borrowers. Labor and any account that provides funds (e.g., deposits and purchased funds) are considered inputs. Any account that uses funds (e.g., loans and purchased securities) is considered an output (Berger, A. & D. Humphrey, 1997; Hancock, D, 1985).

Correspondingly, the standard input-output variables below are used (Berger, A. & L. Mester, 1997; Rice, T, 2003):

Profit is a function of:	*Price of Labor, Price of Funds, Price of Loans, Financial Equity Capital and Physical Capital;*
Revenue is a function of:	*Amount of Labor, Amount of Funds, Price of Loans, Financial Equity Capital and Physical Capital;*
Cost is a function of:	*Price of Labor, Price of Funds, Amount of Loans, Financial Equity Capital and Physical Capital.*

The specific definition of each variable follows the banking efficiency literature (Berger, A. & L. Mester, 1997; Rice, T, 2003). The Price of Funds is defined as the expense for funds divided by the Amount of Funds, which includes core deposits, domestic transaction accounts, time and savings accounts plus the expense for purchased funds including jumbo CDs, foreign deposits, federal funds purchased and all other financial liabilities. The Price of Labor is salary expense divided by the Amount of Labor, which is the number of full-time equivalents. The Price of Loans is the income from loans and securities divided by the Amount of Loans, which includes business loans, consumer loans, real estate loans and securities. Financial Equity Capital is stock and retained earnings. Physical Capital includes buildings and other fixed assets. These variables also are adjusted by the CPI to make them comparable over time.

Eleven IB-related variables are utilized to capture the possible impact of internet banking on profits, revenues or costs. The first variable is a binary variable identifying simply whether or not bank *i* offers IB during quarter *t*. If a bank has an IB system in place, then $HIB_{it} = 1$; otherwise it equals zero.

The next three IB measures are used to assess the potentially non-linear relationship between a bank's profits, revenues and costs and the number of bank customers using internet banking at time *t* ($IBUsers_{it}$). $IBUsers_{it}$ is defined as the number of IB accounts in existence at time *t*. For modeling simplicity we estimate a piecewise rather than continuously differentiable relationship. This piecewise estimation style is commonly utilized. Piecewise relationships between the dependent and independent variables where the data dictates the breakpoints are central to all Data Envelopment Analysis procedures (Horsky, D. & P. Nelson, 1996; Seiford, L. & R. Thrall, 1990). Data-dictated breakpoints are also utilized to identify when scale economies kick in (White, L, 1971; White, L, 1982).

A grid search along with the maximum likelihood estimation was used to identify the levels of consumer adoption at which one line segment ended and the next line segment began. This follows work done concerning scale economies in the automotive industry in (White, L, 1971; White, L, 1982). In such, we utilize three variables to reflect the impact of increased consumer adoption of IB on bank profits, revenues and costs. The first variable [$IBUsers_{it}$ <=X] equals simply $IBUsers_{it}$ when the number of adopters is less than or equal to X and equals X if the number of adopters exceeds this amount. The second variable [X<$IBUsers_{it}$ <=Y] equals 0 if $IBUsers_{it}$ <=X, equals $IBUsers_{it}$ - X if the number of adopters exceeds X and is less than or equal to Y, and equals Y if the number of adopters exceeds Y. The third variable [$IBUsers_{it}$ >Y] equals $IBUsers_{it}$ - Y if the number of adopters exceeds Y and zero otherwise. Note that the breakpoints X and Y need not be the same for revenues, costs and profits.

The fifth through tenth IB variables are interactions of the above three adoption level variables with time. These variables act to make the impact of [$IBUsers_{it}$ <=X], [X<$IBUsers_{it}$ <=Y] and [$IBUsers_{it}$ > Y] on profit, revenue or cost differ depending upon the time period analyzed. In such, they determine if the impact of IB changes over time. Given that the first implementation of IB occurred in Q4 (between October and December of 1998) and quarterly time dummies are already modeled in order to account for "random" temporal variation, "fiscal year" breakdowns FY1, FY2 and FY3 are utilized. Defining $FY2_{it}$ =1 if 7<=t<=10, and zero otherwise, and $FY3_{it}$=1 if 11<=t<=14, and zero otherwise, our six interaction terms are: [$IBUsers_{it}$ <=X*$FY2_{it}$], [X<$IBUsers_{it}$ <=Y*$FY2_{it}$], [$IBUsers_{it}$ > Y*$FY2_{it}$], [$IBUsers_{it}$ <=X*$FY3_{it}$], [X<$IBUsers_{it}$ <=Y*$FY3_{it}$], and [$IBUsers_{it}$ > Y*$FY3_{it}$]. For identification purposes, FY1 (Q3-Q6) is not included.

The final IB variable is used to examine whether an early-mover advantage exists. For this, we measure when a bank implemented internet banking relative to its peers. A binary $Innovator_{it}$ variable equals one for those banks that installed internet banking prior to March 31, 1999 (prior to Q6), and zero otherwise. Seven banks installed IB in Q4 and twelve more installed IB in Q5. For

these innovator banks, the innovator variable equals one only for those quarters when the bank has IB. These 19 innovator banks are among the first five percent of banks to adopt IB in the nation and the first seven percent of our sample.

Given the above definitions, our profit function is explicitly (cost and revenue functions are similar):

$$\begin{aligned}\ln(\mathbf{Profit}_{it}) &= \alpha_i + \beta_1 \ln(\mathbf{Price\ of\ Labor}_{it}) + \beta_2 \ln(\mathbf{Price\ of\ Funds}_{it}) + \beta_3 \ln(\mathbf{Price\ of\ Loans}_{it}) \\ &+ \beta_4 \ln(\mathbf{Financial\ Equity\ Capital}_{it}) + \beta_5 \ln(\mathbf{Physical\ Capital}_{it}) \\ &+ \alpha_{HIB}\mathbf{HIB}_{it} + \alpha_{\le X}[\mathbf{IBUsers}_{it} \le \mathbf{X}] + \alpha_{<X\le Y}[\mathbf{X} < \mathbf{IBUsers}_{it} \le \mathbf{Y}] + \alpha_{>Y}[\mathbf{IBUsers}_{it} > \mathbf{Y}] \\ &+ \alpha_{\le XFY2}[\mathbf{IBUsers}_{it} \le \mathbf{X{*}FY2}_{it}] + \alpha_{\le XFY3}[\mathbf{IBUsers}_{it} \le \mathbf{X{*}FY3}_{it}] \\ &+ \alpha_{<X\le YFY2}[\mathbf{X} < \mathbf{IBUsers}_{it} \le \mathbf{Y{*}FY2}_{it}] + \alpha_{<X\le YFY3}[\mathbf{X} < \mathbf{IBUsers}_{it} \le \mathbf{Y{*}FY3}_{it}] \\ &+ \alpha_{>YFY2}[\mathbf{IBUsers}_{it} > \mathbf{Y{*}FY2}_{it}] + \alpha_{>YFY3}[\mathbf{IBUsers}_{it} > \mathbf{Y{*}FY3}_{it}] \\ &+ \alpha_{Innovator}\mathbf{Innovator}_{it} \\ &+ \sum_{t=2}^{14}\gamma_t \mathbf{Q}t_{it} + \eta\mathbf{MSA}_{it} + \mathbf{error}_{it} \quad .\end{aligned} \qquad \textit{Equation (3)}$$

This model assumes all banks have the same basic profit (cost, revenue) function. That is, the basic structure – the impact of the price of labor, the price of funds, the price of loans (or the amount of labor, funds and loans) and the amount of financial equity capital and physical capital – is the same for all banks. Implicitly, banks choose the level of each variable to optimize profit (cost, revenue). However, for quasi-fixed variables such as physical capital there is a cost associated with changing their usage rate. Hence, a bank does not adjust them continuously. Hitt and Brynjolfsson (Hitt, L. & E. Brynjolfsson, 2000) note that if these variables are not in equilibrium, their parameter estimates may be biased. However, the function shifts over time (due to the quarterly time variables) and for each bank (due to the bank-specific intercept terms). Our interest lies in the shifts in the model that occur due to the IB variables.

EMPIRICAL RESULTS

The equation (3) random effects model results for profit, revenue and cost are presented in Table 3. To simplify presentation, only the IB variables that are significant at the 5% level or better are included. For each of the three models the fit is statistically superior at better than the 1% level to a model that excludes the IB variables. Face validity also is strong as the signs of the five input-output parameters are consistent with those found in the banking productivity literature. This section discusses each of our four hypotheses in turn. It closes with a discussion of possible alternative explanations.

Table 3: Profit, Revenue and Cost Empirical Results				
Variable	Parameter Estimate	Std Error	t-value	Pr > t
Profit				
$IBUsers \leq 3,300$	0.000103	0	4.1	<.0001
$IBUsers > 6,000$	0.000081	0	3.69	0
Intercept (mean)	-2.0576	0.5384	-3.82	0
Price of Labor	-0.6677	0.1058	-6.31	<.0001
Price of Funds	-7.5754	17.2419	-0.44	0.6604
Price of Loans	25.4933	9.287	2.75	0.0061
Financial Equity Capital	0.9583	0.0567	16.81	<.0001
Physical Capital	0.0474	0.0383	1.24	0.2169
MSA	0.1418	0.0702	2.02	0.0436
Q3, Q4, Q11, Q12 are significant and negative; x^2 test relative to a model without the IB variables = 19.7 (p < .005)				
Revenue				
$IBUsers \leq 3,500$	0.000024	0	2.05	0.0408
Intercept (mean)t	-2.3133	0.4105	-5.64	<.0001
Labor in FTEs	0.0976	0.0354	2.76	0.0059
Total Funds	0.483	0.1284	3.76	0
Price of Loans	13.7711	3.2747	4.21	<.0001
Financial Equity Capital	0.3305	0.0997	3.31	0.001
Physical Capital	0.0689	0.0325	2.12	0.034
MSA	0.0071	0.0274	0.26	0.7957
Q9-Q14 are significant and positive; x^2 test relative to a model without the IB variables = 22.8 (p < .005)				
Cost				
$IBUsers \leq 3,100$	0.00003	0	2.38	0.0173
$IBUsers > 6,000$	-0.000017	0	-2.62	0.0088
Intercept (mean)	-3.3855	0.2669	-12.69	<.0001
Price of Labor	0.2199	0.0321	6.85	<.0001
Price of Funds	32.0702	6.1497	5.21	<.0001
Loans	0.6912	0.0479	14.44	<.0001
Financial Equity Capital	0.1207	0.0361	3.34	0.001
Physical Capital	0.1187	0.0182	6.5	<.0001
MSA	-0.0195	0.0232	-0.84	0.4003
Q2 - Q4, Q7, Q8, Q10 - Q12 are significant and positive; x^2 test relative to a model without the IB variables = 40.2 (p<.005)				

H1: Installation of Internet Banking

Since the α_{HIB} parameter is statistically insignificant in all three models, the simple existence of IB at a bank has no impact on profits, revenues or costs (i.e., we cannot reject H1). For revenues this is unsurprising since revenues only accrue through customer usage. The use of an IB service provider minimizes the fixed costs associated with offering IB, so costs also are not significantly impacted. It follows that no measurable effect on profit is found.

H2: Consumer Adoption of Internet Banking

Profits, revenues and costs, however, are significantly affected by the number of IB users a bank succeeds in acquiring (thus rejecting H2). The stylized piecewise linear relationship is found for each of the three models. The piecewise function's breakpoints X and Y are 3,300 and 6,000 for profits and 3,100 and 6,000 for costs. For revenues, a single breakpoint occurs at 3,500. This piecewise function approximates a continuously differentiable function. Consequently, true profits, for example, do not increase strictly linearly with each additional consumer adopter until 3,300 consumers adopt, and the 3,301st adopter does not have exactly zero effect on profit. Similarly, the levels of X and Y are based on statistical criteria. Hence, the cost and revenue saturation breakpoints X vary a bit from that for profit. However, there is little statistical or economic difference between the models reported and ones that restrict the breakpoint X for all three models to be the same. Finally, the dollar impacts that we report are to show reasonableness. We do not expect that these are the exact impacts that banks have seen or will see from implementing IB and getting their customers to adopt IB. What is important is the direction of the changes and the relative shapes of the curves.

The positive sign for the [$IBUsers_{it}$ <=X] parameter $\alpha_{<=X}$ in all three models indicates that an increase in the level of consumer adoption increases revenues, costs and profits until their particular "saturation" level X is achieved. The statistical insignificance of the [X<$IBUsers_{it}$ <=Y] parameter $\alpha_{<X<=Y}$ in all three models implies that additional adopters in excess of the respective saturation level X do not add further to bank profit, revenue or cost until the second breakpoint Y is possibly reached. The cost and profit models experience a change at this second breakpoint but revenue does not. In the cost model, the negative value for the [$IBUsers_{it}$ > Y] parameter $\alpha\alpha_{>Y}$ indicates that after enough customers adopt IB (6,000), a bank's costs begin to decrease. Correspondingly, profits trend upwards after this point.

Note that reaching these IB user adoption level breakpoints constitutes a major undertaking for the vast majority of studied banks. For 25% of the banks, reaching 3,100 adopters requires over half of their customers to adopt IB. For another 25%, this requires a customer adoption level exceeding 25%. In fact, only eight banks reach the 3,100 adopter level during the time span analyzed, and they take, on average, 6.67 quarters to do so. Four banks reach an adoption level

greater than 6,000 customers. In fact, for almost half (125) of the banks this second breakpoint exceeds their customer base. For twenty of the banks, however, this is less than 20% of their customer base. Of these "larger banks," only eleven implemented IB, so we have a balance of larger banks that did and did not adopt IB. (These percentages use the number of direct deposit accounts to approximate the number of bank customers). This relatively high saturation level coupled with the distribution of the banks based on size points towards a possibility that the larger banks in our sample drive the estimation results. However, the discussion at the end of this section provides evidence against this possibility.

The cost estimation results imply that for a median sized bank quarterly costs increase between $16 and $164 (with a mean of $91) for each customer who adopts IB until the saturation level of adopters X is met. (This range results from inputting the median quarterly cost of $3,037,931 and the endpoints of the 95% confidence interval for $\alpha_{<=X}$ into the partial derivative of the cost function with respect to [$IBUsers_{it}$ <=X] and setting it equal to $\alpha_{<=X}$ time Cost.) This means that for the median bank with 1,109 IB users (the average number of adopters in Q14) costs are between $17,735 and $181,930 higher per quarter than if the bank did not offer IB, with an average cost increase of $100,070. Note, however, that this impact of IB on a bank's total costs is relatively small. This increase corresponds to just 3.3% of the median bank's total cost. Also note that the increased cost per IB account is not tied solely to the fees charged the bank by the IB service provider. This additional cost also includes additional operating expenses such as IB marketing and increased customer service, as well as added interest payments on new or enlarged DDAs. For those banks that exceed the 6,000 adopter level Y, costs start to decrease at slower rate than at which they had earlier increased. This decrease for a median bank is between $13 and $91 (with an average of $52) per additional IB user per quarter.

The initial positive impact that consumer adoption of IB has on costs arises because all four of the key cost drivers point towards higher costs. First, there is a small fixed cost to operating the IB system. Second, as discussed previously, the basic wholesale pricing structure for IB services includes a base fee, a fee per customer and transaction fees for certain types of transactions (e.g., bill payment). Each bank negotiates the fee structure with the IB service provider, but given this fee structure, the expected cost savings from significantly lower per transaction costs (Dynamicnet, 2001; Goldfinger, C., 2003) are unlikely to materialize. Third, banks that implement IB perform significantly more transactions. For example, their growth rate in the number of accounts is 14% higher for DDAs and 32.8% higher for savings accounts. In addition, IB is associated with a larger average deposit size per account of about $800 at a median bank. Coupled with the work by Hitt and Frei (Hitt, L. & F. X. Frei, 2002) and findings reported by Woodford (Woodford, R, 2001), this indicates that while new customers are drawn to the bank, existing customers also are doing more business with their bank. This increase in bank activities necessarily increases costs. Clearly previous bank customers who utilize IB increase their use of bank services and/or IB attracts new customers to the bank. Furthermore, not all these bank services are transacted through IB. Last,

despite this increase in transactions, the actual volume of transactions performed using IB relative to more traditional transactions is typically quite small. For example, on average, in our sample, IB bill payment transactions are only two tenths of one percent of the DDA transactions. Correspondingly, reductions are unlikely in the fixed infrastructure costs related to traditional transactions (e.g., the number of tellers employed or ATMs operated) unless a large number of customers adopt IB.

The decrease in costs after the 6,000 user adoption level likely results from changes that occur in the last two of these four cost drivers as customer adoption of IB becomes substantial. With a significant number of IB transactions relative to traditional transactions the likelihood that IB services replace rather than augment ATMs, tellers and so on increases. A simple check indicates that the number of accounts per full-time equivalent employee is larger when the number of IB adopters exceeds 6,000. Additionally, the diffusion of innovations concept discussed earlier kicks in. That is, later consumer adopters of IB (the early and late majorities and the laggards) are more likely to use fewer IB services for which the bank is charged and non-IB services which the bank must provide than are the "consumer innovators" that constitute the early consumer adopters (Horsky, D, 1990).

The revenue and profit results strongly reflect the diffusion of innovations argument. The first consumer adopters of IB do appear to be more profitable. The plateaus at 3,300 adopters for profit and 3,500 for revenue reflect that incremental gains in these measures dissipate as the number of adopters swells. Until these adopter breakpoints, with each additional IB consumer the median bank experiences a quarterly revenue increase of between $4 and $185 with an average of $93. The corresponding profit increase ranges from $44 to $124 with an average of $83. Note that the estimated incremental profit figures fall within the combined range of the estimated incremental revenues minus the incremental costs.

The additional increase in profits related to adoption levels exceeding the second 6,000 adopter breakpoint results from the decreased costs discussed above. In fact, the estimated cost reduction and profit increase are very similar. In particular, at the median bank each adopter in excess of 6,000 corresponds to a per quarter profit increase of between $31 and $99 with an average of $65.

As with cost, it is important to note that the impact of IB usage on revenue and profit is relatively small. For example, the median quarterly revenue per DDA is $765 ($3,855,548/5,040 DDAs), the median cost per DDA is $603 and the median profit per quarter per DDA is $162. Additionally, at the Q14 average level of IB adoption (1,109) revenues are on average increased by $102,619, which account for just 2.7% of median revenues. To put this in perspective, note that a single IB adopter taking out a $200,000 mortgage at 6% interest increases the bank's revenues by $3,000 per quarter. Hence, only a few additional such customers are needed to drive the revenue numbers. As for profits, in approximately 60% of the bank-quarters where IB was implemented the bank that adopted IB has an expected profit increase of less than 5%. In fact, for the few banks that

do achieve a user base large enough to generate a 10% increase in quarterly profits, it took, on average, 5.46 quarters to reach this level. On the other hand, while the profit impact is small in relative size, in concordance with Hitt and Frei's (Hitt, L. & F. X. Frei, 2002) findings, IB users are significantly more profitable than the average bank customer.

Four additional models are used to take a deeper look at the sources of the revenue and cost increases. These models, reported in Table 4, use fee revenue, interest revenue, operating expenses and interest expenses as their dependent variables and the same independent variables as in the original revenue or cost models. For both the fee revenue and operating cost, we tried models that included variables for the number of accounts. Since these variables did not affect the results, we have not included a detailed discussion of them. As shown in Table 4, the significant $\alpha_{<=X}$ parameter implies that interest revenue, like total revenue, increases up to a saturation level X = 3,200 after which additional IB adopters have no measurable impact on interest revenue. Specifically, for the first 3,200 adopters at the median bank, interest revenue increases between $15 and $104 per quarter (with an average of $59) with each adopter.

This large increase in interest revenue is coupled with a much smaller increase in fee revenue. While no saturation level exists for fee revenue, the incremental impact of consumer adopters on fees is minimal (the $\alpha_{<=X}$ parameter is very small but statistically significant and we found no level X where this relationship changed). The $\alpha_{<=X}$ parameter value implies that, for the median firm, each adopter is associated with between $2 and $12 of additional fee revenue per quarter (with an average of $7). This figure constitutes less than 10% of the estimated impact on revenue and in combination with interest revenue roughly coincides with the total revenue increase estimates. Because the impact of fee revenue is so small, after the total revenue saturation level of 3,500 users it likely becomes "lost" in the random noise when aggregated into the total revenues for banks with high adoption rates.

Table 4: Particular Revenue and Cost Empirical Results

Variable	Estimate	Std Error	t-value	Pr > t
Interest Revenue				
$IBUsers_{<=3,200}$	0	0	2.59	0.01
Intercept (mean)	-3.1488	0.1394	-22.59	<.0001
Labor in FTEs	0.0564	0.0337	1.67	0.095
Total Funds	0.7061	0.0467	15.13	<.0001
Price of Loans	13.0547	3.0878	4.23	<.0001
Financial Equity Capital	0.2068	0.0484	4.27	<.0001
Physical Capital	0.0229	0.0169	1.36	0.1754
MSA	-0.0061	0.0136	-0.45	0.6547
Q3-Q6 and Q9 - Q14 are significant. Q3 – Q6 are negative, Q10 - Q14 are positive x^2 test relative to a model without the IB variables = 14.5 ($p < .005$)				

Table 4: Particular Revenue and Cost Empirical Results				
Variable	Estimate	Std Error	t-value	Pr > t
Fee Revenue				
IBUsers ≥ 2,900	0	0	2.6	0.01
Intercept (mean)	-5.6876	1.084	-5.25	<.0001
Labor in FTEs	0.5904	0.1344	4.39	<.0001
Total Funds	0.7791	0.2233	3.49	0
Price of Loans	-4.0377	6.5141	-0.62	0.5354
Financial Equity Capital	-0.3773	0.175	-2.16	0.031
Physical Capital	0.1638	0.0693	2.36	0.018
MSA	-0.5431	0.1133	-4.79	<.0001
Q3, Q4 Q9, Q13 and Q14 are significant. Q9 is negative, Q3, Q4, Q13 and Q14 are positive x^2 test relative to a model without the IB variables = 98.8 (p < .005)				
Interest Expense				
IBUsers ≥ 2,900	0	0	2.26	0.024
Intercept (mean)	-4.4493	0.2209	-20.14	<.0001
Price of Labor	0.0863	0.0267	3.24	0
Price of Funds	40.7503	7.3281	5.56	<.0001
Amount of Loans	0.8581	0.0484	17.72	<.0001
Financial Equity Capital	0.0433	0.0384	1.13	0.2607
Physical Capital	0.0769	0.0163	4.7	<.0001
MSA	-0.0315	0.0203	-1.55	0.1219
Q3, Q5, Q9 - Q14 are significant. Q5 is negative, Q3 and Q9 - Q14 are positive x^2 test relative to a model without the IB variables = 33.9 (p < .005)				
Operating Expense				
IBUsers ≥ 6,000	0	0	2	0.045
IBUsers > 6,000	0	0	-4.34	<.0001
Intercept (mean)	-3.7268	0.3893	-9.57	<.0001
Price of Labor	0.5359	0.0559	9.59	<.0001
Price of Funds	10.1248	7.8898	1.28	0.1995
Amount of Loans	0.4421	0.0533	8.29	<.0001
Financial Equity Capital	0.2077	0.0451	4.61	<.0001
Physical Capital	0.2178	0.0266	8.17	<.0001
MSA	-0.0361	0.0444	-0.81	0.4158
Q2-Q6 and Q10 - Q14 are significant. Q2 – Q6 are positive, Q10 - Q14 are negative x^2 test relative to a model without the IB variables = 15.8 (p < .005)				

The two additional cost models reported in Table 4 show a meaningful relationship between IB consumer adoption and both higher interest expenses and higher operating expenses. For interest expense, costs increase up to 2,900 IB users. The $\alpha_{<=X}$ parameter estimate implies that interest costs increase between \$6 and \$88 (with an average of \$47) per IB user. This is due to an increase in interest bearing accounts and account balances. As noted earlier, banks with IB have higher deposits per customer, and a IB adopter putting just an additional \$10,000 into a bank account with 3% interest generates \$75 in additional interest expenses per quarter.

Operating expenses also show an initial increase of between 50¢ and \$46 per quarter (with a mean of \$23) per IB user up to 6,000 users. This operating expense estimate appears reasonable given that the average total fee per user actually paid by a bank to the IB service provider is \$21.61 per quarter, which does not include operating costs associated with account management, loan processing or ATM fees. A key finding is that these additional operating costs appear to decrease when a high number of customers (more than 6,000) adopt IB. The rate of this operating cost decrease per IB user is between \$36 and \$107 (with an average of \$71) for a median bank. This is consistent with the rate of decrease found for the overall cost, as is the level at which the costs start to decrease.

In sum, all else equal, banks offering internet banking are more profitable than those that do not. However, when weak marketing efforts result in limited consumer adoption of IB, very limited gains are realized relative to overall bank profits. Improved profits initially result from increased revenues despite increased costs. These improved revenues are the result of an increase in the bank's interest income through soliciting new customers and getting more business from previous customers as well as more fee-based bank services being sold. Furthermore, at high consumer adoption levels banks do begin to realize some substitution of less expensive internet-based services for more traditional ATM and teller-based services. The resulting reduction in operating costs drives a revived profit upswing.

H3: Internet Banking Early Movers

Our empirical results do not refute H3 – being an innovator has no impact on bank profits, revenues or costs (the $\alpha_{innovator}$ parameter is not statistically significant in any model). The sourcing approach – a vendor supplied and managed IB system – provides a likely partial explanation. The higher costs and operational risks typically associated with innovation are mitigated by the use of a vendor, and banks that use this service are unable to physically distinguish themselves from other banks using the same service.

The key explanation for finding no early-mover advantage is likely that the standard definition of an early-mover is ill-suited to this industry. Being in roughly the first 5% of banks to adopt IB nationally is not really what is relevant when thinking about an early-mover advantage. Rather, most banks, especially the small banks analyzed, are regional in nature and so what is really

relevant is how early they adopt IB relative to the other banks that do business in their service area. The insignificance of the $\alpha_{innovator}$ parameter means that this competitive adoption issue has not yet become an issue. In fact, the statistics previously reported in both this paper and Hitt and Frei (Hitt, L. & F. X. Frei, 2002)that point toward increased revenues being largely due to the bank acquiring a larger share of their previous consumers' financial business indicate that, perhaps, this competitive pressure may never become strong.

H4: Internet Banking Impact Over Time

Similar to our findings concerning banks that are early adopters, the impact of IB on profits, revenues and costs is not found to change over time (H4 cannot be rejected). First, in the profit, revenue and cost models, the six [fiscal year * number of consumer adopters] interaction term parameters $\alpha_{<=XFY2}$, $\alpha_{<=XFY3}$, $\alpha_{<X<=YFY2}$, $\alpha_{<X<=YFY3}$, $\alpha_{>YFY2}$, and $\alpha_{>YFY3}$, are not statistically significant. Second, time alone (other than a subset of the quarterly dummy variables Q2-Q14) has no statistically significant impact even though it is inherently correlated with the number of IB users since the cumulative number of IB customers invariably must increase. Even when the three IB user variables (e.g., [$IBUsers_{it}$ <=X]) and the six interaction terms are replaced simply by the $FY2_{it}$ and $FY3_{it}$ binary variables, these time variables remain statistically insignificant.

This finding that revenues, costs and profits per IB user do not change over time implies that increased competition over time is not forcing banks to pass on more benefits to customers and adds further support for a lack of an early-mover advantage. This finding is good news for the banks that are considering whether or not to offer IB – a profit opportunity exists.

POTENTIAL ALTERNATIVE EXPLANATIONS AND STUDY LIMITATIONS

A key question with this research is whether the results presented are due to IB's impact or to some other factor that is correlated with IB. One possibility is that IB implementation and use are correlated with bank size and that larger banks are more efficient (i.e., have higher profits, higher revenues and lower costs). Two separate analyses show this is not the case. To investigate potential spurious correlation, we normalized profits, revenues, costs, labor, funds, financial equity capital and physical capital by dividing them by bank assets and reran the analyses. Results similar to those reported in the paper arise (with slight differences in when the breakpoints occur).

As an alternative approach to investigating the impact of bank size, we limited the analysis to only those banks in the top half of the sample in terms of their assets. Again, very similar results are found with the primary difference being that the cost increase at low levels of IB adoption is significant at only the 9% level. When we limit the analysis to only the smaller half of the banks we find that these banks don't attract enough IB customers to reach a breakpoint. Correspondingly, we find profits, revenues and costs increase with more IB use but never reach a point where they level

off. Finally, we performed the analysis after removing the ten largest banks. Again, the results are similar to those reported in the paper. Taken together, these sub-sample results indicate that the full sample results presented earlier are valid - the overall structure of the impact of implementing IB and getting customers to adopt it appears robust.

Another possibility is that banks with richer more lucrative customers offer IB and this not IB causes these banks to be more profitable, have higher revenues and have lower costs. Simple correlation analyses disprove this notion. To examine this clientele explanation, we looked at assets per deposit account (ApDA) across banks. Two methods were used to define ApDA. The first divided total assets by the total number of DDA and savings accounts. Since a customer may have multiple accounts, this implicitly understates ApDA. Hence, the second method defined ApDA as assets divided by just the number of DDAs. For the two banks that did not have DDAs, we used their number of savings accounts. For each measure, its correlation with both IB adoption and the number of IB users is small and negative (between 0.00 and -.02).

As with all research, there are limitations to this study. The implications of this analysis are limited by the fact that our sample banks are small. The benefits of IB to large institutions like Wells Fargo and Bank of America are likely to differ in magnitude but not in direction. The smaller size of the banks we analyze points towards an adoption level of around 3,500 customers where additional IB customers become fairly "average" in their profit appeal. For larger banks, given their installed customer base and greater mass appeal, this saturation level is likely to be higher. In addition, incremental costs are still likely to rise at first. The increased number of transactions and incomplete substitution of traditional transaction-based fixed costs remain appropriate, and while these larger banks are likely to witness variable transactions cost reductions, they are also more prone to build their own IB system, thereby incurring greater fixed costs. As with our smaller banks, at higher IB adoption levels more substitution from ATM and teller servicing is likely and, hence, costs should decrease and profits increase. In sum, larger banks with greater fixed costs and a larger customer bases also are likely to exhibit a nonlinear relationship between profits (costs or revenues) and the number of their customers using IB. The "breakpoints" in this relationship are likely, however, occur at higher usage levels.

The time horizon of the study also is limited to the first few years of IB availability. It is possible that as more banks adopt IB, competition for the lucrative IB customers will drive the revenue and profit advantages of IB downwards. Alternatively, it also is possible that with enough consumer adoption and with time to adjust how banks deliver services, the often forecasted decrease in costs may be realized. On the other hand, the finding that most of the incremental revenues and costs associated with IB are due to a deepening of the bank's business relationship with its installed customer base mitigate concerns over this point.

SUMMARY AND IMPLICATIONS

This paper explores whether and how implementing internet banking impacts bank profits. By focusing on a single type of IT system within an industry with well documented and standardized profit, revenue, cost and input-output variable measures, we were able to perform a detailed econometric analysis of the impact of internet banking and the drivers behind increased profits. The level of analysis is most appropriate for managers, since their IT investment decisions are by nature industry and technology specific. In such, our results provide insights into the impact of other customer-oriented information systems on firm performance, especially in an environment where small and medium sized business must compete aggressively with much larger players.

The paper's key finding is that IB is a desirable opportunity for banks and that the key to success is customer adoption. At first, the benefits of internet banking do not come from lower costs as is often predicted with information technologies, but, rather, come from higher revenues driven by growth from the more lucrative customer demographic profiles. Since the fixed costs associated with internet banking through a service provider are low, our results show even low levels of customer adoption allow an expected profit increase. Cost reduction does, however, have a significant impact on profits at sufficiently high levels of consumer adoption. Once the level of internet-based transactions reaches a sufficiently large level substitution away from more costly ATM and teller-based transactions becomes feasible. Hence, profits originally increase as consumer adoption of IB grows. Profits then flatten as these adopters become less lucrative until a relatively large amount of IB usage takes place allowing operating costs to decrease and profits again to increase. It appears that internet banking, even if not well marketed to consumers, does NOT resemble a money pit. It can, however, become a small gold mine if properly and aggressively marketed.

Two secondary findings also are reported. First, whether or not a bank is an early-mover when it comes to implementing IB has no impact on its profits other than that the increased profits derived from IB are reaped over a longer period. The regional nature of most banks implies that a bank should be compared to its regional rather than national competitors when thinking about such an issue. Furthermore, since much of the benefit derived from IB is due to a deepening of the bank's relationships with its installed customer base, the importance of an early-mover advantage is secondary. Similarly, the benefits derived from IB are not found to dissipate over time. The lack of competitive pressure just mentioned again drives this finding.

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DERIVATIVE USE BY BANKS IN INDIA

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ABSTRACT

Derivative use by banks operating in India is hypothesized to improve their intermediary function. The research outcome identifies the influence of derivative use on the growth of advances by banks. Bank participation in advances increases with increase in hedging activities through futures. It has also been found that the Indian private sector banks have a high exposure of risk and have externalized their risk management process. Foreign banks operating in India have a low risk exposure level, but still they have moderately externalized their risk management practices. Indian public sector banks have a large deposit bas and high risk exposure but are still internalizing their risk management through ALM. The policy implication of the study is that derivative usage by banks is likely to increase the intermediary role of banks, i.e., the increase in advances growth rate rather than investment portfolio growth rate. Banks with large deposit base could gain relatively by externalizing their risk management practices since the study reveals that interest rate risk exposure of derivative users is statistically lesser than non-users / partial users.

INTRODUCTION

Banking sector faces numerous risks and the transit towards risk management practices has become imperative in the present scenario. Present day measured risk could be a potential loss to the bank. Risk measurement of revenue and cost potential of a bank is comparatively apparent while the interest rate risk is not as visible as these tangible revenues and costs. Modeling the interest rate risk management practices for banks has potential incentives to the sector as a whole in the form of improved profits, capital and integration with economic expectations.

Indian Banks have long used risk management activities such as duration and gap analysis. Risk management through derivative securities has been another avenue for banks to refine risk management practices. Similar to other international markets, price and interest rate volatility in Indian financial markets is high; hence the implications of not hedging the bank portfolio may prove to be disastrous.

Derivatives give banks an opportunity to manage their risk exposure and to generate revenue beyond that available from traditional bank operations. The research objectives framed to reiterate the importance of risk management practices through derivatives are to examine the derivative exposures in banks and to determine the influence of derivative exposure on bank's intermediation role.

LITERATURE REVIEW

Interest rate volatility and the globalization of capital markets have induced the usage of derivative futures by banks. The competitiveness in the market and the need to identify risk and hedge accordingly requires more coordination in the management of assets and liabilities of these banks. Research on introduction of derivatives, especially financial futures, into the balance sheet of banks and as an off-balance sheet hedging tool can be discussed through the works of Ederington (1979), Franckle (1980), Schweser, Cole & D'Antonio (1980), Arak & McCurdy (1980) and Morgan & Smith (1986). They have addressed the use of financial futures and have suggested hedging through interest rate derivatives as an ideal risk management solution. However, focus is more on hedging a cash position in a treasury bill or to hedge an anticipated issue of a Certificates of Deposit (CD). Further studies added multidimensional aspects to financial intermediary's hedging practices under conditions of uncertainty. Morgan, Shome & Smith (1988) considered uncertainties around deposit supply and loan demand as well as random rates of return on loans and CD's. They had also concentrated on the effect of deregulation on interest rate risk borne by financial institutions.

Risk management decisions of banks have been analyzed in detail and specifically with respect to hedging of bank risks. Allen & Santomero (2001), Kashyap (2002), Bauer & Ryser (2004) have identified risk management strategies for banks. Supportive works are Benninga & Oosterhof (2004), Cebenoyan & Strahan (2004), Szego (2002), Danielsson (2002), Nawalkha (2003), Angbazo (1997). Surveys by Bank for International Settlement (2002), Basle Committee and IOSCO (1996), are a few international market surveys on derivative practices in banks. Patnaik & Shah (2003) have measured interest rate risk of a sample of major banks in India using equity capital and market price.

A model of the intermediary role of banks and an explanation as to why derivatives use and lending are complementary activities are validated by Diamond (1984). Koppenhaver (1985) and Benninga (1985) use the optimization model for international hedging in commodity and currency forward markets. Kim & Koppenhaver (1992) used bank assets, net-interest margin, derivative dealing, capital-asset ratio and the concentration ratio to test the influence of derivative trading. Brewer, Minton & Moser (2000) examined the relationship between bank participation in derivatives and bank lending and found that the banks using interest-rate derivatives experienced greater growth in their commercial and industrial loan portfolios than banks that did not use these financial instruments.

Sharpe & Acharya (1992) and Bernanke & Lown (1992) have related loan growth with capital to asset ratio and quality of loan. A bank with too little capital relative to required amount would not be able to improve its capital position by improving the assets. Similarly the loan quality if good would induce the bank to increase its loan portfolio the next year. Bernanke & Lown (1991), Diamond (1984) and Brewer (2000) proposed that derivatives use could have an influence on the loan portfolio growth.

RESEARCH MODEL

Asset liability management (ALM) process of bank management requires reduction of interest rate risk exposure of banks by increasing the volume of loans and decreasing the volume of deposits. Since loan demand and deposit supply is dependent on interest rates offered, banks can achieve this policy by changing loan and deposit rates to attract loans and dissuade deposits. This process internalizes the market incompleteness of a missing risk sharing market namely derivatives. But, if a derivative market is there for the banks to hedge the bank's exposure, then banks have an opportunity to enter into an unbiased derivative market to externalize their risk exposure. When banks enter a derivative market with an expected contract amount for the futures price quotation in the market, this to a certain extent may not require the bank to alter the interest rates beyond a desired level. Hence, through derivatives, the ALM process is expected to be more efficient. Banks stand to gain operationally as well as from the derivative exposure.

Risk exposure, Bank size and certain financial parameters are expected to differentiate the derivative users from non-users. Variables that are expected to influence the intermediation role of banks (Growth in advances(AG)) such as Asset Size (LA), Intermediation cost (IC), Credit risk (LQ), Capital adequacy (CA), Investment deposit ratio (ID), Percentage of assets other than advances (OA), Earnings risk (ER), Interest Margin risk (IMR) and derivative growth (DG) are considered for the empirical model.

$$AG_t = a + b_1 * LA_{t-1} + b_2 * IC_{t-1} + b_3 * LQ_{t-1} + b_4 * CA_{t-1} + b_5 * {}_{Idt} + b_6 * OA_t + b_7 * ER_{t-1} + b_8 * IMR_{t-1} + b_9 * DG_t + e_t \qquad \textit{Formula (1)}$$

DATA SOURCE

During 2005-06, 92 banks were operating in India. Nine of these did not record any operational activities since they had commenced their operations very recently, hence were deleted for research purposes. The remaining 83 banks operating in India constituted the sample for the study. Financial reports published by banks as made available by the Reserve Bank of India constitute the data for the study. Interest rate sensitivity depends to a large extent on the deposit size of the bank. Besides the public sector banks, both foreign and private Indian banks were also included in the sample. The sample had adequate representation on the basis of size and sector (Table 1).

Table 1: Sample Characteristics				
Deposit Size Classification		Sector Classification		
Bank Size	Total Sample	Sector	Total Sample	Derivative Users
Large Banks	33 (39%)	Public Sector	27 (33%)	25
Medium Banks	27 (33%)	Private Sector	29 (34%)	25
Small Banks	23 (28%)	Foreign Banks	27 (33%)	22
Total	83 (100%)	Total	83 (100%)	72 (87.8%)

Derivative users were identified as those banks that reported financial futures exposure consistently in their books as an off-balance sheet item during the past five years. Banks that did not show any exposure in all the five years were considered as non-users. Additionally when banks had financial futures exposure in only one of the prior five years and no exposure in the current year were considered as partial users and were grouped with non-users. Derivative users were dominant in the sample (87.8%).

RESEARCH FINDINGS

Derivative users showed significant difference from non-users / partial users only on the parameter of interest margin risk, which was lower for the derivative users (Table 2). On all other parameters the derivative users and non-users / partial users did not show any statistical significance. Derivative usage has curtailed the interest rate risk exposure of banks operating in India.

Table 2: Parameters Differentiating Derivative Users							
Derivative Usage	Interest Margin Risk	Solvency Risk	Credit Risk	Earnings Risk	Business Per Employee	Profit Per Employee	Bank Asset Size
Users	0.46	21.26	4.15	1.42	563.94	4.82	3013755.5
Non-Users/Partial Users	0.73	32.33	2.97	1.13	486.40	2.83	908288.36
F-Value	5.228*	1.946	0.126	0.340	0.278	0.069	1.295
Note: * - Statistical significance at 5% level.							

The application of the proposed model to banks using derivatives had a statistical good fit. The adjusted R square of the model had an explanatory power of the combined variables as 47.3%. Tolerance test and VIF do not indicate any multicollinearity among the variables. Adequacy of solvency, credit risk, derivative growth and asset size are significant at 1% level. Derivative growth

as an explanatory variable for advances growth has an explanatory power of 8% while adequacy of solvency is the prominent influencer with 19.1% explanatory power. Credit risk has a significant explanatory power of 9.7% (Table 3).

Standardized beta coefficients are useful when the independent variables representing the model are of different units as in this case. Assuming all other variables of the model are held constant, the beta for derivative growth indicates that for every one-unit change in advances growth, banks enter into a derivative position to the extent of 0.4931 units.

Table 3: Empirical Model Results – Full Sample

Variable	Beta	t-value	R square change	Tolerance	Variance inflation factor
Constant		-2.23**			
Investment deposit ratio	-0.2141	-2.13**	0.042	0.7130	1.4026
Intermediation cost	0.1145	1.29		0.9126	1.0958
Adequacy of solvency	0.5830	4.47*	0.191	0.4245	2.3554
Credit risk	0.4284	4.09*	0.097	0.6573	1.5214
Derivative growth	0.4931	4.80*	0.080	0.6832	1.4638
Other asset growth	-0.0420	-0.37		0.5607	1.7835
Bank asset size	0.3532	2.66*	0.063	0.4101	2.4382
Interest margin risk	-0.0203	-0.19		0.6286	1.5908
Earnings risk	-0.0726	-0.73		0.7358	1.3591

Note: Dependent variable: Advances growth;
* - Statistical significance at 1% level;
** - Statistical significance at 5% level.

Banks with low capital to asset ratio adjust their lending to meet some predetermined target capital to asset ratio, hence a positive relationship could be expected between capital to asset and advances growth. This has been affirmed in the case of banks operating in India. Brewer (2000) reported a positive coefficient between capital to total asset and loan growth.

Loan quality if good enables a bank to increase its loan portfolio for the next year. The larger the non-performing assets (NPA), the lower the loan quality and hence the expectation is a negative relationship between loan quality to the advances growth next year. However, the positive credit risk coefficient in the model indicates that banks have a higher credit risk exposure and have not improved the loan assessment and recovery process.

Lagged total asset is expected to influence advances growth positively. This iterates the experience of bank in lending activities. The beta coefficient in the current model is significant and

positive. Investment deposit ratio has a negative beta coefficient as is theoretically expected. Traditionally banks have viewed loans and investment securities as substitutable assets. Consequently, when loan growth strengthens, hypothetical assumption is that banks hold less investment securities. Conversely, larger investment leading to increase in assets results in a negative loan growth.

Interest margin risk and earnings risk have the expected negative sign in the equation but are not significant variables. The specific influence of variables could vary due to size differences among banks and also in terms of types of banks operating in India due their unique operational policies and governance.

LOAN GROWTH INFLUENCERS IN TERMS OF BANK DEPOSIT SIZE

The model was applied separately for banks with larger deposit size, medium deposit size and smaller deposit size. All three models established statically good fit, but as was expected significant variables were different for each model. Credit risk is the only variable common in all three models (Table 4). Derivate growth was a significant influencer only for the small deposit size banks. The coefficients in all the models had the similar sign as in the overall model.

Table 4: Model Results – Banks Classified on the basis of Deposit Size

Large size banks	Medium size banks	Small size banks
Credit risk	Credit risk	Credit risk
	Earnings risk	Adequacy of solvency
	Intermediation cost	Derivative growth
	Adequacy of solvency	

LOAN GROWTH INFLUENCERS IN TERMS OF BANK TYPE

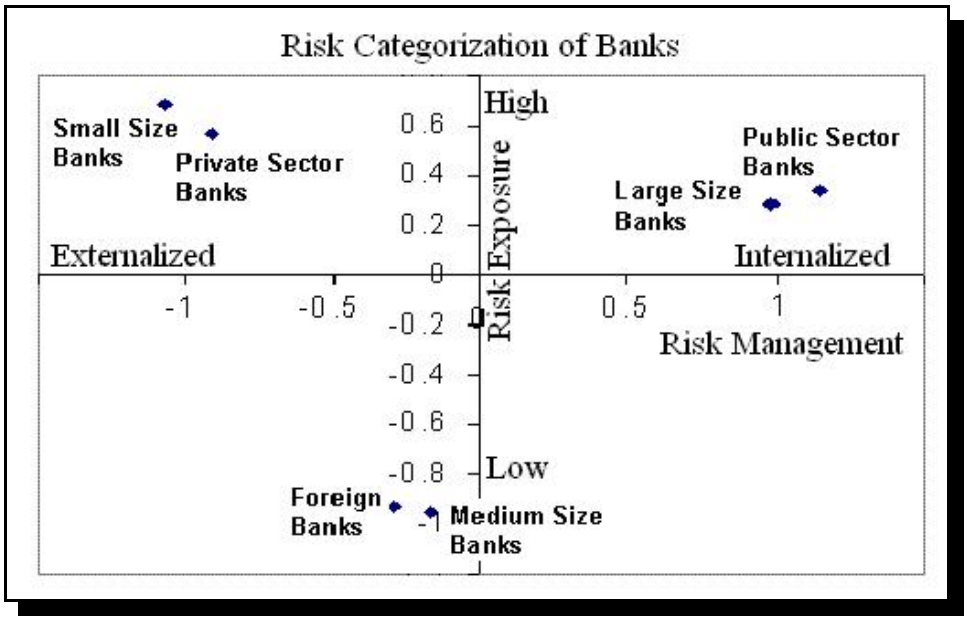
Three models were built to examine specific influencers of advances growth in terms of bank type. All these models showed statistically good fit. Adequacy of solvency was the only variable that influenced advances growth in all the three models. Public sector banks in addition emphasized intermediation cost for determining the growth of advances. Foreign banks in addition considered interest margin risk and percentage of other assets. Foreign banks' exposure in terms of advances and investments as bank assets is low compared to other assets. This could be the reason for the negative statistical significance of other assets in the model for foreign banks. Indian private sector model results are similar to the overall model (Table 5). Operationally, Indian private sector banks

seem to dominate the banking sector advances growth. This could be due to the competitive environment and introduction of best practices in bank operations.

Table 5: Model Results – Banks Classified on the basis of Type		
Public Sector Banks	Foreign Banks	Private Sector Banks
Intermediation cost	Intermediation cost	Adequacy of solvency
Adequacy of solvency	Interest margin risk	Derivative growth
	Percentage of other assets	Credit risk
	Adequacy of solvency	Investment deposit ratio
		Bank size

RISK EXPOSURE AND RISK MANAGEMENT OF BANKS

Sub-models built on the basis of deposit size and bank type were integrated together to identify the risk exposure and risk management practices through correspondence analysis. Private sector banks are small deposit size banks and have high-risk exposure and have externalized their risk management practices (Figure 1). Indian public sector banks though have a high-risk exposure with a large deposit base have not externalized their risk management practices and are more traditional in this respect. Foreign banks have low risk exposure and their risk exposure to a certain extent have been externalized.



POLICY IMPLICATIONS

The research highlights the use of derivatives in a bank portfolio as an influencer of advances growth. There is a positive relationship between derivative growth and advances growth. Derivative growth significantly influences the advances growth of small deposit size banks and Indian private banks. However in all the models derivate growth had a positive sign and this could be inferred as derivatives being used by even public sector and foreign banks as a tool to foster lending activities. Hence, restrictive policy regulations with respect to bank's derivative activities may lead to lower loan growth rate.

Indian banks report their overall commitment of futures position in their financial reports. However, the distinct usage of different types of derivative products needs to be known to understand the attributes of bank's hedging requirements. A policy on mere usage of derivative products may not be as convincing as a policy that is based on knowledge of usage as well as implications of the derivative product usage on the operations of banks. This research tests only the implications of the derivative use. This could be further corroborated through the type of derivatives used to hedge bank portfolio risk. Further the effect of derivatives use on earnings of banks can be established. This would help in determining whether derivative use has resulted in value addition for banks.

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CREDIT UNION PORTFOLIO MANAGEMENT: AN APPLICATION OF GOAL INTERVAL PROGRAMMING

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ABSTRACT

The uncertainty of cash flows, cost of funds and return on investments in ever changing financial markets require financial institutions to develop mathematical models for managing portfolios effectively and efficiently. In this paper, we propose a goal interval programming (GIP) technique for credit union portfolio management. In this technique, penalty functions are introduced in a goal programming (GP) formulation. We present how a system of penalties acts in a GIP to obtain efficient portfolios for credit union problems that have multiple goals and constraints. A comparison of GIP with penalty function and lexicographic goal programming (LGP) has been used to test the results for the same data. We observed from our results that the GIP provides better results in terms of portfolio allocation with maximum returns compared to traditional LGP model.

INTRODUCTION

Credit unions are chartered by their respective states or by the federal government in the United States under provisions of the Credit Union Act of 1934. In 1970, the Bureau of Federal Credit Unions became an independent federal agency with the establishment of the National Credit Union Administration (NCUA). The same year, credit unions, without the use of federal tax dollars established the National Credit Union Share Insurance Fund (NCUSIF) to protect credit union deposits against loss. According to the published data by USA Federal Credit Union, currently, there are more than 85 million credit union members in the United States, with deposits worth over $520 billion (National Credit Union Administration, 2006). Credit unions are financial institutions that specialize in consumer credit and residential mortgages. The primary function of credit unions is similar to other financial institutions and involves generating funds from their members by selling shares and savings deposits to its members and then lending the funds to members in the form of personal or consumer loans (Taylor, 1971).

Financial institutions are fundamentally different from other corporations. When a corporation goes bankrupt, shareholders, debtors and creditors suffer financial losses. The overall

impact of the failure; however, is limited to stakeholders directly. In contrast, the failure of a financial institution can be potentially much more harmful. Financial institutions play a special role of intermediation e.g. payment flows across customers and maintain markets for financial instruments. This role can also make failure of financial institution much more disruptive for the economy than the failure of other entities. Credit unions are generally local and relatively small institutions whose failure is unlikely to destabilize financial markets. However, their failure can affect the growth and sustainability of such institutions as they are usually composed of persons from the same occupational group or the same local community. Credit unions have a comparatively weak governance structure compared to shareholder-owned financial institutions in the sense that no private individuals has the financial incentive to intervene strongly to discipline the management when the credit union's policies or performance go astray (Rasmusen, 1988). The Unions are operated as member-owned, tax- exempt, not-for-profit financial cooperatives and are democratically governed by a volunteer member-elected board of directors (Walker and Chandler, 1976 and 1977). The tax exemption status of credit unions, which is regulated at the federal level by the NCUSIF arises neither from the credit unions' limited fields of membership nor from the type of services they offer. Moreover, in 1951 and 1999, Congress reaffirmed credit union tax exemption status because credit unions operate "without capital stock" and are "organized and operated for mutual purposes without profit." The single exemption of state chartered credit unions is the 5% state corporate income tax. Federally chartered credit unions are exempt from both the State Sales and Corporate Income taxes (Tax Equalization Act, 1951 and Credit Union Access Act, 1999). As credit unions' are exempt from certain taxes, they are able to provide earnings back to members in the form of lower loan rates on loans and higher deposit rates. Banks are insured by the Federal Deposit Insurance Corp. (FDIC), a Federal government agency, and are taxed because they are designed as profit-making corporations that disburse profits to stockholders.

While management of credit union portfolio is less complex than with commercial banks, it still requires some level of quantitative skills and tools that can assist in making better investment decisions. Credit union management typically involves several conflicting objectives such as the maximization of returns, minimization of risk, expansion of deposits and loans. A credit union must determine its trade-off between risk, return and liquidity in managing its portfolio in light of uncertainty in cash flows, cost of funds and return on investments. Mathematical models that use multiple criteria decision-making (MCDM) techniques can assist to achieve these multiple goals. The MCDM approach differs from the mathematical programming model primarily in that it strives to optimize several objective functions simultaneously as opposed to just one. The MCDM modeling process can be divided into multi-attribute decision making (MADM) and multi-objective decision making (MODM). The former is often applicable to problems with the alternatives in a probabilistic environment, while the latter is generally applied to deterministic problems. Lexicographic goal programming (LGP) falls in the category of MODM (Messac et al., 1996).

LGP is one of the most widely used tools for solving MODM problems (Romero, 1986) developed to handle multi-criteria situations within the general framework of linear programming (LP). The LP assists only in modeling a single objective function while the LGP approach is the most popular for handling multiple objective problems in LP framework. The resulting LGP model yields what is usually referred to as an efficient solution because it may not be optimum, with respect to all the conflicting objectives of the problem (Romero, 1991). In the LGP model, a decision-maker associates a fixed target with each attribute in order to achieve the target. The objectives, as well as the structural constraints, are considered as goals by introducing under- and over-deviational variables to each of them. In this formulation, the model penalizes any deviational variable with respect to its target value according to a constant marginal penalty where the fixed target level of a goal is not achieved. However, in a real world situation the objective usually may not be achieved precisely and some degree of deviations from the fixed target will satisfy the needs of decision-makers. The introduction of penalty functions within GP has removed this difficulty and allows decision-makers to use the percentage target achievement where the goal achievement can lie within a certain target interval (Kvanli, 1980). A decision maker can set penalties according to the importance of the changes considering the marginal changes in the achievement of the target. Romero (1991) demonstrated various types of penalty functions and explained if the marginal penalty increases monotonically with respect to the targets than the V- shaped penalty function turns into U-shaped penalty function. This approach is known as goal interval programming (GIP).

In this paper, we present how the system of penalties acts in a GIP to obtain an efficient portfolio that has multiple goals and constraints. In our model for credit union portfolio selection, we have used U-shaped penalty functions. The GIP model allows credit union portfolio managers to allocate funds to maximize returns given the several constraints including regulatory requirements. A comparison of GIP with penalty function and LGP has been used to test the results for the same data. The remainder of the paper is organized as follows. Section 2 gives a brief review of literature on the related problem. Section 3 presents a mathematical model for the problem. Section 4 demonstrates the application of the model. Section 5 presents the results of the application. Finally, Section 6 gives the concluding remarks.

REVIEW OF LITERATURE

The history of GP modeling techniques goes back to 1955 when Charnes et al. (1955, 1961) published the first application of GP. Since then, several studies have been published using LGP for financial decision-making problems (Lee, 1972; Lee and Lerro, 1973; Kumar et al., 1978; Lee and Chesser, 1980; Levary and Avery, 1984; Schniederjans et al., 1992; Sharma et al., 1995; Cooper et al., 1997; Dominiak, 1997; Leung et al., 2001; Pendaraki et al., 2004 & 2005). Lee and Lerro (1973) developed a LGP portfolio selection model for mutual funds. Kumar et al. (1978) developed a conceptual LGP model for portfolio selection of dual-purpose funds. Lee and Chesser (1980)

demonstrated how linear beta coefficient from finance theory reflecting risk in alternative investments could be incorporated into a LGP model. Levary and Avery (1984) also introduced a LGP model representing the investor's priorities and compared the use of LP to GP for the selection of optimal portfolio. Schniederjans et al. (1992) illustrated the use of LGP as an aid to investors planning investment portfolios for themselves. Sharma et al. (1995) presented LGP as an aid for investors or financial planners planning investment portfolios for individuals and/or companies by using beta coefficients and other important parameters. Recently, Pendaraki et al. (2004) applied LGP on a sample of Greek mutual funds.

According to the survey, the lexicographic goal programming (LGP) technique has become a popular technique for solving multi-decision making problems (Sharma et al. 1999; Tamiz and Jones, 1995; Romero, 1986 & 1991). Charnes and Collomb (1972) introduced the idea of goal interval programming. Kvanli (1980) incorporated penalty functions into GP model by analyzing a financial planning problem considering target intervals. Can and Houck (1984), Rehman and Romero (1987), Romero (1991), Ghosh et al. (1993), Sharma et al. (2003), and others have also applied GP with penalty functions.

Most of the studies have focused on commercial banking and other financial institutions. Kusy and Ziemba (1986) applied a stochastic LP model for the Vancouver City Savings Credit Union portfolio. Walker and Chandler (1977 & 1978) used GP models for allocation of Credit Union net revenues and net monetary benefits of credit union membership. Sharma et al. (2002) applied GP modeling for best possible solutions for loan allocation problems. However, the GIP technique has not been significantly used to solve credit unions' portfolio management problems.

METHODOLOGY FOR MODEL DEVELOPMENT

The basic LGP model can be expressed as:

Minimize $\quad \bar{X} = [P_1(\bar{d}), ..., P_k(\bar{d}), ..., P_K(\bar{d})],$

subject to,

$$\left.\begin{array}{l} f_i(\bar{x}) + d_i^- - d_i^+ = b_i \\ d_i^-, d_i^+, \bar{x} \geq 0 \\ and \quad d_i^- . d_i^+ = 0 \end{array}\right\}, \; for \; i = 1,2,....., m, \tag{3.1}$$

where,

$\bar{X}$ = Vector of K priority achievement functions,

$$P_k(\bar{d}) = P_k(w_{ik}^{-}d_{ik}^{-} + w_{ik}^{+}d_{ik}^{+}),$$

$f_i(.)$ = the i[th] function of decision vector , $i = 1,2,...,m$,

b_i = the aspiration level of the i[th] goal,

w_{ik}^{-}, w_{ik}^{+} = the respective weights associated with the under and over- deviational variables,

d_{ik}^{-} and d_{ik}^{+} at the k-th priority level .

In LGP, the goals assigned to different priority levels are not comparable. To make it directly comparable, percentage of achievement is introduced. In this situation, the decision-maker may desire to achieve the goals in terms of percentage in a specified interval rather than achieving goals in fixed targets. In GIP, a system of penalties works for different specified intervals. Introduction of penalty functions according to different intervals of achievement will help to derive a GIP model from a LGP model. In case of five or more sided penalty functions, goals are less or equal to and greater or equal to the target. If the goals are less or equal to the target, the decision maker does not accept an achievement of the goal over t_R% of its target and for the deviation between $t_r - t_{r-1}$% with respect to its target, the marginal penalty is δ_r . The total penalties produced are as $\sum_{r=1}^{R} \delta_r D_{ir}^{+}$. On the other hand, if the goals are greater or equal to the target, the decision maker does not accept an achievement of the goal under t_s% of its target and for the deviation between $t_{s-1} - t_s$% with respect to its target, the marginal penalty is α_s. The total penalties produced can be represented as $\sum_{s=1}^{S} \alpha_s D_{is}^{-}$. The system of goal achievement and marginal penalties is presented in Table 1.

In terms of general GIP model, the equation (3.1) can be expressed as:

Minimize $\bar{X} = [P_1(\bar{D}),...,P_k(\bar{D}),...,P_K(\bar{D})],$

subject to,

$$\left[\frac{100}{b_i}\right] f_i(\bar{x}) + \sum_{s=1}^{S} D_{is}^{-} - D_{is}^{+} = 100 \text{ , for s = 1,2,....,S ; i = 1,2,.....n}$$

$$\left[\frac{100}{b_i}\right] f_i(\bar{x}) + D_{ir}^{-} - \sum_{r=1}^{R} D_{ir}^{+} = 100, \text{ for r = 1, 2,....., R; i = n+1, n+2,.....,m}$$

$$0 \le D_{is}^{-} \le T_s, \; 0 \le D_{ir}^{+} \le T_r \qquad (3.2)$$

where, r (=1,2,...,R) and s (=1,2,....,S) are the target ranges of goals.

T_r, T_s Measurement of achievement of the goal in the r-th target range and s-th target range respectively.

$$P_k(\bar{D}) = P_k\left(\sum_{r=1}^{R} \delta_r D_{ir,k}^{+} + \sum_{s=1}^{S} \alpha_s D_{is,k}^{-}\right),$$

Table 1: Goal Achievement and Marginal Penalties

Attributes	Unit (%)	Marginal Penalty
Goal achievement greater or equal to the target	Below t_S	∞
	……	.....
	$t_{s-1} - t_s$	α_s
	……	.....
	Over 100	0
Goal achievement less or equal to the target	Below 100	0
	.....	.....
	$t_r - t_{r-1}$	δ_r
	.....	.....
	Over t_R	∞

By introducing the defined penalty scales in (3.2), the modified constraints can be expressed as follows:

$$D_{is}^{-} + \eta_s - \rho_s = T_s, \; D_{ir}^{+} + \gamma_r - \varphi_r = T_r$$

The priority structure can be modified as:

$$P_k(\bar{D}) = P_k\left(\sum_{r=1}^{R} \delta_r D_{ir,k}^{+} + \sum_{s=1}^{S} \alpha_s D_{is,k}^{-} + w_{sk}^{-}\eta_{sk} + w_{sk}^{+}\rho_{sk} + w_{rk}^{-}\gamma_{rk} + w_{rk}^{+}\varphi_{rk}\right), \quad (3.3)$$

GIP Model of Credit Union

The following notations are defined to formulate the model of the credit union problem:

Indices

l index for the loan type, $l = \{1, 2, \ldots, L\}$.

c index for Fed Funds, money market fonds or short term securities, $c \in \{c_1, c_2, \ldots, c_n\} \subseteq \{1, 2, \ldots, L\}$

h index for Home Equity loan $h \in \{1, 2, \ldots, L\}$

m index for mortgage loan, $m \in \{m_1, m_2, \ldots, m_n\} \subseteq \{1, 2, \ldots, L\}$

p index for personal loan, $p \in \{p_1, p_2, \ldots, p_n\} \subseteq \{1, 2, \ldots, L\}$

nm index for new motorcycle loan, $nm \in \{1, 2, \ldots, L\}$

um index for used motorcycle loan, $um \in \{1, 2, \ldots, L\}$

nv index for new car/truck loan, $nv \in \{1, 2, \ldots, L\}$

uv index for used car/truck loan, $uv \in \{1, 2, \ldots, L\}$

nb index for new boat, $nb \in \{1, 2, \ldots, L\}$

ub index for used boat, $ub \in \{1, 2, \ldots, L\}$

v index for visa loan, $v \in \{1, 2, \ldots, L\}$

Variables and Parameters

X_l = Amount of money invested in loan *l*,

A_l = Annual rate of return from loan *l*,

R = Total annual return from all loans,

τ = Total available funds available,

C = Required cash for processing all loans,

C_l = Percentage of loans as a cash reserve for each loan l.

The Goals and Priorities

The decision maker's priorities with different goals are defined as follows:

P_1 Utilizes total available funds for investment, maximizing annual return and satisfies home equity loans.

P_2: Satisfies new and used motor cycle loans, cash and money market funds, visa loan, new and used boat loan, and minimize the portfolio's risk.

P_3: Satisfies mortgage and personal loans.

The decision-maker may decide these target goals and priorities depending on their preference.

Goal Constraints

The following goal constraints appear in the general model of the credit union problem to formulate the GIP model.

(1) Available Funds: The objective is to utilize the total available funds. In terms of percentage achievement, the goal equation appears as:

$$\left[100/\tau\right]\sum_{l=1}^{L} X_l + D_1^- - D_1^+ = 100 \qquad (3.1.1)$$

(2) Annual Return: The weighted average annual return on the portfolio should be at least a certain percent of total available funds. In terms of percentage achievement, the goal equation can be written as:

$$\left[100/R\right]\sum_{l=1}^{L} A_l X_l + D_2^- - D_2^+ = 100 \qquad (3.1.2)$$

(3) Operating Cost: The weighted average operating costs should be at least a certain percentage (C_1) of the portfolio. In terms of percentage achievement, the goal equation can be expressed as:

$$\left[100/C\right]\sum_{l=1}^{L} (C_l\%^* X_l) + D_3^- - D_3^- = 100 \qquad (3.1.3)$$

(4) Diversification: In order to reduce risk through diversification, the decision maker may prefer to invest minimal amount of money in several different types of investments/loans, but at the same time establish a maximum amount that can be invested in any particular investment/loan. The restriction and limits on different types of investments/loans and other securities by a credit union are also predefined by senior management. The percentage achievement is not applicable to any goal constraint where the target value is zero. These restrictions can be defined into the following categories:

***(i) Cash/Short Term Securities**:* To ensure liquidity of funds, a percentage of amounts ($d\%\alpha(=\kappa, say)$) are required to be invested in short-term securities such as Fed Funds, money market funds etc. In terms of percentage achievement, the goal equation appears as:

$$\left[100/\kappa\right]\sum_{c=c_1}^{c_n} X_c + D_4^- - D_4^+ = 100 \qquad (3.1.4)$$

(ii) Home Equity Loans: The home equity loans (X_h) for a year must be at least a percentage (y) of all mortgage loans ($m = m_1, m_2, ...,m_n$). The goal equation can be written as:

$$X_h + d_5^- - d_5^+ = y\ \%\ of \sum_{m=m_1}^{m_n} X_m \qquad (3.1.5)$$

(iii) Mortgage Loans: A mortgage ($X_{mq\ \epsilon\{m1,\ m2,\ ...mn\}}$) loan must also be at least a percentage (y) of all other mortgage loans. The goal equation can be expressed as:

$$X_{m_q} + d_6^- - d_6^+ = y\%\ of \sum_{m=m_1(\neq m_q)}^{m_n} X_m \qquad (3.1.6)$$

Also, total allocated mortgage loans must not exceed a percentage (y) of total loan amount. In terms of percentage achievement, the goal equation can be written as:

$$[100/(y\%of\ \tau)]\sum_{m=m_1}^{m_n} X_m + D_6^- - D_6^+ = 100 \qquad (3.1.7)$$

Similarly, other adjustable rate and unimproved property restrictions for each loan type may also be considered.

(iv) Personal Loans: Personal loans are usually unsecured loans with higher interest rate. In order to minimize risk, there should be a limit on those loans. The total amount of personal loans (X_p) for a year must be at least a percentage of total amounts allocated for all other loans. The goal equation can be defined as:

$$\sum_{p=p_1}^{p_n} X_P + d_7^- - d_7^+ = y\%of \sum_{l=1,(l\neq p)}^{L} X_l \qquad (3.1.8)$$

Also, personal loan must exceed a certain percentage of total loan amounts. In terms of percentage achievement, the goal equation can be written as:

$$[100/(y\%of\ \tau)]\sum_{p=p_1}^{p_n} X_P + D_7^- - D_7^+ = 100 \qquad (3.1.9)$$

(v) Vehicle Loans: The goal constraints for vehicles loans can be written as:

(a) New Vehicles: New motorcycle (X_{nm}) and used motorcycle (X_{um}) loans may not exceed the new car/truck loans (X_{nv}). Again, used car/truck loan (X_{uv}) must not exceed 70% of the new motorcycle loans. Mathematically, this can be represented as:

$$X_{nm} + X_{um} + d_8^- - d_8^+ = X_{nv} \qquad (3.1.10)$$

$$X_{nm} + X_{um} + d_8^- - d_8^+ = X_{nv} \qquad (3.1.11)$$

(b) Recreational Loans: New boat (X_{nb}) and used boat (X_{ub}) recreational vehicle loans must be at least a percentage (y) of the total loan amount. In terms of percentage achievement, the goal equation can be written as:

$$[100/(y\%of\ \tau)]\left[X_{nb} + X_{ub}\right] + D_{10}^- - D_{10}^+ = 100 \qquad (3.1.12)$$

(vi) Visa Loans: Visa loan (X_v) amount for a year must be at least a percentage (y) of total amounts allocated for all other loans. The goal equation can be defined as:

$$X_v + d_{11}^- - d_{11}^+ = y\%of \sum_{l=1,(l\neq v)}^{L} X_l \qquad (3.1.13)$$

For example, after introducing penalties to equation (3.1.7), the goal equation with penalty functions can be written as:

$$Minimize \quad \sum_{r=1}^{2} \delta_r D_{6,r}^+$$

$$[100/(y\%of\ \tau)] \sum_{m=m_1}^{m_n} X_m + D_6^- - D_{6,1}^+ - D_{6,2}^+ = 100 \qquad (3.1.14)$$

$$D_{6,1}^+ \leq T_1 \ , \ D_{6,2}^+ \leq T_2$$

The other goal equations may be defined in a similar way.

To demonstrate the use of the proposed GIP model with penalty functions, the following application of Credit Union is presented.

APPLICATION OF GIP TO THE CREDIT UNION

This section considers an application of the GIP model to the portfolio problem of a credit union. We have used the estimated data of a credit union that has $300 million available funds for a given planning year. The objective of decision-maker is to construct a diversified portfolio that provides the maximum total annual return by allocating the funds among twenty different types of loans and investments. Table 2 contains the rates of interest on various loans and investment choices and Table 3 contains the data for the penalty scales for different loans and investments.

Table 2: Credit Union Data

Variable	Loan Types	Annual Rate of Return (%)
X_1	Home Equity Loan (Fixed Rate)	7.25
X_2	30-Year Fixed Rate Mortgage	6.50
X_3	20-Year Fixed Rate Mortgage	6.38
X_4	15-Year Fixed Rate Mortgage	6.00
X_5	3-Year Adjustable Rate Mortgage	5.38
X_6	1-Year Adjustable Rate Mortgage	3.38
X_7	10-Year Unimproved Property	7.75
X_8	Personal Secured Loan	6.75
X_9	Personal Unsecured Loan	6.80
X_{10}	Personal Computer Loan	6.50
X_{11}	New Vehicles (car/truck)	6.25
X_{12}	Used Vehicles (car/truck)	7.75
X_{13}	New Boat	8.25
X_{14}	Used Boat	8.75
X_{15}	New Recreational Vehicle	7.75
X_{16}	Used Recreational Vehicle	8.25
X_{17}	New Motorcycle	8.25
X_{18}	Used Motorcycle	8.75
X_{19}	Visa loan	8.75
X_{20}	Cash/money Market Funds	3.05

Table 3: Penalty Scales for Three Different Loans Attributes		
Attributes	**Units**	**Marginal Penalties**
Personal Loan and Recreational Vehicle Loan	Below 80% 80% - 90% 90% - 100% Over 100%	∞ 2 1 0
Mortgage Loan	Below 100% 100% - 110% 110% - 120% Over 120%	0 1 2 ∞

The complete GIP problem with penalty functions is as follows:

$$Minimize\,(D_1^- + D_1^+ + 2D_2^- + 2d_3^-,\ d_{16}^+ + d_{17}^+ + d_{18}^+ + D_{21,1}^- + 2D_{21,2}^- + \rho_5 + \rho_6 + d_{19}^- + d_{20}^- + d_{22}^+ + d_{23}^- + D_{24}^-, 2d_4^- + d_5^- + d_6^- + D_{7,1}^+ + 2D_{7,2}^+ + \eta_1 + \eta_2 + d_8^+ + d_9^+ + d_{10}^- + d_{11}^- + D_{12,1}^- + 2D_{12,2}^- + \rho_3 + \rho_4 + d_{13}^- + d_{14}^+ + d_{15}^+)$$

The goal equations (4.1), (4.2), (4.7), (4.12), (4.21) and (4.24) have been converted in terms of percentage achievement whereas the goal equations (4.7), (4.12) and (4.21) have been presented as per penalty scales given in Table 2. The percentage achievement is not applicable to goal constraints (4.3-4.6), (4.8-4.11), (4.13-4.20), (4.22) and (4.23) because of target value is zero. The goal equations are defined as follows:

(i) To utilize the total \$300 million in funds, the goal equation appears as:

$$0.333\sum_{l=1}^{20} X_l + D_1^- - D_1^+ = 100 \qquad (4.1)$$

(ii) The average annual rate of return from loans/investments is at least 10% (assumed).

$$0.2417X_1 + 0.2167X_2 + 0.2127X_3 + 0.2X_4 + 0.1793X_5 + 0.1127X_6 + 0.2583X_7 + 0.225X_8 + 0.2266X_9 + 0.2167X_{10} + 0.2083X_{11} + 0.2583X_{12} + 0.275X_{13} + 0.2917X_{14} + 0.2583X_{15} + 0.275X_{16} + 0.275X_{17} + 0.2917X_{18} + 0.325X_{19} + 0.101X_{20} + D_2^- - D_2^+ = 100 \qquad (4.2)$$

(iii) Home equity loans must be at least 15% of all mortgage loans.

$$X_1 + d_3^- - d_3^+ = 0.15\sum_{l=2}^{6} X_l \tag{4.3}$$

(iv) (a) 30-year fixed mortgage must be 25% of fund invested in all other mortgage loans.

$$X_2 + d_4^- - d_4^+ = 0.25\sum_{l=3}^{6} X_l \tag{4.4}$$

(b) 20-year fixed mortgage must be 20% of fund invested in all other mortgage loans.

$$X_3 + d_5^- - d_5^+ = 0.20 \sum_{l=2(l\neq 3)}^{6} X_l \tag{4.5}$$

(c) 15-year fixed mortgage must be at least 30% of all other fixed rate mortgage loans.

$$X_4 + d_6^- - d_6^+ = 0.30(X_2 + X_3) \tag{4.6}$$

(d) Total allocated mortgage loans must not exceed 40% of total loan amount.

$$\left.\begin{aligned} &0.83\sum_{l=2}^{6} X_l + D_7^- - D_{7,1}^+ - D_{7,2}^+ = 100 \\ &D_{7,1}^+ + \eta_1 - \rho_1 = 10 \\ &D_{7,2}^+ + \eta_2 - \rho_2 = 10 \end{aligned}\right\} \tag{4.7}$$

(e) The adjustable rate mortgage must not exceed 30% of the of fixed rate mortgage loans.

$$X_5 + X_6 + d_8^- - d_8^+ = 0.30\sum_{l=2}^{4} X_l \tag{4.8}$$

(f) 1-year adjustable rate mortgage loans must not exceed all other mortgage loans.

$$X_6 + d_9^- - d_9^+ = \sum_{l=2}^{5} X_l \tag{4.9}$$

(g) 10-year unimproved property loans must exceed 10% of total mortgage loans.

$$X_7 + d_{10}^- - d_{10}^+ = 0.10\sum_{l=2}^{6} X_l \tag{4.10}$$

(v) (a) Personal loans may exceed 10% of the fund invested in all other loans.

$$X_8 + X_9 + X_{10} + d_{11}^- - d_{11}^+ = 0.10 \sum_{l=1(\neq 8,9,10)}^{20} X_l \tag{4.11}$$

(b) Personal loans must exceed 8% of total loan amount.

$$\left.\begin{aligned} &4.167\sum_{l=8}^{10} X_l + D_{12,1}^- + D_{12,2}^- - D_{12}^+ = 100 \\ &D_{12,1}^- + \eta_3 - \rho_3 = 10 \\ &D_{12,2}^- + \eta_4 - \rho_4 = 10 \end{aligned}\right\} \tag{4.12}$$

(c) Personal loans may exceed Visa loan.

$$X_8 + X_9 + X_{10} - X_{19} + d_{13}^- - d_{13}^+ = 0 \tag{4.13}$$

(d) Personal unsecured loans must not exceed 30% of all other personal loans.

$$X_9 + d_{14}^- - d_{14}^+ = 0.3(X_8 + X_{10}) \tag{4.14}$$

(e) Personal secured loans must not exceed 20% of all other personal loans.

$$X_8 + d_{15}^- - d_{15}^+ = 0.2(X_9 + X_{10}) \tag{4.15}$$

(vi) (a) Motorcycle loans may not exceed the car/truck loans.

$$-X_{11} - X_{12} + X_{17} + X_{18} + d_{16}^- - d_{16}^+ = 0 \tag{4.16}$$

(b) Used motorcycle loans must not exceed 40% of total loans allocated for motorcycle.

$$-0.4X_{17} + 0.6X_{18} + d_{17}^- - d_{17}^+ = 0 \tag{4.17}$$

(c) Used car/truck loans must not exceed 40% of total allocated amount for car/truck loans.

$$-0.4X_{11} + 0.6X_{12} + d_{18}^- - d_{18}^+ = 0 \tag{4.18}$$

(vii) Cash/Money market funds may exceed 20% of visa loans.

$$X_{20} - 0.2X_{19} + d_{19}^- - d_{19}^+ = 0 \tag{4.19}$$

(viii) Visa loans may exceed 30% of the total fund allocated to all other loan types.

$$X_{19} + d_{20}^{-} - d_{20}^{+} = 0.30 \sum_{l=1(\neq 19)}^{20} X_l \tag{4.20}$$

(ix) a) New and used boat loans must exceed 15% of total loan amount.

$$\left.\begin{aligned} &(2.22)\left[X_{13} + X_{14}\right] + D_{21,1}^{-} + D_{21,2}^{-} - D_{21}^{+} = 100 \\ &D_{21,1}^{-} + \eta_5 - \rho_5 = 10 \\ &D_{21,2}^{-} + \eta_6 - \rho_6 = 10 \end{aligned}\right\} \tag{4.21}$$

b) Used boat loans must not exceed 40% of total loans allocated for boat loans.

$$-0.4X_{13} + 0.6X_{14} + d_{22}^{-} - d_{22}^{+} = 0 \tag{4.22}$$

(x) New and used motorcycle loans may exceed new car/truck loans.

$$-X_{11} + X_{17} + X_{18} + d_{23}^{-} - d_{23}^{+} = 0 \tag{4.23}$$

(xi) The credit union has to maintain at least 5% of loans as a cash reserve with the federal bank.

$$0.33 \sum_{l=1}^{20} X_l + D_{24}^{-} - D_{24}^{+} = 100 \tag{4.24}$$

RESULTS AND DISCUSSION

The case analysis has been performed using LGP and GIP models. A computer code based on Ignizio's (1976) algorithm has been used to run both models. A sensitivity analysis on the total available amount has been performed to identify the best allocation of loans and investments. The results are summarized in the Table 3. The goal achievement in all priorities for both the techniques has been fulfilled. However, according to the result, GIP provides better loan allocation compared to LGP in all Runs. Run-1 requires $250.7663 millions in LGP while in GIP $250.5100 millions to

achieve the same required rate of return. Similarly, Runs-2, 3 and 4 demonstrates improved results in GIP over LGP techniques.

The results show that the attainment of minimum budget requirement is reflected in Run-2. Here, the allocation of amounts to different types of loans will satisfy the primary purpose of management for the planning year. With this allocation all the priorities have been achieved. Again, it is observed that, using LGP, no loan amount is allocated for 3-year adjustable rate mortgages, 1-year adjustable rate mortgages, personal unsecured loans, new vehicles (car/truck), new recreational vehicles, used recreational vehicles, and used motorcycles whereas using GIP, no loan amount is allocated for 3-year adjustable rate mortgages, 1-year adjustable rate mortgages, new recreational vehicles and used recreational vehicles. However, this does not mean that the categories that have an allocation of zero amount will not be considered in practice. These results serve as a guide to the decision-makers based on priorities in a given situation. The LGP and GIP models allocate the total loan amount of $300 million as given in Table 4.

CONCLUSION

Lexicographic goal programming (LGP) and goal interval programming (GIP) provide a basis for handling conflicting objectives in investment decision making and helps provide means for achieving objectives with respect to desired targets. In this study, we have presented the capabilities of LGP and GIP techniques and have applied them to a case study of credit union. From the case example, we have demonstrated that the management decision processes can considerably be enhanced through the application of LGP and GIP models. Our results demonstrate that the GIP model has improved results as we have observed that the desired required rate of return can be achieved by allocating a lower amount in GIP as compared to LGP. The application of these techniques is quite subjective for the decision making process. The improvements of results in a GIP model over LGP depends on the proper selection of penalty values, priority levels, and targets set by the decision- maker in a given situation.

Table 3: Sensitivity Analysis on Available Loan Amount								
	RUN-1		RUN-2		RUN-3		RUN-4	
	LGP	GIP	LGP	GIP	LGP	GIP	LGP	GIP
Loan Target	250.0000	250.0000	300.0000	300.0000	350.0000	350.0000	400.0000	400.0000
Achievement	250.7663	250.5100	300.9194	300.01448	351.0727	350.4279	401.2259	400.1190
X_1	09.2590	09.4000	11.1108	11.1108	12.9626	14.2900	14.8144	16.6900
X_2	12.8260	13.6500	15.3911	24.4499	17.9564	38.5700	20.5215	40.6500
X_3	9.9905	05.5100	11.9887	06.1534	13.9867	07.1510	15.9848	07.9120
X_4	8.9103	06.9000	46.6923	07.8554	54.4745	08.6600	62.2565	09.3260
X_5	0.0000	01.4800	00.0000	00.0000	00.0000	00.0000	00.0000	00.0000
X_6	0.0000	00.0000	00.0000	00.0000	00.0000	00.0730	00.0000	00.0780
X_7	4.6478	03.7600	05.5774	06.6891	06.5070	09.6540	07.4366	13.4510
X_8	4.5006	06.9000	05.4008	06.8718	06.3009	07.0600	07.2011	07.3800
X_9	0.0000	06.9300	00.0000	09.9906	00.0000	12.0290	00.0000	16.5000
X_{10}	2.5034	18.5400	27.0040	26.4303	31.5047	34.1260	36.0054	43.7390
X_{11}	0.0000	00.0000	00.0000	00.0034	00.0000	00.0050	00.0000	00.0240
X_{12}	1.1125	75.2500	85.3350	85.3350	99.5575	90.2520	113.780	97.4610
X_{13}	22.5000	17.7500	27.0000	26.0980	31.5000	34.7600	36.0000	43.9336
X_{14}	15.0000	15.0200	18.0000	16.4532	21.0000	19.1700	24.0000	22.8560
X_{15}	0.0000	00.0000	00.0000	00.0000	00.0000	00.0203	00.0000	00.0340
X_{16}	0.0000	00.0000	00.0000	00.0000	00.0000	02.2400	00.0000	02.3200
X_{17}	7.1112	07.3300	08.5335	08.5335	09.95575	09.2400	11.3780	09.8700
X_{18}	0.0000	00.0000	00.0000	00.0037	00.0000	00.0056	00.0000	00.0064
X_{19}	7.0040	28.0600	32.4048	21.3454	37.8056	14.7800	43.2064	09.8620
X_{20}	5.4008	34.0300	06.4809	42.6908	07.5611	48.3420	08.6413	58.0260

Table 4: Allocation of total loan amounts			
Type of Loan		LGP Model Amount ($Million)	GIP Model Amount ($Million)
X_1	Home Equity Loan (Fixed Rate)	11.1108	11.1108
X_2	30-Year Fixed Rate Mortgage	5.3911	24.4499
X_3	20-Year Fixed Rate Mortgage	11.9887	06.1534
X_4	15-Year Fixed Rate Mortgage	46.6923	07.8554
X_5	3-Year Adjustable Rate Mortgage	00.0000	00.0000
X_6	1-Year Adjustable Rate Mortgage	00.0000	00.0000
X_7	10-Year Unimproved Property	05.5774	06.6891
X_8	Personal Secured Loan	05.4008	06.8718
X_9	Personal Unsecured Loan	00.0000	09.9906
X_{10}	Personal Computer Loan	27.0040	26.4303
X_{11}	New Vehicles (Car Truck)	00.0000	00.0034
X_{12}	Used Vehicles (Car Truck)	85.3350	85.3350
X_{13}	New Boat	27.0000	26.0980
X_{14}	Used Boat	18.0000	16.4532
X_{15}	New Recreational Vehicle	00.0000	00.0000
X_{16}	Used Boat Recreational Vehicle	00.0000	00.0000
X_{17}	New Motorcycle	08.5335	08.5335
X_{18}	Used Motorcycle	00.0000	00.0037
X_{19}	Visa (Classic, Gold, Student)	32.4048	21.3454
X_{20}	Cash/money Market Funds	06.4809	42.6908

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Articles for Volume 6, Number 2

INSIDE VERSUS OUTSIDE SUCCESSIONS IN THE BANKING INDUSTRY

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ABSTRACT

Our investigation of executive succession at major U.S. commercial banks identified differences between natural and forced successions. Investors responded more favorably to succession events when the new executive was hired from outside of the institution in forced successions. Similarly, forced successions were also viewed as wealth creating activities by the financial market. Notwithstanding the regulatory environment in which banks operate, the findings in this study are similar to those reported for non-banking firms.

INTRODUCTION

The replacement of the top executives of a firm is a significant corporate event that has economic implications for investors. Several studies have examined executive succession in industrial firms, with focus on the cause and consequences of the appointment of a new chief executive officer (CEO). Kesner and Sebora (1994) provide a comprehensive review of the executive succession literature. The evidence presented in this body of research suggests that the cause of a succession partly determine the new successor and the effect of the succession on the firm. Therefore, whether the successor is hired from within the firm or from outside becomes an interesting question.

Some qualities of the human capital critical to the successful operation of a firm are unique to the banking industry, because of the legal and regulatory environment in which banks operate. Regulation is a stated reason for omitting banking firms in earlier studies. Consequently, commercial banks are a fitting group of firms to investigate the implication of inside versus outside succession of top executives. This focus on banks is a fundamental difference from earlier studies that have examined industrial firms. The top executives of a banking firm, unlike their counterparts in industrial firms, must also be responsive to the concerns of government banking regulators. Therefore, a working knowledge of bank regulations has to be an integral component of the qualification of bank executives, if they are to be effective managers. To complicate matters more for bank executives, regulators also have a stakeholder interest in the safe and sound operation of these institutions. Notwithstanding these differences when compared to industrial firms, our

evidence suggest that the implication of executive successions are quite similar. Investors in commercial banks also view executive succession as important events in determining the future prospect of banks. This was most pronounced at banks where the executives were forcibly removed from office. The evidence also suggests that the origin of the successor is of interest to both investors and bank regulators, particularly when the prior executive is forced from office.

Managers occupy the pivotal position between the claimants of a firm. Rosen (1992) suggests that managers' decisions have the greatest impact on the firm because of the multiplicative effect that their decisions generate down through the lower levels of the organization. Consequently, changes of personnel occupying executive positions should affect the firm in ways that have significant economic consequences. However, most of the published articles on executive succession appear in the management and behavioral science literature. They focus on the origin of successors (Cannella & Lubatkin,1993; Dalton & Kesner, 1983; Davidson, Worrell, & Cheng, 1990;, and Rajagopalan & Datta ,1996)), and on socio-political factors (Zajac & Westphal, 1996, Cannella & Lubatkin; 1993; Weirsema, 1982; and Kesner & Dalton, 1994)) that affect the succession process. Still other studies such as Denis and Denis (1995), Kesner and Dalton (1994), Zajac (1990), and Reinganum (1985) have examined the relationship between succession and firm performance using both accounting and market measures.

In this study, we use market determined returns to measure performance, as the use of accounting performance measures, especially as they relate to managerial discretion, is widely criticized in the literature by scholars including, Healy (1985), Murphy (1985), DeAngelo (1988), Jensen and Murphy (1990), and Hubbard and Palia (1995). These authors correctly contend that managers can manipulate accounting results. Some studies including Barro and Barro (1990) and Chung, Lubatkin, Rogers, and Owers (1987) have found that executive turnover had no effect on accounting performance measures while having significant effect on market determined measures of performance. However, other studies including Weisbach (1988) and Denis and Denis (1995) have used accounting returns to measure performance and obtained results consistent with market-determined measures of performance. There is some evidence of inconsistency using accounting metrics in turnover studies. Even though banks are the subject of this study and they operate in a highly regulated industry compared to the industrial firms used in earlier studies, we use market returns as the measure of performance.

Using market returns, we estimate abnormal returns associated with the succession announcement by sample banks. Our results show that successors from outside the bank but from within the banking industry attract the most favorable market response for natural successions. However, successors from outside of the industry generate the highest abnormal returns for forced successions. We also find evidence that successions in which regulators are involved are more likely to result in the hiring of outside executives.

The remainder of the paper consists of four sections. Section two includes a review of the literature and provides the motivation for the study. A description of the sample and of how it was

developed is presented in the third section. We develop the hypotheses and discuss our findings in section four. The paper concludes with a summary of our results.

LITERATURE REVIEW

The issue of executive succession has received much attention, particularly in the management literature, (Datta & Guthrie, 1994; Davidson, Worrell, & Cheng, 1990; Kesner & Sebora, 1994; Reiganum, 1985; Wiersema, 1992). The characteristics of the firms prior to and the circumstances of the succession seem to be the most extensively examined issues. In addition, all of these studies examine industrial firms, and provide evidence that is inconclusive on the effect of executive succession on the firm. Our study addresses two important questions. First, the origin of the new executive, and second the subsequent market response, are issues that have received much less scrutiny. Other studies that have looked at the issue of the origin of the new executive include Cannella and Lubatkin (1993), Dalton and Kesner (1983), Davidson, Worrell, and Cheng (1990), Parrino (1997), and Rajagopalan and Datta (1996).

Executive succession continues to generate interest in the business literature for a number reasons. First, the executives occupy a unique position in the corporation, which gives them tremendous influence over all of the firm's activities. Second, the agency problems that exist between managers and shareholders when the ownership and control of corporate assets are separated. Finally, the prior research has provided no unified evidence on the effect of executive succession on subsequent firm performance. An extensive survey of research that focuses on succession conducted by Kesner and Sebora (1994) covers 178 articles published since 1960. The studies included in the survey explore how socio-political factors, corporate strategy, industry differences, and firm performance are related to top executive succession. This study expands our understanding of the executive succession decision by providing an analysis of executive succession at commercial banks, a group of firms not examined in other studies.

The effect of socio-political and behavioral factors on the succession decision usually focuses on the relationship between managers and board members, to the exclusion claimants whose interest is primarily financial, such as shareholders. However, the financial performance of the firm may be affected by sociopolitical and behavior factors, as these factors impact the decisions made by top executives. Socio-political and behavioral factors are more remote from financial performance; therefore, they would tend to play a more significant role in natural successions such as the retirement of a CEO, where claimants with an economic interest in the firm are not necessarily involved. For example, the retirement of a CEO can generally be anticipated. This gives both the CEO and the board ample time to plan for and select a successor. It is widely reported that retiring CEOs prefer continuity, and therefore, want to play the major role in deciding whom their successor will be. Incumbent CEOs tend to prefer an individual more akin to himself or herself, usually an insider who the CEO has groomed for a number of years. Incidentally, the choice of an insider may

also be in concert with the directors who may have had the opportunity to observe or even interact with this individual. The board as the final arbiter over the replacement decision, may support such a CEO-designated candidate, to reduce the search cost and eliminate the risk associated with hiring an unknown outsider.

A firm will not always hire an insider in a retirement succession, as the board may have an overriding interest in finding a new executive who is more reflective of the characteristics and philosophy of its members. Zajac and Westphal (1996) makes a persuasive argument that both the incumbent CEO and the board of directors are driven by a desire to hire new executives with demographic characteristics that are similar to themselves. These characteristics include their functional background, age, and educational background, and may have nothing to do with maximizing firm value. In a study of 232 successions at large U.S. firms listed in 1988 Forbes and Fortune 500 indexes, Zajac & Westphal find evidence that outside successors had demographic characteristics that were different from those of incumbents and more similar to those of the board members. However, the eventual successor, in some cases, depends largely on the relative power of the CEO and the board in the hiring decision. The influence of the CEO over the board is usually made evident by the presence of an heir-apparent. The CEO also holding the position of chairman of the board, the number of insiders on the board, and the ownership stake of inside board members are also reflective of the CEO's influence.

Cannella and Lubatkin (1993) investigated the relationship between firm performance and the likelihood of hiring an outside CEO. Poor firm performance, as measured by both accounting (ROE and adjusted ROE) and market returns, was shown to predict outside hiring. Yet the major contribution of their research was to show how sociopolitical factors alter the succession decision by reducing the likelihood of hiring an outsider when the firm has performed poorly. This provides evidence that the internal politics of the organization may directly impede the use of performance measures by directors to increase firm value.

In spite of the evidence that socio-political factors reduce the effectiveness of the board in the succession decision, directors still have the opportunity in a large number of successions, both natural and forced, to hire executives who could disrupt the status quo by changing the focus of the firm, adopting new corporate strategies, or undertaking a major restructuring of the firm. Wiersema (1992) addressed issues related to corporate focus and strategy in her investigation of a random sample of 146 of the largest U.S. manufacturing firms. She finds that changes in corporate focus and strategy are negatively related to the nature of the succession. Hiring of outside presidents is identified with the most significant changes in corporate strategy. She measured the change in corporate strategy by a change in the firm's specialization ratio. This measure restricted the sample to only multi-business firms. An increase in corporate control activities including asset sales, layoffs, and cost-cutting measures following top management turnover is reported by Denis and Denis (1995) and Weisbach (1995). Major organizational changes such as a change in the dispersion of power, increase flow of information, and more competitive aggressiveness was also

found in an examination of CEO succession, conducted by Miller (1993) on a sample of 36 large U.S. corporations.

Succession events have the potential to create havoc on lower level employees and on the informal relationships they have developed over several years under the old managers. Kesner and Dalton (1994) reports higher than normal turnover among lower level executives following outside successions. These employees are apt to resist what they view as a disruption of the existing order in the organization and by so doing could negate the benefits from the transition to a new executive. Disruptive successions are more likely to be associated with forced successions and the hiring of outsiders. The chance of a successful transition can be severely impaired when successions are preceded by long-tenured CEOs who have developed strong bonds and an informal network within the organization.

Other studies that focus on firm performance and executive successions such as Denis and Denis (1995), Kesner and Dalton (1994), Zajac (1990), and Reinganum (1985) used both accounting and market measures of performance. Both Denis and Denis (1995) and Kesner and Dalton (1984) looked at the pre- and post-succession periods and used returns on assets to measure performance, however, Denis and Denis (1995) also used abnormal stock returns. The two studies predicted increased firm performance following successions preceded by poor performance. Poor performance preceded forced turnovers in Denis and Denis' (1995) study and is associated with increased managerial turnover in Kesner and Dalton's (1994) study.

Reinganum (1985) also finds a positive relationship between executive succession and post-succession performance, but only for outside successions at small firms. Internal successions had no effect on post-succession performance for either large or small firms. This is contrary to Denis and Denis (1995) who found internal successions were associated with positive stock price performance. Puffer and Weintrop (1991), using a sample of 53 turnovers that occurred during 1983, found no evidence linking either accounting or market performance to the likelihood of CEO turnover. However, they found that failure to meet analysts' forecast of earnings was a factor in determining executive turnover. Declining market share also appeared to have a positive effect on the likelihood of executive turnover. A number of studies including Denis and Denis (1995), Kesner and Dalton (1994), Warner, Watts, and Wruck (1988), and Weisbach (1988) seem to support the idea that firm performance played an important role in executive succession decisions.

The prior studies cover diverse aspects of the social science discipline, which necessarily involves several methodological approaches. These studies have applied qualitative and quantitative techniques to data generated by surveys and from secondary sources. In addition, the earlier studies excluded financial firms. This paper adopts a quantitative approach and focuses on objective economic analysis. Our central question is to assess whether commercial banks replace their top executives with insiders or outsiders and how investors respond to that choice.

DESCRIPTION OF SAMPLE

Our sampling period extends from 1983 through 1993. We selected the largest bank holding companies and commercial banks that are listed on COMPUSTAT, CRSP, and in the *American Bank Directory*. There were 246 banks that met this criteria in 1983 but only 145 of these banks remained independent at the end of the study period. The other 101 banks were either acquired or merged with other institutions. This is testament of the significant consolidation within the banking industry during the 1980s and continuing into the 1990s. All executives holding the titles of chairman, CEO, or president were recorded from the *American Bank Directory* published in the fall of each year from 1983 through 1993. Earlier studies used the *Wall Street Journal* (Reinganum,1985; Warner, Watts, & Wruck,1988; Davidson, Worrell, & Cheng, 1990; Denis & Denis, 1995; Cannella & Lubatkin, 1993), Forbes annual report (Parrino,1997; and Zajac & Westphal, 1996)), and *S&P's Register* (Warner, Watts, & Wruck, 1988)) to compile their sample of executive successions. The fall directories report information as of June 30 each year. All instances where an officer holding any of the titles was not also reported as an officer in the publication for the prior year is recorded as a succession. Changes where one titleholder takes on an additional title or moves from one position to another such as the CEO taking on the additional title of chairman or the president becoming the CEO are not recorded as successions. Also not recorded as a succession are cases where an officer holding any of these three titles in one year is not listed with one of the titles in the following year, and no new replacement is identified. Therefore, all successions must involve someone that has taken on at least one of the titles of chairman, president, or CEO. For a succession to be recorded, a new executive must be promoted from a non-executive position within the firm or appointed from any position outside of the bank. A total of 235 successions and 259 successors were identified between 1983 and 1993. The greater number of successors is due to the fact that some successions involved more than one newly appointed executive. Comparing successive annual records of the officers holding executive positions at the sample banks identified these successions.

Next, we checked the *Wall Street Journal* and local, regional and national publications for public announcement of these successions. Announcements for 164 of the successions was identified in at least one of the following news outlets: *Wall Street Journal, American Banker, The Financial Times, Reuters Financial Report, PR Financial News, Southwest Newswire, or United Press International*. The information from these sources confirms the successors identified by tracking the annual fall issue of the *American Bank Directory*. Announcement of some successions was found in more than one news outlet, sometimes on different dates. In all cases, we recorded the earliest date of any of the public announcements. In many cases, the article containing the announcement also provided additional information that is used to classify a succession as either natural or forced. We also checked the various news outlets for the days immediately following the

announcement for related articles that might provide additional information pertaining to the successions.

The origin of a successor was classified depending on whether the new executive was from within the bank or a subsidiary, from another organization in the banking industry, or from another industry (SIC not between 6000 and 6099). Successions involving former employees of a merged institution are recorded as insiders. The reason for the succession, whether natural such as death, retirement or advancement or when the executive was forced to leave was also recorded.

Outside successions include both those from other banking organizations and from other industries. The outsider group includes all appointments where the individual had served less than two years at the bank. Cannella and Lubatkin (1993) also used a two-year limit to classify outside successors. However, two earlier studies Davidson, Worrell, and Cheng (1990) and Chung, Lubatkin, Rogers, and Owers (1987) truncated the years of service with the new company at one year. Some earlier studies record as insiders, executives with either more than five or more than six years with the firm. For each firm involved in a succession, we extract data from COMPUSTAT tapes from CRSP data files.

Thirty-eight of the 259 successors held only the position of chairman. Executives holding only the title of chairman are likely to be heads who play no direct role in the management of the bank. Therefore, like Morck, Shleifer, and Vishny (1989), we checked the signatories to the annual reports for the year each executive holding only the title of chairman was appointed to that position. Sixteen of these chairman (only) successors did not sign the report, which suggests that they were not active participants in the day-to-day affairs of the bank. These 16 executives were deleted from the sample of executive successors that we use in the analysis. One other successor, Sidney Lassen, the chairman of Hibernia Corp was appointed in July 1991 but did not sign the annual reports for either 1990 or 1992. We could not locate the 1991 report so he too was dropped from the sample. The appointment of Terry Raymond, Jr., chairman of North Fork Bancorporation was announced in December 1987 but he signed only the 1988 report. Another chairman, John Adam Kanas, signed both the 1987 and 1989 annual reports. Terry Raymond, Jr., is retained in the sample of successors. The remaining sample includes 223 succession events and 242 successors reported in Table 1.

We are able to classify 150 or 62 percent of the successors in the sample based on their origin. One hundred and six of these successors, representing 71 percent of the sample are insiders and the other 44 representing 29 percent of the sample are outsiders. Cannella and Lubatkin (1993), Lubatkin, Chung, Rogers, and Owers (1989), and Shetty and Perry (1976) reported outside appointments at 11%; Beatty and Zajac (1987) 12%; Dalton and Kesner (1983) 16%; Kesner and Dalton (1994) 18%; and Reinganum (1985) 13% of the successions in their samples. The proportion of outside appointees reported in Table 2 is twice as great as the average of the percentage reported in these earlier studies. Nine of the outsiders are from an industry other than banking. This represents 20 percent of the outside successors, however, to our knowledge none of the earlier studies distinguished between outsiders from within and outside the industry. Seventy percent of

the outside successions occurred in the 1990s, which suggest an increasing tendency for banks to hire outside executives during the later years of the period under review. These outside successions represent a total of 30 successors or 68 percent of the outside successors. Of the 242 successors, we found public announcement of appointments for 160 successors. This forms the base sample used in the remainder of the analysis.

Table 1

Summary of executive successions at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the Fall of 1983 to Fall 1993. The merged/acquired column represents banks dropped from CRSP because they were involved in either a merger or an acquisition during the corresponding or prior year (that is, between the publication for two successive fall directories). The succession events were detected and successors identified by comparing the officers reported in each annual fall issue of the *American Bank Directory* from 1983 through 1993. Inside successions refers to the number of successions where at least one individual holding the title of chairman, president, or chief executive officer was appointed from within the bank or a subsidiary of the bank. Inside successions also include cases where appointees at the surviving bank were formerly employed by one of the banks involved in a merger or acquisition. Industry represents successions where the appointee is from another firm within the financial services industry such as a commercial bank, S&L, or a bank regulatory agency. Successions where the appointee is from a firm other than a commercial bank, S&L, or a bank regulatory agency were recorded as non-industry.

Year	Merged/Acquired	No. of Banks	Successions	Successors
1983		246		
1984	11	235	24	28
1985	17	218	25	29
1986	11	207	21	19
1987	9	198	19	22
1988	11	187	30	34
1989	6	181	24	26
1990	8	173	23	24
1991	9	164	26	28
1992	11	153	16	16
1993	8	145	15	16
Total	101	145	223	242

Table 2

Summary of executive successors at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the Fall of 1983 to Fall 1993. Inside successors include individuals holding the title of chairman, president, or chief executive officer that were appointed from within the bank or a subsidiary of the bank. Insiders also include appointees at the surviving bank that were formerly employed at one of the banks involved in a merger or acquisition. Industry successors represent the appointees from another firm within the financial services industry such as a commercial bank, S&L, or a bank regulatory agency. Non-industry successors include appointees from a firm other than a commercial bank, S&L, or a bank regulatory agency. AD represents the number of successors for which an announcement date is identified in at least one of the following publications: *Wall Street Journal, American Banker, The Financial Times, Reuters Financial Report, PR Financial News, Southwest Newswire, or United Press International*.

Year	AD	Inside Industry	Outside Industry	Non-industry
1984	18	20	0	0
1985	18	13	0	0
1986	14	10	2	0
1987	13	11	3	0
1988	14	12	3	3
1989	16	7	2	1
1990	16	11	6	1
1991	26	12	7	2
1992	11	6	6	1
1993	14	4	6	1
Total	160	106	35	9

HYPOTHESES AND DISCUSSION OF RESULTS

We adopt Fama's (1980) view of the firm as a nexus of contracts, which ties together groups of individuals as the most efficient mechanism to create wealth. The party to these contracts that is most often examined is the shareholders. The other groups include those who hold fixed or implicit claims against the firm, such as creditors, customers, employees, suppliers, and the communities in which the firm operates. Denis and Denis (1995) reported that 68% of the forced turnovers in their sample were at firms actively monitored in the year prior to the turnover by parties other than the board of directors. These parties included blockholders, other shareholders, creditors, and potential acquirers. Furthermore, 56 percent of the firms that experienced forced turnovers were also the target of some form of corporate control activity. In their study Davidson, Worrell, and Cheng (1990) included officers holding the titles of chairman, vice-chairman, CEO, and president,

Wiersema (1992) considered only the president, and Warner, Watts and Wruck (1988) the titles of chairman, CEO, and president in identifying management turnover. Hambrick and Mason (1984) suggest that including the entire management team may strengthen the predictive value of the model. The managers of the firm administer the relationships between these diverse groups but hold primary responsibility to shareholders, though they may have incentives to renege on this obligation. Still, it is the shareholders, through an elected a board of directors that hire and replace the managers. Therefore, shareholders can offer incentives that should ensure that managers pursue policies consistent with the shareholders' interests. A manager is defined here as an officer holding any one or a combination of the titles of chairman, chief executive officer (CEO), or president. We restrict our definition of managers to the three titles that would represent only those senior executives with substantial participation in directing the affairs of a non-banking firm. This is most appropriate since banks are known to have a large number of other officers holding executive-type titles such as senior vice president, executive vice president and vice president.

Academics, including financial economists, are interested in the arrangements, which govern the manager's relationship with the firm because of the important position manager's hold in the organization. The most important issues are the selection, remuneration, and monitoring of the managers' activities to ensure that the objective of maximizing shareholders' wealth remains the focus. Studies by Jensen and Meckling (1976), Fama and Jensen (1983), and Shleifer and Vishny (1986) have examined the mechanisms that should align the interests of managers and shareholders.

An alternate approach focuses on the internal and external control mechanisms that serve to align the interests of shareholders and managers. One option among the internal control mechanisms is the ability of the board to replace the managers of the firm. Managers are replaced under three basic circumstances (a) natural, that is, upon the death, illness, retirement, or promotion of an executive; (b) at the initiation of claimants who want to change the direction or strategy of the firm; or (c) by outside parties who attempt to or acquire control of the firm. For the purpose of this study, we classify successions as either natural or forced. Forced succession includes those that were initiated by shareholders, creditors, the government, or outside investors. Warner, Watts, and Wruck (1988) omitted successions resulting from outside takeover of the firm from their sample; therefore, these successions are also excluded from their forced replacement set. The claimants initiating the replacement of managers are usually the shareholders, but in some instances creditors or implicit claimants may also exert some influence over the management succession decision. The replacement of the top executives at Cendant Corporation in 1998 represents an extreme case for forced action, where it was alleged that the officers committed fraud.

The origin of the successor, that is, whether the successor is an insider, from another organization within the banking industry, or from another industry is an important question raised in this study. The government as regulator holds a peculiar position in banking firms through a series of explicit and implicit contracts. This places the regulator in a unique position between

creditors and the shareholders. The regulator's prime interest is the safety of the institution rather than profitability.

None of the earlier research we reviewed examined financial institutions as a separate group. Banks are an interesting set of firms to study executive succession because banking is a relatively homogeneous industry, banks employ human capital of a specialized nature, and they are extensively regulated. Furthermore, the production processes in the banking industry involve intangibles such as systems, procedures, and expertise that dominate in ways not present in manufacturing firms. All of these intangibles are directly related to human capital.

Successions initiated because of poor firm performance or regulatory actions are considered forced successions. These successions provide directors with the greatest leverage to initiate change through the selection of outside successors. Outsiders are more attractive under these circumstances because these candidates may possess characteristics that differ from those of insider candidates. Zajac and Westphal (1996) argue that there are also socio-political motives for directors to hire executives with characteristics that are different from those of the incumbent management. The perception that these new outside executives are more likely to take actions that will improve the fortunes of the firm is consistent with earlier studies such as Dalton and Kesner (1983), and Datta and Gutherie (1994) that have reported a positive relationship between poor performance and the hiring of outside CEOs. Therefore we predict that outside executive appointments will be associated with forced successions.

Forced successions reflect the stakeholders' displeasure with the performance of incumbent managers. Therefore, if directors are value maximizers, replacing these managers should lead to improved firm performance. Such successions should alter investors' expectation of the prospect for the firm, resulting in higher stock prices.

Table 3: Classification of Executive Succession Events

Summary of executive successions at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the Fall of 1983 to Fall 1993. These successions have been classified as natural, forced, and regulatory. Each succession is also identified by the origin of the successor when there is only a single successor or if all the successors for a given succession are of the same origin. Whenever there is more than one successor for each succession and the successors are of a different origin, no classification is made as to origin. Therefore, the number of succession events reported in this table will be less than that reported in Table 1.

Origin	Natural	Forced Non-Regulatory	Forced Regulatory	Total
Inside	57	8	2	67
Industry	21	11	5	37
Non-industry	3	3	1	7
Total	81	22	8	111

Thirty or 27 percent of the 111 successions that are reported in Table 3 were identified as forced successions, and twenty or 67 percent of these forced successions resulted in the appointment of outsider successors. On the contrary only 30 percent of the natural successions resulted in the appointment of outside successors. Similarly, as presented in Table 4, 66 percent of the 38 forced successors were appointed from outside compared to only 29 percent of the natural successors that were from outside of the firm. Consistent with our conjecture, the evidence indicates outsiders are hired when the stakeholders become dissatisfied with incumbent executives.

Table 4: Classification of Executive Successors

Summary of executive successors at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the Fall of 1983 to Fall 1993. These successors have been classified as natural, forced, and regulatory. Each successor is also identified by their origin.

Origin	Natural	Forced Non-Regulatory	Forced Regulatory	Total
Inside	59	9	4	72
Industry	21	11	6	38
Non-industry	3	4	4	11
Total	83	24	14	121

If forced successions are indicative of the claimants' displeasure with the management of the bank, then banks that forcibly remove their executives should record a positive stock price response. The abnormal return associated with forced successions was 3.12 percent, which is significantly higher than the 0.72 percent recorded for natural successions. The significantly positive response of the market to forced successions reflects investors' favorable assessment of the directors' decision to replace the executives. Investors also seem to concur with the decision to hire a new appointee from outside of the firm. The strong correlation between forced successions and the appointment of an outsider is also reflected in the significant abnormal returns recorded in Panel B of Table 5, for outside successions.

A succession is considered to have the regulator's input if it is a response to regulatory action or if there is any reference of regulatory pressure in the succession announcement or related published articles. The regulators are mostly concerned with the risk of the bank, and therefore, the impact of managerial decisions on bank risk. Regulators should advocate the hiring of new outside managers, since the basis for their concern can usually be linked directly to inept management. Regulators may also have some preference for industry experience, since the human capital acquired over years of dealing with banking laws and regulation may be critical to restoring the bank to a sound operation.

In light of the association between forced successions and the hiring of outsiders, ad the fact that successions in which regulators are involved are classified as forced, we would also expect regulatory successions to result in the hiring of outsiders. Recall from Table 3 that 75 percent of the regulatory successions involved outsiders and 83 percent of these outside successions were industry successions. The pattern is similar in terms of the actual number of successors reported in Table 4. Seventy-one percent of the 14 successors that were associated with regulatory induced successions were from outside the bank. While the primary focus of the regulators is to protect the insurance fund and depositors, and to maintain confidence in the banking system, we can glean some idea of how investors view regulatory induced succession by comparing the abnormal returns of banks where the regulators precipitated the succession to the abnormal returns associated with natural successions. The evidence presented in Panel C of Table 5 shows that, banks where the succession was the result of regulatory intervention the abnormal returns were 4.90 percent, which is significantly greater than the 0.72 percent recorded for natural successions.

Table 5: Abnormal Returns Associated With Executive Succession

Summary of the two-day abnormal returns associated with the announcement of an executive succession at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the fall of 1983 to fall 1993. These successions have been classified as natural, forced, and regulatory. Each succession is also identified by the origin of the successor when there is only a single successor or if all the successors for a given succession are of the same origin. Whenever there is more than one successor for each succession and the successors are of a different origin, no classification is made as to origin. The classification of successions by origin include inside succession, if the executive is promoted from within the firm, a subsidiary, or a merged firm; industry succession, if the executive is from another bank, S&L, or banking agency, and non-industry succession, if from a firm other than a commercial bank, S&L, or banking agency. Outside successions combine industry and non- industry successions. The t-statistics test the difference in mean abnormal returns between the two types or classes of successions reported in each panel. Wilcoxon rank-sum Z scores not reported in the tables that test the difference in medians between various sub-samples are consistent with the t-tests.

Description of succession	N	Mean Abnormal Returns	T-stat
Panel A: Type of succession			
Forced succession	41	3.121	2.087[b]
Natural succession	87	0.721	
Panel B: Origin of successor			
Inside succession	75	0.666	-2.001[b]
Outside succession	53	2.655	
Panel C: Natural and regulatory successions			
Natural succession	87	0.721	1.779[c]

Table 5: Abnormal Returns Associated With Executive Succession

Summary of the two-day abnormal returns associated with the announcement of an executive succession at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the fall of 1983 to fall 1993. These successions have been classified as natural, forced, and regulatory. Each succession is also identified by the origin of the successor when there is only a single successor or if all the successors for a given succession are of the same origin. Whenever there is more than one successor for each succession and the successors are of a different origin, no classification is made as to origin. The classification of successions by origin include inside succession, if the executive is promoted from within the firm, a subsidiary, or a merged firm; industry succession, if the executive is from another bank, S&L, or banking agency, and non-industry succession, if from a firm other than a commercial bank, S&L, or banking agency. Outside successions combine industry and non- industry successions. The t-statistics test the difference in mean abnormal returns between the two types or classes of successions reported in each panel. Wilcoxon rank-sum Z scores not reported in the tables that test the difference in medians between various sub-samples are consistent with the t-tests.

Description of succession	N	Mean Abnormal Returns	T-stat
Regulatory succession	16	4.489	
Panel D: Outside successions			
Industry succession	40	2.474	-0.346
Non-industry succession	13	3.213	
Panel E: Inside and non-industry successions			
Inside succession	75	0.666	-1.322
Non-industry succession	13	3.213	
Panel F: Inside and industry successions			
Inside succession	75	0.666	1.621
Industry succession	40	2.474	
Panel G: Forced successions			
Non-regulatory succession	25	2.246	-0.946
Regulatory succession	16	4.489	

The abnormal returns for banks with outside of the banking industry (non-industry) successions were greater than the abnormal returns for banks with inside successions and also for banks with industry successions. However, the differences are never at a level greater than the 10 percent level of significance.

Table 6: Regressions

The two-day abnormal returns associated with the announcement of an executive succession at a sample of U.S. banks that are listed by both CRSP and COMPUSTAT, and that are also recorded in the *American Bank Directory* from the Fall of 1983 to Fall 1993 is regressed on the variables hypothesized to influence the impact of executive successions. These successions have been classified as natural or forced. Each succession is also identified by the origin of the successor when there is only a single successor or if all the successors for a given succession can be classified as being of the same origin. Whenever there is more than one successor for each succession and the successors are of a different origin, no classification is made as to origin. The classification of successions by origin include inside succession, if the executive is promoted from within the firm, a subsidiary, or a merged firm; industry succession, if the executive is from another bank, S&L, or banking agency, and non-industry succession, if from a firm other than a commercial bank, S&L, or banking agency. The t-statistics (in parentheses) test the significance of the estimated coefficients for the various explanatory variables in explaining the abnormal stock returns associated with executive successions.

Variables	Model 1	Model 2	Model 3
Intercept	0.0312[a]	0.027[a]	0.037[a]
	(3.955)	(3.803)	(4.273)
Type of succession	-0.024[b]		-0.020[b]
	(-2.508)		(-1.996)
Origin of successor		-0.020[b]	-0.015
		(-2.181)	(-1.579)
Number of observations	127	127	127
F	6.288	4.757	4.427
Adjusted R^2	0.048	0.036	0.066

[a] Represent significance at the 1% level,
[b] represent significance at the 5% level,
[c] represent significance at the 10% level.

Finally, we use two binary variables in a multivariate model to assess whether there is any association between the type of succession and the abnormal returns. The variable representing the type of succession is set equal to one if the succession is natural and zero for forced successions. The second variable is set equal to one if the successor is appointed from within the bank and equal to zero for outside hires. The regression results reported are in Table 6. Apparently, it is the type of succession that generated the significantly greater abnormal returns for some banks. The estimated coefficient for the type of succession is -0.024 and for the origin of the successor is –0.020, both significant at the 5 percent level. However, the significance of estimated coefficient for the binary variable representing the origin of the successors disappears when the type of

succession variable is included in Model 3. With the estimate of the coefficient for the type of succession variable at –0.020 and significant in Model 3, we conclude that outside succession is the result of forced succession. Therefore, the abnormal returns we observe represent investors' approval of the replacement decision in forced successions, rather than the approval of the hiring of outsiders.

CONCLUSION

Some of the desirable attributes of top executives in the banking industry may differ from those of the executives at industrial firms, because of the regulatory environment in which banks operate. The regulators of banks also have a unique stakeholder-interest in protecting the interest of depositors, borrowers, the bank insurance fund, and providing for the stability of the financial system. In spite of these differences, our analysis of executive succession at U.S. commercial banks reveals evidence similar to those for industrial firms.

Banks that undertake forced successions experience substantially greater wealth gains than do banks with natural successions, which is consistent with the idea that poor managers were being replaced. Outside appointments that were not the result of forced successions also appeared to have being viewed more favorably by investors. This is reflected in a more favorable response from the market for natural successions when the new officers where employed from outside of the firm but from within the banking industry. However, for forced successions the market responded more favorably when the new successors came from outside of the banking industry. The difference in market response to the selection of outside successors for natural and forced successions suggest that when there was a problem with the incumbent management, the market was more willing to entertain appointment of officers without bank-specific experience. Any inference from this finding regarding non-industry successions must be tempered because of the relatively few observations for this category of successions. Regulatory involvement in the succession also appears to encourage the hiring of outsiders. Finally, further research may include an examination of the characteristics of the banking firms that influence how investors respond to executive succession.

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THE EFFECT OF RESALE CONSTRAINTS ON ABNORMAL RETURNS OF BORROWERS IN SYNDICATED LOANS

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ABSTRACT

We study the relationship between various loan characteristics and abnormal returns to client firms subsequent to commercial bank loans. Using a sample of 1,472 syndicated loans, we find that constraints on loan resale are predictive of short-run abnormal returns. Specifically, we find a negative relation between borrower consent constraints and short-run returns, while agent consent constraints actually appear to foster higher returns, particularly for issues with positive event performance. Our results are consistent with the notion that resale constraints are in place to mitigate potential financial distress, as well as to help facilitate relationships.

INTRODUCTION

Mickelson and Partch (1986) and James (1987) were among the first to document that banks appear to be "unique" as compared to other lenders in their impact on a firm's performance subsequent to a loan. Specifically, other types of financing have been known to lower average stock prices. For example, Asquith and Mullins (1986), Masulis and Korwar (1986), and Bayless and Chamlinsky (1996) have shown that SEO announcements result in an average decline of 2-3%. Further, Eckbo (1986) and Howton, Howton, and Perfect (1988) find that announcements of public bond issues generate zero or negative returns. However, commercial bank loans have been shown to generate positive abnormal returns for client firms around the announcement date. The traditional notion has been that banks are generally considered insiders and may enhance firm value by monitoring performance and reducing information asymmetries (see Fama, 1985; Berlin and Loeys, 1988; and Lwan and Carleton, 1998).

Whereas previous studies examine all bank loans as a single group, implicitly assuming equality in underlying contract characteristics, we address the uniqueness question from a different perspective, considering the possibility that some bank loans are "more unique" than others. To examine this issue, we study particular characteristics of syndicated loan contracts in an effort to determine whether banks are predicting abnormal returns via details within the contract.

Specifically, we look at the length, size, and spread of the loan, as well as certain constraints placed upon loan resale. These constraints can take two forms: (1) a minimum size of resale constraint or (2) an explicit consent constraint, requiring either the borrower or the lender (agent) to give permission for pieces of the loan to be sold in the secondary market.

Mullineaux and Pyles (2006) examine the motivation behind the consent constraints, providing two possible suggestions for their existence. First, the constraints may serve as a device to mitigate financial distress, particularly as it relates to debt restructuring. This motivation suggests that constrained debt may be associated with lower abnormal returns subsequent to the loan announcement, as the constraints may signal a higher probability of default. Second, Mullineaux and Pyles (2006) also suggest the constraints, particularly the agent constraint, may serve to facilitate relationship building, as it effectively "locks-in" the members of the syndicate, at least to a certain extent. This latter motivation is suggestive of enhanced value, thereby implying a potentially positive relation between agent constraints and abnormal returns.

Using syndicated loan contracts active from January 1, 1998, to December 31, 2000, we find that the minimum size of resale constraint is generally not predictive in regards to abnormal announcement returns, as is the case with the size of the loan, the number of lenders, the length of the loan, and the spread of the loan. This seems to indicate that if the loan contracts are indirectly telling us something about the returns of client firms, it comes primarily in the form of loan consent constraints, of which there is little understanding or acknowledgment. We therefore seek to identify the different natures of the two consent constraints.

Past literature finds that loan announcements are associated with positive borrower returns, but this may be offset by the presence of potential bankruptcy, which the constraints may signal. Consistent with this notion, we find borrower and agent consent constraints on loan resale are associated with lower abnormal returns following loan initiation, at least across the entire sample. This finding lends support to the hypothesis that these constraints are more likely to be related to firms with a higher probability of being financially distressed.

As suggested by Mullineaux and Pyles (2006), it is possible that the constraints, particularly the agent consent, may also be used for relationship reasons. Lenders seek to build relationships not only with the borrower, but also with fellow members of the lending syndicate. These relationships, however, are presumably more important with firms likely to sustain (i.e., those with a lower probability of default). Consistent with this notion, after segmenting the sample, we find a positive relation between the agent consent constraint and returns for borrowers with positive abnormal returns, but a negative relation to the remaining observations.

To more fully examine the nature of the constraints, we examine the incremental impact of the constraints by identifying loans that have both agent and borrower constraints (which is the majority of the constrained loans), those that have only a borrower constraint, and those that have only an agent constraint. We find that those with both constraints have generally lower returns (relative to those with no constraints), which is consistent with constraints signaling financial

distress. This is also the case for firms with only a borrower constraint. For firms with only an agent consent constraint, we find lower returns relative to loans with no constraints, but higher than those with borrower constraints. These findings suggest that constraints are generally a negative indication of subsequent equity performance; however, the existence of agent constraints, and the relationships they create, may somewhat offset the signal of financial distress, primarily for those firms that exhibit the highest degree of financial stability.

THE SYNDICATED LOAN MARKET AND RESALE CONSTRAINTS

The syndicated loan market is now widely acknowledged as the largest segment of the global capital market. In 1995, Moody's started rating syndicated loans and by 2001 was providing over 2,000 ratings on syndicated loans, approaching one trillion dollars in value. Standard and Poor's also rates numerous syndicated loans.

The syndicated loan begins with a lead lender, or an "arranger." This institution originates the loan and manages the syndication process. In relatively large loans, there may be more than one lead arranger, or "co-leads." Generally, the lead lender retains the largest piece of the loan. (See Rhodes (1996) for a discussion of the syndication process.)

Once the lead lender receives a mandate from the borrower that allows syndication, the lending institution prepares an informational memorandum that includes the pertinent descriptive and financial information about the borrower to distribute to potential syndicate members. The recipients must sign a confidentiality statement upon receiving the memorandum. They will then generally meet with the lead arranger and discuss the terms of the loan. The lead arranger negotiates and drafts all loan documents and acts as the intermediary between the borrower and other members of the syndicate. In return for these services, the lead arranger receives a fee, generally ranging from 10 to 15 basis points as a percent of the loan.

There are various titles allocated to the other members of the syndicate. Participants taking larger pieces of the loan are often entitled "managers," while smaller participants may be called "co-managers." The smallest members are referred to as "participants." In an oversubscribed loan, the borrower can increase the size of the loan. If they do not, the lead arranger will allocate smaller portions to each member, generally with the goal of maintaining proportional allocations at each level of membership. If the loan is undersubscribed, the lead bank will either take unsold portions or change the terms of the deal in order to make it more attractive to potential members. On rare occasions, the lead arranger(s) contract on a "best-efforts" basis to syndicate the loan. In these cases, they are responsible to take the unsold portion of the loan. Since each member of the syndicate has a separate loan agreement with the borrower, there is at least some incentive for monitoring (see Diamond, 1984). This leads to potential agency problems within the syndicate, since some participants might free ride on the monitoring of other participants.

Most syndicated loans trade in an active secondary market, similar to bonds. This market provides investors, which include non-bank institutions, with access to liquidity. Borrowers and underwriters do not place constraints on bond resale activity, while arrangers and/or borrowers in a syndicated loan context often do place contractual restrictions on the resale of a loan. One type of constraint is a requirement that the borrower and/or arranger grant explicit consent for a secondary market sale. Consent is indicated by the signature of the borrower or lead bank on the assignment contract that affects the sale. In a second type of constraint, the arranger requires a minimum size, such as $10 million, on the re-sale of loans. Such requirements limit the capacity of loan holders to sub-divide the loan into multiple pieces for sale in the secondary market. The lead bank also can, and often does, require that loan holders pay an assignment fee when re-selling the loan.

Both types of constraints have the effect of potentially reducing the degree of liquidity associated with the loan. Borrowers and/or arrangers could withhold consent for resale, effectively making a loan illiquid. The minimum size constraint alternatively creates an "all or none" arrangement for resales at the amount specified. If the minimum is $10 million, for example, the loan is illiquid for any amount smaller than $10 million. The consent constraints also have the potential to make the loan entirely illiquid if either party declines to approve loan sales.

Clearly, there must be some economic benefits associated with the application of these constraints to be balanced against the costs. Since these constraints allow for some control over the size and composition of the lending group, the arranger and/or borrower may see some value in preserving the original make-up of a syndicate. Borrowers may have some concerns about the identity of the lender holding its loan, particularly in the event of financial distress. Boot and Thakor (2002) suggest that flexibility is most valuable in the face of potential disagreements between contracting parties. In particular, the value of flexibility is decreasing to the extent the views of a decision-maker are correlated with the opinions of others who may be able to impede decisions. In our context, the borrower and/or lenders are the "decision-makers" and syndicate members are the agents who might impede future decisions. We argue that decision-makers are especially likely to value flexibility in a state of financial distress. This leads to the straightforward hypothesis that constraints, particularly borrower consent, are likely to be associated with loans that have higher probably of default.

Mullineaux and Pyles (2006) find evidence consistent with the notion that the constraints may be put in place to mitigate financial distress issues. Specifically, it appears that loans are more likely to be constrained if they are to riskier borrowers (i.e. those with lower rating, lower return-on-assets, and lower market-to-book ratios). Therefore, we could expect to see some of the positive reaction to loan announcement negated by this increased probability of financial distress.

Existing research also suggests that "relationships" may play a crucial role in bank lending and, therefore, the motivation of these constraints. (See Boot (2000) and Ongena and Smith (2001) for a survey of this literature.) The value of lender/borrower relationships has multiple sources. A relationship might stem from a pattern of repeat transactions, with a lender learning more about a

borrower over time, resulting in reduced information asymmetry and adverse selection. A similar argument applies to the value of relationships among lending banks in a syndicate. Originators may find it more efficient to market syndications to banks with which they have established relations.

Loan sale constraints might also serve to facilitate and bond such relationships. For example, Dennis and Mullineaux (2000) use the volume of repeat transactions among syndicate members with a given lead arranger as a proxy for the originator's reputation. Lenders, therefore, have incentive to build relationships not only with the borrower, but also with other members of the lending syndicate as well. Constraining loan sales could be a method for preventing a relationship from depreciating in quality. As relationships are generally regarded as positives, we could expect positive responses to the presence of these constraints. Mullineaux and Pyles (2006) find evidence consistent with this "relationship" hypothesis, although the results suggest the financial distress hypothesis may have the more powerful influence. They find that constraints are more likely to be placed on loans to smaller borrowers, which are more likely to value relationships.

DATA

Data come from the Loan Pricing Corporation's (LPC) Dealscan database. Our final sample consists of 1,472 syndicated loans that went active from January 1, 1998, to December 31, 2000. There were a total of 8,249 syndicated loans over this time period. Ticker symbols were available for only 2,676 of the loans. Other than borrower names, the ticker symbol is the only identification available from Dealscan. Criteria for inclusion in the final sample are that the length and amount of the loan must be available, the loan must be confirmed, and that stock price data are available on CRSP. This provides us with a "clean" sample. Descriptive Statistics are presented in Table 1. The consent constraints are listed as either an explicit "yes," an explicit "no," or "N/A" for both the borrower and the lender. We initially assume that the designation of a "N/A" for the consent parameter is equivalent to a "no," but we also examine a sample that excludes the N/A observations and the results are qualitatively similar. The minimum re-sale constraint is given as a proportion of the total amount of the loan. Among the 1,472 observations, 871 have minimum constraints. Out of these, the average minimum constraint was 4.2% of the amount of the loan. Among the 1,472 observations, 981 have some type of explicit constraint.

Following previous studies (e.g., Flannery, 1986; Berger and Udell, 1990; Angbazo, Mei, and Saunders, 1998; Berger and Udell, 1998; Jackson and Perraudin, 1999), we examine various contract characteristics. For example, the variables used in the study include *Tenor*, which is the maturity of the loan, in months; *FeeDum*, which is a dummy variable that equals one if the loan has fees attached to the resale process and zero otherwise; *NumbLend*, which is the size of the syndicate, measured by the number of members in the lending syndicate; *LnAmount*, which is the natural log of the loan size in U.S. dollars; and *Spread*, which is the amount the borrower pays in basis points over LIBOR for each dollar drawn down. (Dealscan, unfortunately, was missing data on the spread

for 68 loans.) Specific to this study, we also examine *MinDum*, which is a dummy variable that equals one if the loan has a minimum constraint and zero otherwise, as well as *AgYesDum* and *BorrYesDum*, which are dummy variables that equal one if the loan has any explicit agent or borrower consent constraint, respectively, and zero otherwise.

Table 1: Descriptive Statistics

	Total Sample	Those with Borrower Consent Constraints	Those with Arranger Consent Constraints	Those with Minimum Constraints	Those with None
	(n=1,472)	(n =867)	(n = 953)	(n = 871)	(n = 491)
% of Sample		58.86	65.70	59.13	33.36
Amount	486.18	502.99	507.14	535.59	464.16
	{758.83)	{729.23}	{771.18}	{794.14}	{750.64}
NumLend	8.43	9.77	9.66	10.07	6.29
	{8.58}	{8.84}	{9.18}	{9.20}	{6.90}
Tenor	39.27	42.78	42.71	43.78	32.49
	{23.50}	{22.90}	{22.89}	{23.08}	{23.03}
Spread	149.58	161.47	162.49	163.37	119.33
	{103.89}	{98.80}	{97.73}	{99.58}	{107.32}

Amount is the size of the syndicated loan, in millions of US dollars. *NumbLend* is the size of the lending syndicate, measured by the number of participants at loan origination. *Tenor* is the maturity of the loan, in months. *Spread* is the all-in drawn spread of the loan, calculated in basis points above LIBOR for each dollar drawn down. Shown are the means, with standard deviations in brackets. Data are from Loan Pricing Corporation's (LPC) DealScan database.

Examining Table 1, consistent with Mullineaux and Pyles (2006), we find that loans with any type of constraint are larger, have a greater number of lenders in the syndicate, and are of longer maturity than those with no constraints on loan resale. The spread is also smaller for loans with no explicit constraints.

There are a couple of caveats to this analysis that must be addressed, both of which concern the established understanding that commercial loan announcements are accompanied by significant positive abnormal returns in the short run. First, it must be acknowledged that syndicated loans are, by nature, large. It is well known that large companies are more immune to fluctuations in returns.

Therefore, we are likely to see much less of a reaction to a loan announcement than has previously been documented. Second, previous studies have taken considerable care to determine the announcement date. Unfortunately, few loans are announced publicly in recent years. The best approximation that we have for the announcement date is the deal active date, defined as the launch date of a deal. This obviously creates a potential problem for our analysis, since it is entirely possible that the loan may be known either before or after the loan becomes active. While there is little we can do in regards to the size of the loans, we attempt to mitigate the date issue by widening the event window in a variety of ways. We address this issue in the following section.

CUMULATIVE AVERAGE ABNORMAL RETURNS

In an attempt to mitigate the potential problems introduced by the lack of an announcement date, we examine a wide range of event windows around the deal active date. We examine periods before, around, and after the deal active date. Window lengths range from a couple of days to over a week. Table 2 reports a sample of the results. Cumulative average abnormal returns are given based on the standard market model. An estimation window of 120 days, ending 20 days before the active date, is used in all calculations.

Table 2: Short-Run Cumulative Abnormal Returns

Window	Cumulative Average Abnormal Return	Significance Level
(-1,0)	0.16%	10%
(-3,0)	0.20%	na
(-5,0)	0.32%	10%
(-7,0)	0.41%	10%
(-7,-3)	0.22%	na
(-5,-2)	0.20%	na
(-1,+1)	0.15%	na
(-2,+3)	0.31%	10%
(-2,+2)	0.25%	na
(-3,+3)	0.31%	10%
(-5,+5)	0.46%	10%
(-7,+7)	0.60%	5%

All calculations are done using an estimation window of –120 days, ending 20 days before the deal active date. Returns presented are based on the standard market model.

The level of abnormal return is considerably lower across all event windows than previously documented. This is not unexpected given the specific characteristics of the sample. However, over half of the windows examined did have significantly (at the 10 percent level) positive abnormal returns. Also, all windows have the predicted positive sign. We feel that this allows us to proceed with the analysis since our sample is severely biased against finding abnormal (positive) returns.

There is no theoretical basis to believe that the actual date of public awareness is more likely to be before or after the deal active date. On one hand, it is possible that information could leak out from a variety of sources before the action date. On the other hand, it is also conceivable that it could take time for the loan to get public attention if there is a sufficient opacity. As you can see, the cumulative average abnormal returns do not help in this determination. There are periods both before and after the active date in which abnormal returns are significantly positive, as well as windows that surround the active date.

We choose to focus on the (-5,0) window for several reasons. First, it corresponds to previous research finding positive abnormal returns. Second, we believe that it is more likely that the loan is known prior to the deal active date than after. Again, these are large, syndicated loans that involve a sizeable amount of money. Moreover, the nature of syndication naturally means that more than one financial institution must know of its existence prior to the active date. In fact, the number of participants can be quite large, as evidenced in Table 1. The greater the number of syndicate members, the greater the number of opportunities for information leakage.

Third, we feel that a 5-day window most closely approximates the period of information resolution. In other words, in the modern technology age, we feel that any asymmetric levels of public information would be incorporated into prices within one trading week. Fourth, the window (-5,0) provides results qualitatively similar to windows (-3,0) and (-7,0). The windows that surround the active date (e.g., (-2,3) and (-3,3)) provide results that are comparable in nature, but differ in some minor specifics, such as occasional significance of the tenor variable. We readily acknowledge that a potential weakness of our short-run analyses concerns the choice of our event window and the influence it has on our results. Therefore, we do all analyses on several different event windows. The results are qualitatively similar to those reported, particularly with the primary variables of interest.

SHORT-RUN ANALYSIS

The average abnormal return in the (-5,0) window for those borrowers with loans involving a borrower consent constraint is .35%, while those with agent consent constraints are associated with a .50% abnormal return. Loans without either constraint experience, on average, a .57% abnormal return, suggesting that constraints may lessen the positive return generally associated with bank loan announcements. Although, this is consistent with the financial distress hypothesis, the higher return for those with agent consent constraints is consistent with the notion that the benefits of relationships

offset the cost of potential financial distress. We will now turn to a formal regression analysis to determine if other loan variables are associated with this difference.

We take a straightforward approach to analyzing the impact loan characteristics may have on abnormal announcement returns. Specifically, we run ordinary least squares regressions on the following model:

$$SRCAR = a + b_1 LnAmount + b_2 Tenor + b_3 FeeDum + b_4 Numblend + b_5 Spread + b_6 Const + e \quad (1)$$

where *SRCAR* is the cumulative abnormal return for each borrower in the (-5,0) window surrounding the deal active date, and *Const* represents the respective constraint of interest. The predicted signs for *LnAmount* and *Tenor* can be viewed in a couple of ways. First, investors may see a large loan (or a longer commitment) as evidence of growth and successful financial planning and therefore react positively to the news. In this case, we would expect to see a positive relation between the size of the loan and the abnormal return of the borrower. On the other had, investors may see a larger loan (or a longer commitment) as a more significant burden on the borrower's future cash flows and therefore interpret it as a "handcuffing" device, suggesting a negative relation.

We include *FeeDum* as an additional measure of extended agent control. If agents receive fees upon the resale of pieces of the loan, this can be perceived as a reduction in liquidity as the transfer process becomes burdensome for the borrower. Therefore, the loan cannot be resold as smoothly as before, and we could see a negative relation between the presence of these fees and the event date abnormal return.

The size of the syndicate, as measured by the number of members in the lending syndicate, could also potentially influence returns. A larger syndicate likely means more transparency about the loan characteristics as information must flow more freely from one lender to another. A large syndicate could also signal the perceived health of the borrowing firm. With more lending institutions willing to become involved in the commitment, investors may interpret this as the lenders' faith in the borrowing firm's financial stability. Also, bank lenders are generally associated with performing a monitoring function that is believed to benefit the client firm. Therefore, we would expect to see a positive relation between *NumbLend* and *SRCAR.* A higher spread on a loan would reflect a larger financial commitment to the borrower. Therefore, we would expect to see a negative relation with the borrower's short-run abnormal return.

We begin by examining the entire sample. The results are presented in Table 3. We find that the size and length of the loan have little predictive ability. Contrary to our expectations, we find a positive relation between *FeeDum* and the cumulative abnormal return. It does not appear that borrowers are troubled by the presence of these fees. We do find the predicted positive relation between the size of the syndicate and borrower abnormal returns, although the spread seems to have little significant relation.

Table 3: Event Returns

	(1)		(2)		(3)		(4)	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Intercept	-2.01	-.73	-1.38	-.49	-2.60	-.95	-1.58	-.56
LnAmount	.14	.63	.09	.38	.17	.75	.11	.49
Tenor	.00	.46	.01	.50	.01	.51	.00	.44
FeeDum	2.13	2.55	1.49	1.62	.39	.37	2.11	1.74
NumbLend	.07	2.01	.08	2.20	.07	2.03	.07	2.07
Spread	.00	.59	.00	.58	.00	.54	.00	.58
BorrYesDum	-2.59	-3.21					-2.41	-2.65
AgYesDum			-1.80	-1.93			-.71	-.67
MinDum					-.44	-.42	.52	.46
N	1,404		1,404		1,404		1,404	
Adj. R^2	.0113		.0067		.0042		.0103	

The dependent variable is *SRCAR,* which is the abnormal return in the (-5,0) window surrounding the deal active date. *BorrYesDum*, *AgYesDum,* and *MinDum* are dummy variables equal to 1 if the loan has a borrower, agent, or consent constraint placed upon it, respectively. *LnAmount* is the natural logarithm of the size of the loan, in millions of dollars. *Tenor* is the maturity of the loan, in months. *FeeDum* is a dummy variable equal to one if the agent receives fees upon the resale of the loan. *NumbLend* is the size of the lending syndicate, measured as the number of lending institutions holding a piece of the loan at origination. *Spread* is the amount the borrower pays, in basis points, over the LIBOR for each dollar drawn down. Data are from the Loan Pricing Corporation's Dealscan and the Center for Research in Security Prices (CRSP) databases.

Examining the primary variables of interest provides intriguing results. Column one suggests that the presence of a borrower consent constraint indicates a lower abnormal return, while we find the same result in column two for the agent consent constraint, although consistent with potential relationship benefits we find lower significance associated with the agent constraint. Column three indicates a minimum consent constraint has no significant impact on the borrower's abnormal return. These results are consistent with the notion that constrained loans are to borrowers with a higher probability of experiencing financial distress. This negative signal appears to, at least partially, negate the positive impact brought about by the announcement of the loan. When all constraints are included in the model (column four), only the borrower constraint maintains significance.

This result may be a function of two possibilities. First, loans generally have both constraints, so multicollinearity may be biasing our results. Second, it is possible that the effect of relationship building offsets the negative signal of financial distress, particularly as it relates to agent constraints. We attempt to determine the likelihood of these explanations in the following analysis.

As previously mentioned, part of our objective in this paper is to identify the different natures of the two consent constraints. Mullineaux and Pyles (2006) find that both have potential advantages in mitigating financial distress, as well as in building relationships, at least for the agent constraint; however, they make no attempt to gauge the relative strength of the two, partially due to the collinearity that exists between them.

While borrowers are likely to value building relationships, arrangers likely have a higher incentive to do so in order to entice future business. Also, the agent constraint may serve to build relationships with syndicate members, which could facilitate future loan commitments. We make a cursory examination of our sample in an attempt to see if there are any discernable borrower characteristics that indicate a relation between the potential for financial distress and abnormal returns around loan announcement.

Unfortunately, we are only able to identify specific borrower characteristics for roughly half of the sample; however, we find no significant differences in those observations and the remaining loans in any of the variables of interest. We find evidence consistent with the notion that the return is somewhat contingent upon the firm's perceived potential to experience financial distress. For example, we find that firms with positive abnormal returns have higher market-to-book ratios. Merton's (1974) model implies the default probability will be negatively related to this variable since the default option is far "out of the money" when this ratio is high. Therefore, a larger market-to-book ratio indicates a smaller likelihood of financial distress. Thus, borrower consent constraints should be less significantly related to firms with positive abnormal performance, and it is these firms that may also experience the greatest benefit from relationships.

To examine this possibility, we segment based on the direction of abnormal returns. In Panel A of Table 4 we examine only those loans in which the borrower experienced a positive cumulative abnormal announcement return. Since the literature is consistent in finding a positive shock around loan announcement, this segmentation may allow us to more closely observe the characteristics associated with this "uniqueness" that loan announcements have. We find some interesting changes in the results. Most interestingly, we find the sign on the agent consent constraint changes, while the borrower stays the same, although it is less significant than for the negative return sample. This is consistent with the belief that agents value relationships more so than borrowers, although only with borrowers who are not likely to default, or in other words, are likely to sustain long enough to provide future business. Borrower constraints, however, appear to be more aimed at mitigating financial distress, as the negative relation persists despite the segmentation.

Table 4: Cumulative Abnormal Returns Segmented by Return Direction								
Panel A: Positive Sample								
	(1)		(2)		(3)		(4)	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Intercept	2.62	.82	1.67	.52	2.44	.77	1.45	.46
LnAmount	.09	.35	.14	.54	.10	.37	.17	.63
Tenor	-.01	-.68	-.01	-.90	-.01	-.76	-.01	-.77
FeeDum	1.18	1.15	-2.41	-2.11	-.15	-.12	-.75	-.52
NumbLend	.10	2.55	.10	2.57	.10	2.66	.09	2.26
Spread	.02	6.02	.02	6.01	.02	5.99	.02	6.08
BorrYesDum	-1.67	-1.67					-3.27	-2.92
AgYesDum			2.51	2.19			4.34	3.32
MinDum					-.11	-.09	-.47	-.37
N	685		685		685		685	
Adj. R^2	.0642		.0669		.0603		.0766	
Panel B: Negative Sample								
	(1)		(2)		(3)		(4)	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Intercept	-8.34	-3.62	-7.00	-2.88	-8.94	-3.88	-7.21	-2.95
LnAmount	.35	1.86	.25	1.25	.39	2.03	.27	1.36
Tenor	.01	.88	.01	.98	.01	1.06	.01	.87
FeeDum	2.17	3.26	2.23	3.04	1.42	1.58	2.67	2.71
NumbLend	-.01	-.42	-.01	-.19	-.02	-.53	-.01	-.22
Spread	-.01	-5.52	-.01	-5.47	-.01	-5.55	-.01	-5.44
BorrYesDum	-1.78	-2.75					-1.35	-1.87
AgYesDum			-1.87	-2.46			-1.22	-1.39
MinDum					-.73	-.82	.12	.13
N	719		719		719		719	
Adj. R^2	.0712		.0692		.0622		.0712	

Table 4: Cumulative Abnormal Returns Segmented by Return Direction

The dependent variable is *SRCAR,* which is the abnormal return in the (-5,0) window surrounding the deal active date. Panel A examines only those loans where the borrower experienced a positive cumulative abnormal return in the window (-5,0) around the deal active date, while Panel B examines only those with negative returns. *BorrYesDum*, *AgYesDum,* and *MinDum* are dummy variables equal to 1 if the loan has a borrower, agent, or consent constraint placed upon it, respectively. *LnAmount* is the natural logarithm of the size of the loan, in millions of dollars. *Tenor* is the maturity of the loan, in months. *FeeDum* is a dummy variable equal to one if the agent receives fees upon the resale of the loan. *NumbLend* is the size of the lending syndicate, measured as the number of lending institutions holding a piece of the loan at origination. *Spread* is the amount the borrower pays, in basis points, over the LIBOR for each dollar drawn down. Data are from the Loan Pricing Corporation's Dealscan and the Center for Research in Security Prices (CRSP) databases.

In Panel B, we examine the other half of the sample and find the results are consistent with those found when looking at the total sample. Specifically, we find a negative relation with both constraints, although column four again indicates that the borrower constraint has the most predictive power.

One interesting result relates to the spread variable. In the positive sample, the coefficient is positive and highly significant, while the opposite is true for the negative sample. We believe this result likely stems from divergent firm characteristics related to spreads. In order to examine this, we divide the sample based on the median of the spread. Again, we can only identify firm characteristics for approximately half of the sample; however, we find that loans with above median spreads are associated with smaller, more risky borrowers (as measured by the firm's sales, market-to-book, and debt-to-asset ratios). These firm characteristics are generally associated with more positive loan announcement abnormal returns, which is consistent with our findings.

To further identify the potential nature of the consent constraints, we segment the sample into four groups: (1) those firms that have no consent constraints, (2) those that have both agent and borrower constraints (which is the majority of the constrained loans), (3) those that have only a borrower constraint, and (4) those that have only an agent constraint. We believe this segmentation will more clearly highlight the effect each has on subsequent firm performance. We then create variables for these different samples and re-examine the *SRCAR* equation. The results from this analysis are presented in Table 5.

We find that relative to those with no constraints, loans with both constraints have significantly lower abnormal returns. For those with just borrower constraints, the return is even lower (F-test is significantly different at the 5 percent level), which is consistent with the specific notion that borrower constraints are signals of potential financial distress. We find, however, that those loans with only agent constraints do not experience significantly lower returns, which is consistent with the offsetting effect of the potential value created by relationships.

Table 5: Regression Results Segmented by Constraints

	(1)		(2)		(3)		(4)	
	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat	Coef.	*t*-stat
Intercept	-2.27	-.83	-3.13	-1.12	-2.41	-.88	-1.19	-.42
LnAmount	.16	.70	.21	.92	.16	.70	.08	.36
Tenor	.00	.45	.00	.47	.01	.50	.01	.48
Feedum	1.76	2.10	-.00	-.00	-.01	-.02	2.54	2.56
NumbLend	.07	2.03	.07	1.93	.07	2.01	.07	2.10
Spread	.00	.56	.00	.50	.00	.54	.00	.64
BothDum	-2.13	-2.64					-3.10	-2.99
AgNotBorr			.98	1.08			-1.15	-1.00
BorrNotAg					-2.89	-1.41	-4.61	-2.16
N	1,403		1,403		1,403		1,403	
Adj. R^2	.0090		.0049		.0055		.0111	

The dependent variable is *SRCAR,* which is the abnormal return in the (-5,0) window surrounding the deal active date. *BothDum* is a dummy equal to 1 if the loan has both a borrower and agent consent constraint. *AgNotBorr* is a dummy variable equal to 1 if the loan has an agent, but not borrower consent constraint *BorrNotAg* is a dummy variable equal to 1 if the loan has a borrower consent constraint, but not an agent consent. *LnAmount* is the natural logarithm of the size of the loan, in millions of dollars. *Tenor* is the maturity of the loan, in months. *FeeDum* is a dummy variable equal to one if the agent receives fees upon the resale of the loan. *NumbLend* is the size of the lending syndicate, measured as the number of lending institutions holding a piece of the loan at origination. *Spread* is the amount the borrower pays, in basis points, over the LIBOR for each dollar drawn down. Data are from the Loan Pricing Corporation's Dealscan and the Center for Research in Security Prices (CRSP) databases.

SUMMARY AND CONCLUSIONS

We examine the predictive power of certain loan characteristics on client firms' abnormal returns around loan announcement. We find that, in the short run, both borrower and agent consent constraints have a negative relation with abnormal returns, although the agent constraint appears to foster relations, thereby offsetting some of the negative impact. We find no relation in regards to the minimum size of resale constraint.

The results for the borrower consent constraint support the hypothesis that constraints are associated with borrowers that have a higher probability of experiencing financial distress. The presence of an agent constraint, however, appears to be motivated by a different reason. When isolating only those borrowers who experience the well-documented positive impact to a loan announcement, the relation is reversed, indicating that the agent constraint may be designed to help build and sustain relationships.

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STRUCTURAL CONFIGURATIONS IN A FINANCIAL SERVICE INDUSTRY

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ABSTRACT

The paper presents an investigation of the strategic profiles of three structural configurations in a sample of executives at financial services firms. In particular, the authors investigate how the firm's in each structural configuration differ in regards strategy, performance, environmental perceptions, and their structural dimensions. Findings indicate that, for nearly every strategic variable, the order from high to low is generally high-structure firms, followed by mixed-structure firms, and then low-structure firms. High structure firms are characterized as larger firms which are aggressive marketers, market-oriented focusing on competitors, showing high levels of perceived performance and adaptability, as well as lower yet acceptable ROI. By definition, the high-structure firms exhibit high levels across all the structural dimensions. On the other hand, low-structure firms are shown to be smaller firms which are passive marketers with less focus on competitors, showing lower levels of perceived performance and adaptability, but higher levels of ROI. Again, by definition, low-structure firms exhibit low levels on all the structural dimensions. The profile of mixed-structure firms are in-between both categories.

INTRODUCTION

For many decades, researchers have studied the various constructs which comprise the strategic nature of organizations and how these constructs interrelate (Chandler 1962, Rumelt 1974, Hall & Saias 1980, Mintzberg 1979). However, an area that has been neglected within this body of research is the examination of the specific structural configurations implemented by firms, as well as how these structural configurations are related to strategy, performance, and environmental factors pertaining to the firm. Most research related to organizational structure focuses on the design, or dimensions, of the company (c.f. Miller 1988). But, rarely does a study investigate the overall structural design, which may be even more relevant than the specifics of the dimensionality (Mahajan & Vakharia 1990, Porter 1980).

The problem with focusing on the dimensions of an organization rather than on the overall structural design is that researchers are required to formulate a myriad of oftentimes contradictory multivariate hypotheses (Shani 1994). Any coherent theme(s) may be obscured by the simple task of interpreting numerous oftentimes different findings related to the dimensions of structure. An

even more serious shortcoming of this approach is that reality is oftentimes not expressed in terms of linear relationships.

Additionally, contingency theory suggests that the levels of structural dimensions, as well as there relationships with other strategic firm characteristics, will depend on the context in which they occur (c.f. Ruekert et al 1985). For example, the centralization of power may correlate positively with innovation in small organizations pursuing a stable task, while the same relationship may be reversed in high-technology firms, where experts are often given broad freedoms to accomplish their goals (Miller 1983). Therefore, structural relationships cannot be divorced from their context. So the 'few variables at a time' alternative of relating strategy to structure may be cumbersome, as well as conceptually inaccurate at times.

It is therefore likely that the dimensions of organizational structure cohere within common configurations, as do those of strategy (c.f. Miles & Snow 1985). If true, then the task of relating the characteristics of the firm to the details of structure will be much simpler. In particular, commonalities across the structural dimensions may accurately reflect the idea of broad structural configurations. The purpose of this paper follows from these ideas and is twofold: (a) to determine if a coherent broad structural configuration is evident and (b) to examine empirically the strategic differences among the structural configurations in areas such as performance or strategy. A sample of executives at financial services firms is selected as the target to study. Firms are grouped into three structural configurations based on the specific structural dimensions: (i) low-structural form, (ii) mixed-structural form, and (iii) high-structural form. Then the profiles of these configurations are examined.

STRUCTURAL FORM

Numerous structural characteristics are common in the literature. However, four major structural dimensions are prevalent: (1) formalization, (2) integration, (3) centralization and (4) complexity (c.f. Child 1974, Ford 1977, Fry 1982, Dalton et al 1980, Hall 1977, Van de Ven 1976, Fredrickson 1986, Miller & Droge 1986, Miller 1987, Miller 1988). Centralization refers to the degree to which the right to make decisions and control activities is concentrated (Fredrickson 1986). In other words, a high degree of centralization within an organization means that the critical decisions are made at the top management level. Formalization can be defined as the extent to which an organization uses rules and procedures to prescribe behavior such as the details on how, where, and by whom tasks are to be performed (Fredrickson 1986). Formalization restricts the activities of employees to those proscribed in advance. Complexity describes the many, usually interrelated, parts of an organization (Fredrickson 1986). This includes the number of hierarchical levels, the span of control, or the geographical dispersion of operating sites, among others. Structural integration refers to the coordination of activities among the different specializations

within the firm (Miller 1987). Highly integrated firms allow contacts between the experts within each department and also with the top level decision-makers.

Porter (1980) claims that organizations require a high degree across all of the structural dimensions in order to implement generic strategies. Thus, the use of consistent structural configurations may lead to better performance. Mahajan and Vakharia (1990) support this empirically in a dynamic environment, where higher performing firms are found to have constant or similar levels across all or most of the structural characteristics. Thus, it may be that the structural configuration plays a significant role in an organization's performance. In other words, perhaps the driver of performance is not the structural dimensions (formalization, integration, etc.) independently, but rather the combination of structural dimensions - referred to as "structural configuration". For this study, three broad structural configurations are possible from which firms might choose: (1) an organic firm: a *low-structure*, (2) a mechanistic firm: a *high-structure*, or (3) a hybrid firm: a *mixed-structure* configuration. Firms implementing a *low-structure* internal environment will exhibit lower levels across all the structural dimensions than other firms. Firms implementing a *high-structure* internal environment will exhibit higher levels across all the structural dimensions than other firms. Finally, a *mixed-structure* firm will show a variety of levels of structural dimensions versus other firms.

OUTCOMES OF STRUCTURAL FORM

Firms with a high-structural configuration (the more mechanistic firms), are said to be more controlling of decision making than other firms, especially the low-structure firms (the more organic firms). Those firms exhibiting a mixed-structure (the hybrids), are most likely the most adaptive firms as they design the structural configuration to match the demands of the market environment. The strategic differences among these configurations have not been extensively delineated and they will now be addressed regarding the general relationships to other characteristics of the firm.

The relationship between organizational structure and performance can best be summarized as inconsistent, since the relationships between key structural dimensions and performance is not strongly supported (Dalton et al 1980). The findings on the associations of integration, centralization, complexity, and formalization to performance do not offer a consistent pattern, oftentimes being positive and other times being negative (c.f. Miller 1988, Dalton et al. 1980, Nwachukwu & Tsalikis 1990). Argument for the positive relationship between high levels of structure and performance stems from the fact that high degrees of formalization contribute to the reduction of role ambiguity and role conflict. Reducing these work stress factors results in increases in related employees attitudes (job satisfaction, organizational commitment, turnover, absenteeism, etc.), and eventually firm performance. Recent studies reveal that corporate boards believe centralized strategic guidance by skilled top management teams produces higher firm performance than widely dispersed management teams (Phan 2000). However, firms with more complex

structures are generally found to be better performers, thus, suggesting that maybe not always will the more mechanistic firms be better performers.

Although the inconsistency of the impact of structural dimensions on performance is accepted, it is widely known that specific structural characteristics do indeed influence performance in some way (Miller 1988). In particular, it may be that the 'fit' between organizational structure and organizational strategy is the key criteria in a given situation (c.f. Venkatraman 1989, Miller 1986). Miller (1988) finds that integration and formalization are relevant for performance for specific strategic types. Therefore, it may be that certain structural dimensions must be present with given strategies in order for the firm to achieve high performance levels (Zeffane 1989). This would suggest that a 'fit' or, alternatively, an interaction between strategy and structure is relevant to performance. Regardless of the explanation, in many cases the benefits of highly structured firms and programs (i.e. TQM, ISO 9000) are apparent for management continuity, quality, and innovation, eventually resulting in improved performance (Shah 2000, Aiken & Hage 1971).

The relationship between structural configuration and environmental perceptions seem to be dependent on environmental uncertainty. The literature on structure and environment indicate that organizations are most effective when their overall design characteristics match or fit with the environment and the levels of uncertainty (Doty et al 1993, Miller 1986, Ruekert et al 1985). Specifically, the more scarce, dynamic, and complex is the environment, then the more organic (low structure) the recommended firm structure. Similarly, the more abundant, stable, and simple is the environment, then the more mechanistic (high structure) should be the structural configuration.

The relationship of structural configuration to marketing factors is not well defined in the literature (c.f. Ruekert et al 1985). Research to date suggests that formalization and centralization, as well as departmentalization, are inversely related to information utilization, which is important for marketing programs (Deshpande & Zaltman 1982, Hage & Aiken 1970). Therefore, it appears that formalization and centralization are inversely related to an organization's responsiveness: more formalized and centralized firms are slower to react to market changes or opportunities. We might expect the more mechanistic firms to be less market-oriented. However, there is reason to believe that the more mechanistic organizational structures may actually result in increased market-orientations. Firms which are more highly structured may more often have the required resources (and personnel) to implement the systems necessary to be truly market-oriented with long-term focus on customers and competitors and attention to the dynamics of the market environment. This may be important because a critical factor pertinent to a market-orientation is the integration of marketing thought throughout the firm – something requiring systems and policies to accomplish (Narver & Slater 1990).

The relationship of structural configuration to innovation, and marketing initiative or leadership, is better understood. Zaltman et al. (1973) draw on numerous studies to argue that organizational dimensions such as formalization, centralization, and departmentalization may have undesirable effects on the planning stages of innovative behavior: more highly structured firms are less innovative. However, the innovative activities may be more successful once implemented under a more mechanistic

structure. Therefore, we might expect higher levels of marketing initiative or leadership to be associated with any of the three structural configurations, depending on the innovative activity under investigation. But again, due to the requirements that marketing systems are in place in order for marketing activities to be successful, it may be that more highly structured firms are more supportive of these types of activities.

INDUSTRY/SAMPLE DESCRIPTION

In the financial services industry, credit union executives are the target of the survey. Data for the study are gathered from a statewide survey in Florida of all the credit unions belonging to the Florida Credit Union League (FCUL). Membership in the FCUL represents nearly 90% of all Florida credit unions and includes 325 firms. A single mailing was directed to the president of each credit union, all of whom were asked by mail in advance to participate. A four-page questionnaire and a cover letter, using a summary report as inducement, were included in each mailing. Of those responding, 92% were presidents and 8% were marketing directors. This approach yielded one hundred and twenty-five useable surveys, a 38.5% response rate. A Chi-squared test of the respondents versus the sampling frame indicates that the responding credit unions are significantly different from the membership firms based on asset size (Chi-sq=20.73, df=7, $p<.01$). Further analysis of the sample indicates that the smaller asset groups are under-represented.

MEASURES

Structural configuration (STRUCFN) is derived from the relevant dimensions of organizational structure, including formalization, integration, centralization, and complexity. Then, the configuration indictor used in the analysis is derived from these four dimensional measures. The firms' structural characteristics are measured using a twelve-item instrument ranging from [1] true to [5] not true. Respondents are asked to circle the number which best describes their firm in regards questions such as: "decision making is highly controlled". From these twelve items the three possible structural forms of firms is derived, as follows: (i) *High-Structure*, (ii) *Low-Structure*, and (iii) *Mixed-Structure*. The twelve structure variables are subjected to a factor analysis using principal factors followed by a varimax rotation. One of the twelve items was eliminated due to inconsistent loading, leaving eleven items. This analysis resulted in three dimensions explaining 60% of the original variance: (1) formalization (FORM) - four items, (2) integration (INTE) -three items, and (3) centralization and complexity combined (CNCM) - four items. Summated scales are used for each of the three components to derive overall indicators of the structural dimensions themselves. Reliability, as measured by coefficient alpha is as follows: .791 for formalization, .696 for centrality/complexity, and .642 for integration.

In order to assign firms to the three structural groups (Low, Mixed, High), first a median split is used to divide each of the individual structural dimensions into high and low categories. Thus, each of the one-hundred nineteen useable respondent firms is now classified as having either high or low levels of formalization, high or low levels of integration, and high or low levels of centralization/complexity. The structural configuration indicator (STRUCFN) is then derived in the following manner. Firms which exhibit high levels across *all* of the structural dimensions are categorized as High-Structure (26%, n=31/119). Firms which exhibit low levels across *all* of the structural dimensions are categorized as Low-Structure (15%, n=18/119). Firms which exhibit inconsistent levels across the structural dimensions are categorized as Mixed-Structure (59%, n=70/119).

Firm Size is included as another relevant structural characteristic, as it may oftentimes be viewed as a proxy for many other organizational characteristics (c.f. Hall et al 1967). In particular, asset size (ASIZE) is the indicator used to represent size of the credit unions. Firms are self-classified by marking the box next to the appropriate asset size category and then ASIZE is estimated from the categories. The size of each credit union is estimated to be the midpoint of the category. This should arrive at an acceptable estimate when accumulated over the entire sample. ASIZE, therefore, has a possible range from $250,000 to $50,000,000, a mean of $18,000,000, and a standard deviation of $17,121,020.

Marketing initiative, or aggressiveness, is conceptualized as inclusive of six relevant areas related to marketing strategy: products, advertising campaigns or other promotions, pricing changes, distribution ideas, technology, and markets (Heiens et al 2004, Pleshko et al 2002). Respondents are asked to evaluate on a scale from [1] not true to [5] true whether their firm is 'always the first' to take action regarding the six items. A principle axis factor analysis indicates the six items load highly on a single factor explaining approximately 67.9% of the original variance in the items. An overall indicator of strategic marketing initiative (SMI) is constructed by summing the six items, with a possible range from six to thirty. A reliability estimate is found to be .902 using coefficient alpha. SMI has a mean of 13.72 and a standard deviation of 5.72.

Market-orientation is defined as a firm's perspective towards its market environment and, in particular, towards its customers and competitors and the variable items are adapted from previous research (Pleshko & Heiens 2000, Narver & Slater 1990). Respondents are asked to evaluate their firm's efforts in the marketplace on a scale form [1] not true to [5] true. The seven items are subjected to a factor analysis using principal axis factoring followed by a varimax rotation. The analysis resulted in two components, three for competitor orientation and four for customer orientation, explaining 69.7% of the original variance. Summated scales were used to represent each of the two components: *customer-focus* (CUSTO) and *competitor-focus* (COMPO). CUSTO and COMPO have a possible range from four to twenty-eight. The reliability of the scales, as measured by coefficient alpha was: customer-focus - .834 and competitor-focus - .789. An overall indicator of market orientation (MARKO) is also created by adding the two components, as in previous empirical efforts (Narver & Slater 1990). CUSTO has a mean of 7.87 and a standard deviation of 2.13. COMPO has a mean of

13.52 and a standard deviation of 3.61. Finally, MARKO, the sum of the two dimensions, has a mean of 31.38 and a standard deviation of 4.51.

Regarding *firm performance*, both market share and profitability indicators are included in the study. In addition, both perceptual and accounting variables are included as well, which should alleviate some of the problems associated with each type of measure (Venkatraman & Ramanujam 1986, Rueckert et al 1985, Keats & Hitt 1988, Frazier & Howell 1983). It is also possible that objective measures may lead to different results than perceptual measures (c.f. Kirca et al 2005). Also, market share and profits are two distinct goals, each with their own demands on the firm. The inclusion of both objectives in the study should greatly add to the findings, especially since different strategies may affect share but not profits, or vice versa (c.f. Kirca et al 2005).

The accounting indicators of performance, *ROI* and *ROA* are derived from government-mandated accounting reports. The ROA variable has a range from 0% to 5%, a mean of 2.20%, and a standard deviation of 0.98. The ROI variable has a range from 1% to 17%, a mean of 7.77%, and a standard deviation of 2.26.

For the *perceptual performance* indicators of market share and profit, ten items are included on the instrument as described below. The ten items are subjected to a principle axis factor analysis, followed by a varimax rotation. This procedure results in two distinct dimensions explaining 66.4% of the original variance in the ten items. The items load as expected with one dimension representing perceived profits and the other representing perceived market share. Perceptual *market share* (PSHARE) is a perceptual indicator measured using a five-item scale, ranging from [1] poor to [5] excellent, as regards five baselines of market share: (1) vs. competitors, (2) vs. goals/expectations, (3) vs. previous years, (4) vs. firm potential, and (5) growth. The overall indicator of market share performance, PSHARE, is constructed by summing the five. A reliability of .872 is found using coefficient alpha. PHARE ranges from five to twenty-five with a mean of 14.64 and a standard deviation of 3.56. The perceptual indicator of *profits* (PPROF) is derived from five questions. In particular, respondents are asked about their profit performance on a scale from [1] poor to [5] excellent, relative to five profitability baselines: [1] vs. competitors, [2] vs. goals/expectations, [3] vs. previous years, [4] vs. firm potential, and [5] growth. An overall indicator of PPROF is constructed by summing the five items. A reliability of .870 is found using coefficient alpha. PPROF ranges from five to twenty-five with a mean of 16.06 and a standard deviation of 4.35.

Additionally, a single-item indicator of perceived *adaptability* (PADAPT) is included. Adaptability is said to have an impact on other aspects of firm performance (c.f. McKee et al 1989). Adaptability is measured using a single-item scale ranging from [1] poor to [5] excellent, as regards a firms adaptations made to the changing environment over the past year. PADAPT has a possible range from one to five, a mean of 3.29, and a standard deviation of 0.91.

One indicator related to the firm's perceptions of the external environment is included: *Environmental Dynamism* (DYNA). The environmental construct is described as the amount of change occurring in an industry environment (Miller 1988; Achrol et al 1983). The respondents are asked to

evaluate their perceptions of the environment on a bipolar scale from [1] to [7] across three items representing dynamism: stable/unstable, variable/not variable, and volatile/not volatile. A factor analysis using principal axis factoring followed by a varimax rotation is performed. The three items load on one dimension explaining 58.7% of the original variance. A summated scale is constructed for DYNA with a reliability of .639 using coefficient alpha. DYNA has a possible range from three to fifteen, a mean of 7.35, and a standard deviation of 2.43.

ANALYSIS/RESULTS

Averages are calculated on all the strategic indicators, for each of the three structural groups. This is followed by an analysis of variance to determine significant differences. If differences are evident, as noted with the 'p'-values, then a post-hoc test using least-squared differences is performed. These post-hoc contrasts are noted to be significant only if they exhibit a 'p'-value of .05 or less. Table 1 exhibits the means, test statistics, and summarizes the findings for each group and each variable.

Table 1: Structural Group Profiles

Variable / Group	Low	Mixed	High	F/X^2	'p'	Finding
Number	20	72	32			
Structure						
FORM (avg)	9.6	12.9	15.6	32.9	.000	H>M>L
CNCM (avg)	5.7	8.5	12.2	54.2	.000	H>M>L
INTE (avg)	7.4	11.6	14.1	31.6	.000	H>M>L
ASIZE (avg $M)	6.8	15.4	31.9	20.6	.000	H>M>L
Strategy						
SMI (avg)	7.7	13.5	17.8	27.5	.000	H>M>L
CUSTO (avg)	18.0	17.8	17.7	0.06	.938	
COMPO (avg)	10.7	13.8	14.5	8.54	.000	H,M>L
MARKO (avg)	28.7	31.6	32.3	4.63	.012	H,M>L
Performance						
ROI (%)	9.3	7.5	7.3	4.98	.009	L>M,H
ROA (%)	2.4	2.2	1.9	1.55	.217	
PPROF (avg)	14.0	15.8	17.7	4.79	.010	H>M,L
PSHARE (avg)	11.6	14.6	16.2	11.0	.000	H>M>L
PADAPT (avg)	2.4	3.3	3.6	16.0	.000	H>M>L
Environment						
DYNA (avg)	7.5	7.6	6.6	1.67	.191	

As noted in the table regarding structural indicators, all three of the structure dimensions show significantly different levels across the groups. However, since the structural configuration was based on the four dimensions, it is expected that the three groups will exhibit significant differences – and it is so. All three, formalization (FORM, p=.000), centralization and complexity (CNCM, P=.000), and integration (INTE, p=.000), show similar significant differences in structural dimensions with high-structure firms exhibiting larger levels than mixed-structure firms, which have higher levels than low-structure firms. Note also structurally that high-structure firms are significantly larger than mixed-structure firms, which are again larger than the low-structure firms. Large firms have an average asset size of $31.9M, while the small firms have an average size of only $6.8M: a very significant difference. Even the mixed-form firms are barely half the size of the high-structure firms.

As noted in the table regarding strategy indicators, three of the four constructs show significantly different levels across the groups. For marketing initiative or aggressiveness (SMI, p=.000), high-structure firms display significantly more initiative than either mixed-structure of low-structure firms, while mixed-structure firms have a higher level of initiative than the low-structure firms. For overall market orientation (MARKO, p=.012), the low-structure firms are significantly less market oriented than the other firms. This market orientation difference is based on the level of competitor-focus (COMPO, p=.000) implemented by the firms, with the low-structure firms displaying significantly lower levels of competitor-focus than do the other firms.

The table also reveals that the groups differ on perceived performance as well, with four of the five indicators exhibiting significant differences. For the perceptual indicators, the results are the same: high-structure firms are the better performers in regards profits (PPROF, p=.010), share (PSHARE, p=.000), and adaptability (PADAPT, p=.000). However, the accounting indicators of percentage returns reveal a different story. No differences are found for ROA (p=.217). But, the low-structure firms show better returns on investment (ROI, p=.009) than other firms and the high-structure firms the lowest ROI, an interesting finding.

Finally, no differences are shown for the perceptions of the external environment (DYNA, p=.191). All three structural configurations seem to have similar evaluations of the environment in which they operate.

DISCUSSION/IMPLICATIONS

The primary purpose of this research is to investigate whether broad structural configurations are evident in the financial services industry and to determine if important strategic differences exist in regards other relevant characteristics of the firm. The statistics reveal that most firms implement a hybrid configuration (a mixed structural form), with the mechanistic (high structural form) and the organic (low structural form) configurations evident in much smaller proportions. The results show that these configurations are significantly different across all four of the main structural dimensions,

as expected by definition. The results also show that these broad structural configurations are highly related to other characteristics of the firm.

Most characteristics of the firm in this study show important differences across the configurations. Where differences exist, except for ROI, the high-structure firms show higher levels on the strategic constructs than the lesser-structured firms. Also, in most cases the mixed-structure firms exhibit higher levels on the strategic constructs than low-structure firms, except for ROI and perceptual profits. Note no differences are found between the groups regarding environmental perceptions, ROA, and customer orientation.

These findings suggest that firms implementing a mechanistic or highly-structural form, characterized by high levels across all the structural dimensions, are better performers in services industries than other firms, unless the main goal is percentage returns. If returns are the primary focus, then the lesser-structured, more organic form might be the better choice. A hybrid or mixed-structural form might also be acceptable in either case, but with lesser perceived and/or accounting performance. But, regarding performance levels, the low-structure form seems to definitely be the lesser performers, except for ROI, at least on the constructs of this investigation.

In regards marketing efforts, the low-structured firms are definitely less market-oriented and aggressive. However, this may actually contribute to the better percentage returns when compared to other firms. Since low-structure firms do not invest large sums of money and effort into activities related to market leadership, it may be possible that this lower investment level leads to better performance. Possibly, being a follower firm in the financial services industry is an acceptable form of competitive strategy.

CONCLUSIONS/LIMITATIONS

The paper studies executives from financial services firms to determine if the strategic profiles differ based on the structural configuration of the firm. In particular, the authors investigate how the firm's in each structural configuration differ in regards strategy, performance, environmental perceptions, and their structural dimensions. Three possible configurations are identified from four dimensions of structure: (i) low-structural form, (ii) mixed-structural form, and (iii) high-structural form. Findings indicate that, for nearly every strategic variable, the order from high to low is generally high-structure firms, followed by mixed-structure firms, and then low-structure firms. The one major exception is that low-structure firms show better ROI than other firms. High structure firms are generally characterized as being aggressive marketers that are market-oriented focusing on competitors, and showing high levels of perceived performance and adaptability. By definition, the high-structure firms exhibit high levels across all the structural dimensions. On the other hand, low-structure firms are passive marketers with less focus on competitors, while showing lower levels of perceived performance and adaptability, but higher returns. Again, by definition, low-structure firms exhibit low levels on all the structural dimensions. The profile of mixed-structure firms are

in-between both categories. It appears that firms wishing to achieve better returns might opt for the low-structure/follower strategy, while other firms wishing for higher market shares or perceived profitability or adaptability opt for a high-structural form. A mixed-structural form is always an option for a middle, safe place in the market.

Caution should be used when generalizing this study to other firms, whether in products or services industries. There several limitations to the conclusions based on the methodology of the study. First, as mentioned previously, conclusions might not be as applicable to smaller firms as to medium and large sized firms. Second, one-shot studies during a single time period are often myopic when investigating strategies. Hatten et al (2004) find that the effects of strategies evolve over time and that it is the implementation of the strategy which is truly important, rather than the classification of the strategic type. Thus, the differences among the structural configurations may be different if measured at (a) an earlier or later time in the same manner or (b) continuously over time. Also, more objective indicators of market share may lead to other conclusions. In addition, the study should only be cautiously generalized to other firms in the financial services industry outside of credit unions. Credit unions exist in an environment that is more protected than other financial institutions, such as banks, and therefore any generalizations might be suspect. It is suggested that future studies investigate this relationship in banks, savings & loans, and other financial services industries. Future studies might also apply this framework to products industries in both the business-to-business and consumer products area to further test the findings.

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MINORITY OWNED COMMUNITY BANKS: 1995-2004

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ABSTRACT

This paper documents the changes in minority ownership of banks over the past decade, 1995-2004. The number (26 to 62) and percentage (.93% to 1.78%) of minority owned banks has increased from 1995 to 2004. The Asian and Hispanic groups experienced the most growth while the African-American group experienced the least. We segment our sample of community banks over the past decade into minority owned banks (MOB) and non-minority owned banks (NMOB). We find significant differences in the bank characteristics MOBs versus NMOBs. We also examine each minority group separately and determine that there are unique characteristics exhibited by each group.

INTRODUCTION

A financial institution is considered to be minority owned if 51% or more of the voting stock is owned by one or more minorities including African-Americans, Hispanic-Americans, Asian-Americans, Native-Americans, and women. One exception to this requirement occurs if the bank's board of directors is mainly minority run or if the bank is serving a community that is predominately made up of minorities. Since a large number of minority owned banks are located in low-income areas, they are often viewed as being the providers of economic stimulation to surrounding underdeveloped communities. The minority owned bank's willingness to make loans in small amounts, connect with the community, and provide other services targeted to minority or low-income groups gives them access to a banking niche that would otherwise not be served. Some critics believe that lending money to individuals and/or businesses in these poor communities is too risky since most minority owned banks do not have access to large amounts of assets (e.g. Brimmer (1971)). Yet, advocates have lobbied for the creation of government sponsored programs that assist minority owned banks through funding.

The first government program created to aid minority-owned banks was the Minority-Bank Deposit Program (MBDP). It was designed by the Nixon administration and put into effect in October of 1970. The MBDP gives minority owned banks preferences to deposits that are made with funds from the federal government. It also encourages corporations to make deposits into minority owned financial institutions. This program was followed up with the Community

Reinvestment Act which was passed by Congress in 1977. It was created in an effort to encourage banks to contribute to the communities that they served, especially low-income areas. The most recent act created to assist the minority banking community is the Community Development Banking Act. It was signed into law in 1994 by President Clinton with the intent of encouraging the creation of a group of community development banks. Beyond the reach of these programs, the FDIC has the ability to help minority owned banks survive even if they are being outperformed by their competitors if the MOB is viewed as being essential to the community that it serves.

It has been debated whether or not these programs have met their goals and contributed to the communities in which they operate. According to the majority of studies, minority owned banks are consistently less efficient and profitable than non-minority owned banks. Some studies attribute the lower levels of efficiency and profitability of minority owned banks to the volatile nature of the large amounts of government deposits that they hold. Other studies have attributed these discrepancies to anything from location in low-income communities to less-qualified key employees. The varying conclusions that have been drawn by previous studies leave room for further exploration of this topic. This paper will not directly address these conflicting views but will rather document the evolution of minority owned community banks over the past decade from 1995 to 2004. We limit our sample to U.S. commercial banks with total assets between $100 million and $1 billion because this is where the majority of minority owned banks exist.

The paper proceeds as follows. Section 2 reviews the existing literature. Section 3 describes the data used in our study, discuss changes in minority ownership over the past decade, and tests for differences in banking characteristics between minority owned banks and non-minority owned banks. Section 4 presents ideas for future research and section 5 concludes the paper.

LITERATURE REVIEW

The majority of the minority banking literature is related to the existence of government programs which are designed to provide deposits to minority owned banks either directly by an allocation of government funds or indirectly by encouraging deposits from corporations. By increasing the deposit base, these government programs have the effect of increasing the availability of loans to borrowers in the communities served by minority owned banks. The presence of these businesses in low-income communities not only helps to foster economic development but provides an example of leadership to the minorities living in the community. Furthermore, the minority bank is seen as providing services to low-income communities that would not be provided if they ceased to exist. Therefore, the goal of the government sponsored programs is not just to strengthen minority businesses, but also to contribute to the economic development of low to moderate income communities. We will proceed by discussing the literature related to these government programs

to provide a background to the existence and progression of minority owned banks. Then we discuss the literature related to differences between minority owned banks and non-minority owned banks.

The Minority Banking Deposit Program was created to fuel the minority banking industry. It was believed that it would simultaneously help the minority banking industry and the economic situations of the local communities that these banks served. While the MBDP was created in an effort to eliminate discrimination against minority owned banks, it has since had the effect of encouraging government agencies and corporations to discriminate against non-minority owned banks when choosing which financial institutions to place their deposits.

Critics of the MBDP such as Brimmer (1971) believe that the program has led to greater inefficiency among minority owned banks. Brimmer believes the types of lending activities that minority owned banks are involved in is restricted by the volatile nature of the government deposits. Boorman (1974) finds a significant difference between the amount of federal deposits at minority banks and non-minority banks. He finds that in 1971, federal deposits made up 10% of total deposits at minority owned banks compared to only about 2% at non-minority owned banks. More recently, Iqbal and Ramaswamy (1999) find federal deposits account for 4.6% of the total deposits of minority banks compared to only 0.5% in non-minority banks. These percentages only represent the amount of deposits that are directly given to the minority owned banks from government funding and do not represent the additional deposits that the banks receive from corporations as a result of government encouragement. It is believed that these percentages would be significantly higher if the deposits from private donors could be singled out. Yet, even from the government funding percentages, it is clear that minority banks continue to rely heavily on deposits from the federal government. Iqbal and Ramaswamy propose that this dependency on funding from the federal government creates deposit instability which is a recurring problem for minority owned banks.

Another way that the government has stepped in to aid minority-owned banks is through the passage of the Community Reinvestment Act (CRA) requires every bank to be evaluated on how well it has helped meet the credit needs of its local community. Each bank is evaluated by use of a CRA audit and is given one of four ratings: Outstanding, Satisfactory, Needs to Improve, or Substantial Non-Compliance. While this process of evaluation was originally intended to occur every 18 months, the passage of the Glass-Leach-Bliley law in 1999 altered the requirements. Since the law went into effect in 2000, the only banks that are required to be audited every 18 months are those banks that receive a rating of either Needs to Improve or Substantial Non-Compliance. The banks that receive an Outstanding rating are to be audited every 5-years and those receiving a Satisfactory rating are to be audited every 4-years. Critics of the new law believe that it will encourage neglect among the banks that are audited less frequently. Matasar and Pavelka (2004) examine the most recent CRA ratings available and indicated that no minority bank received a rating of Substantial Non-Compliance and that only one minority bank received a rating of Needs to Improve.

A bank's CRA rating is required by The Financial Institutions, Reform, Recovery and Enforcement Act of 1989 to be readily available to the public so that potential customers can monitor how much a bank is contributing to the community. While the CRA does not encourage or require banks to get involved in risky loans that might hurt their performance, minority owned banks often participate in these types of activities causing their operating costs to be significantly higher than non-minority owned banks. The scarcity of creditworthy customers in these low-income communities has greatly increased the competition between minority and non-minority banks for the business of the limited number of customers with good credit. Lawrence (1997) points out that this competition often leads the larger non-minority banks to offer services at lower prices than the minority banks can afford, and the result is that the non-minority banks capture the only creditworthy customers from the low-income communities. Therefore, the minority bank's high rejection rate of minority applicants may be attributable to the fact that they receive applications from the least credit-worthy individuals of the community.

The Community Development Banking Act (CDBA), signed into law by Clinton in 1994, created the Community Development Financial Institutions Fund which is aimed at financing specialized, community development financial institutions. It is an alternative to the Community Reinvestment Act and differs by providing subsidies directly out of general tax revenues. According to the CDBA, the government set aside $382 million from general tax revenue to contribute over a span of four years to finance community development banks that are located in and serve low-income communities. The CDBA requires that the banks match every dollar received from government funding with a dollar raised from private capital. Its intent is to promote economic and community development by contributing to the liquidity of community banking institutions. Advocates of the CDBA believe it is less costly when a tax is spread over the entire society as opposed to being levied on a single industry. Since the CRA imposes a tax on the banking industry alone, it is often viewed as inefficient (Lacker (1995)).

Next, we will discuss literature relating to comparisons between minority owned banks and non-minority owned banks. When studying the different characteristics between minority owned banks and non-minority owned banks, the two types of banks must be compared in a similar context. In the past there have been several methods that have been used in order to create a control group of non-minority banks to compare with minority banks. One method of creating these control groups is through the use of zip code clusters. Clair (1988) was the first to use this methodology to compare banks that were located in the same zip code or in a zip code adjacent to the bank's main office. Those in favor of using zip code clusters believe that it is more appropriate to use this method, because it matches banks within a narrower geographical region. The narrower the region being used, the more likely it is that both the non-minority and minority banks exist in similar conditions and face comparable market trends. Clair (1983) and Lawrence (1997) find in their studies that when a narrower geographical region is used there are fewer significant differences between the performances of minority and non-minority owned banks.

Previous studies used zip-code clusters to compare the efficiency of minority owned banks to that of non-minority owned banks. One approach to comparing the efficiency of these two types of banks is through the use of a frontier model. Elyasiani and Mehdian (1992) judge efficiency under the frontier model by determining how the bank managers could maximize revenue or minimize cost. Specifically, they focus on the levels of costs incurred by the minority owned banks versus the non-minority owned banks. In their study they control for regional, regulatory, size, and maturity differences, and find that there was not a significant statistical difference between the efficiency of minority-owned banks and non-minority owned banks. Hasan and Hunter (1996) follow a similar approach in their study of the production efficiency of minority-owned banks versus non-minority owned banks. They compare minority owned banks and non-minority owned banks to a group of best-practice banks. They define best-practice banks as any bank, regardless of ownership, that is able to produce its financial services at the lowest cost while also allocating any inputs or factors of production efficiently. Their results indicate that the minority and women owned banks operate at a lower level of efficiency than the average non-minority bank. This result is partly based on the fact that minority and women owned banks experienced significantly higher operating costs. Lawrence (1997) points out that under information theory, financial institutions may discriminate in an effort to lower costs. If they are prohibited from discriminating they may be faced with higher costs and therefore be viewed as operating inefficiently.

In an early study by Boorman (1974), he finds when comparing costs of non-minority banks to minority banks, the minority banks had higher employee expenses, lower interest costs, and significantly larger loan losses than non-minority banks. Boorman also finds that while minority owned banks and non-minority owned banks have similar levels of efficiency, minority owned banks do not have much potential to stimulate the economies of the communities they are located in and that minority banks are less than half as profitable as non-minority banks. His study determines that this large difference could be attributed to the large loan losses experienced by minority banks. Brimmer (1971), Gardner (1984), and Boorman and Kwast (1974) also indicate in their research that minority banks are less profitable than non-minority banks.

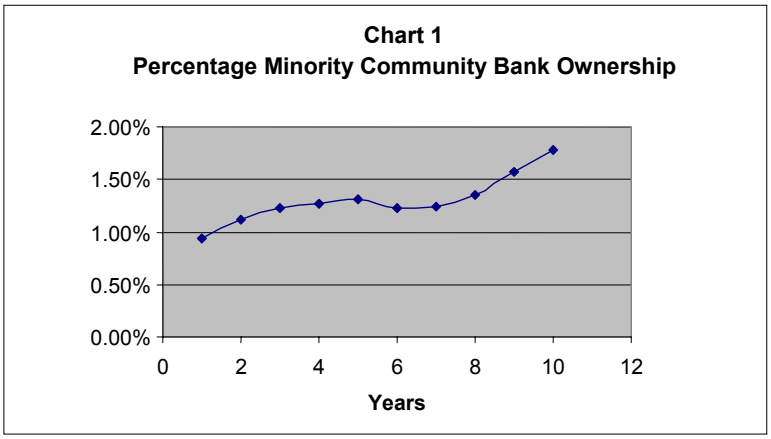
In a recent study by Iqbal and Ramaswamy (1999), the frontier model is used to determine output efficiency by measuring technical and allocative efficiency, which measure whether banks are producing the maximum amount of possible outputs and using the correct proportions of those outputs. Their results indicate that minority owned banks are not acting efficiently in the technical or allocative areas.

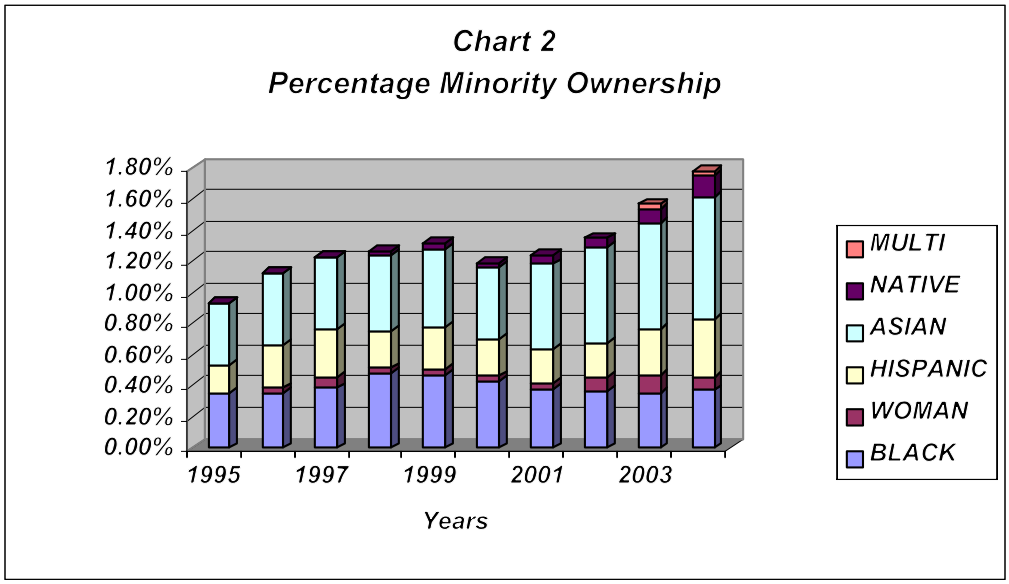
DATA, VARIABLE SPECIFICATION, AND METHODOLOGY

We gather our community bank data from the Annual Reports of Condition and Income (Call Report) required by the Federal Deposit Insurance Corporation. We use the definition of community

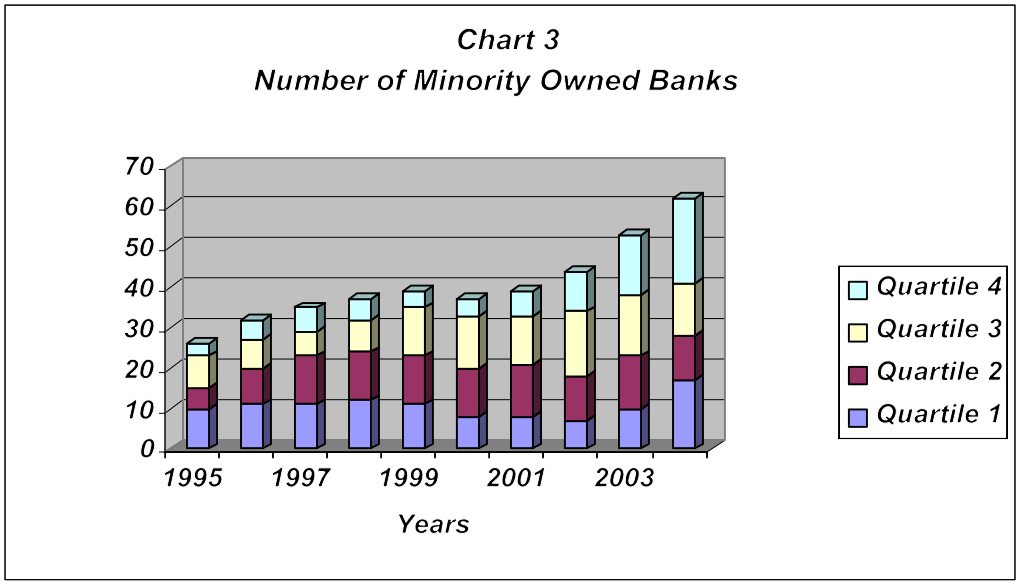
banks as defined by Carter and Sinkey (1998). We examine US commercial banks with total assets between $100 million and $1 billion. There are 4,397 banks and/or bank holding companies in this category between 1995 and 2004. We choose the dates for our sample to cover the most recent 10 year period. The Call Reports classify banks as being owned by either a Caucasian man, black, woman, Hispanic-American, Asian-American, Native American, Eskimo, Aleut, Arab-American, or Multiracial. In our sample we find at least one bank owned by each minority group except for the Eskimo, Aleut and Arab-American.

This paper examines the changes in minority ownership at the community bank level over the past ten years. Chart 1 shows the growth in minority banks as a percentage of all banks. Here you can see that in 1995, .93% (26) of community banks were owned by minorities. That percentage grew to 1.78% (62) by 2004. Although these are very low percentages, the number has more than doubled in a decade. Chart 2 examines which minority group of minorities has experienced the most growth from 1995-2004. Here you can see that the Asian (11 to 27) and Hispanic (5 to 13) minority groups have seen the largest growth. The number of women owned banks has increased from zero existing in 1995, to three existing in 2004. It is interesting to note that the African American group has remained fairly stable in their ownership of community banks, ranging from 10 to 13.





In addition to simply examining growth among each minority group, it is interesting to examine the change in the characteristics of these banks. We start by examining changes in size. We divide the entire sample of community banks into quartiles based on total assets. Chart 3 shows the number of minority owned community banks in each quartile. You can see from this chart that quartile 4, contains the largest community banks, and has seen an increase in the number of MOBs. In 1995, only 3 minority owned banks existed in quartile 4. By 2004, 21 MOBs were included in quartile 4. We also observe a less significant increase for quartile 3 from 8 banks to 13 banks. This chart indicates that not only are minority owned banks increasing in number but they are also increasing in size which should increase their ability to compete in their local markets.



We also compute summary statistics on the minority owned and non-minority owned banks each year. The variables that we calculate and make comparisons between are defined as follows:

TA = Total Assets
EC = Equity Capital divided by Total Assets
PS = Dollar amount of Preferred Stock divided by Total Assets
DIV = Dividends divided by Total Assets
NIM = Net Interest Income divided by Total Assets
NLCO = Net Loan Charge-Offs divided by Total Assets
BHC = Bank Holding Company
ROA = Net Income divided by Total Assets
ROE = Net Income divided by Total Equity
Cash/TA = Cash divided by Total Assets
Loans/Deposits = Total Loans divided by Total Deposits
CommL/TL = Commercial Loans divided by Total Loans
USgovtdep/TD = US government deposits divided by Total Deposits
Provforloan/TOE = Provisions for loan losses divided by Total Operating Expenses
Nonfedsec/TS = Non-federal Securities divided by Total Securities
TA/#Emp = Total Assets divided by Number of Employees

Total assets is used to represent firm size. Equity capital represents a firm's financial stability as viewed by regulatory agencies. Asset liquidity represents the bank's on-balance sheet assets. Preferred stock is included to determine if the source of financing differs by bank ownership type. Dividends are included because the amount that a firm pays in dividends can indicate whether the firm has sufficient funds to enable them to pay out surplus cash to investors and be viewed positively by creditors. Net interest margin is a measure of the banks spread between interest income and interest expense. Net loan charge-offs is a proxy for credit risk. The bank holding company dummy variable indicates whether or not the bank is part of a holding company (1, it is part of a BHC and 0, it is not). ROA and ROE are measures of the bank's return on assets and equity and are used as indications of performance. Cash to total assets is a measure of liquidity. Loans to deposits and commercial loans to total loans give us information on the banks' portfolio composition. United States government deposits to total deposits measures volatility of the deposit base (Bates and Bradford (1980)). Provision for loan losses is the expense a bank incurs due to expected loan losses and it directly reduces net income and ROA. Non-federal securities to total securities measures the portion of investments made in non-federal securities such as mortgage backed securities, asset-backed securities, and foreign debt securities. Total assets divided by number of employees indicates the amount of assets managed per employee and is a measure of operational efficiency.

PRESENTATION OF SUMMARY STATISTICS

The final aspect of this study is to compare the characteristics of MOB to NMOB. These statistics appear in Table 1. (Tables 1, 2 and 3 are at the end of the article). The most notable difference is that the size of NMOB is much larger than the MOB. This is not surprising and has been cited by other researchers. However, one interesting observation is that the size gap narrows as the years progress. For example, in 1995 the difference in average total assets for MOB compare to NMOB was almost $54 million. By 2004, the difference had shrunk to less than $10 million. The ratio of equity to total assets is lower for MOB indicating they have less equity capital per asset than NMOB. Additionally, MOB have higher ratios of preferred stock and lower dividend ratios. These two results indicate that NMOB are more financially secure than MOB and therefore MOB may be viewed as riskier investments.

MOB have a larger net interest margin, which can be viewed in two different ways. It is favorable in that it indicates higher profitability for MOB. However, the higher the NIM is it is more likely that riskier loans are being made which would result in larger interest revenue but could lead to larger loan losses. Not surprisingly, then, we find net loan charge-offs at MOB are higher than at NMOB. Both profitability measures, ROA and ROE are smaller for MOB. In addition to the credit concerns discussed earlier, the lower profitability of MOB can also be traced to the ratio

of cash to total assets, which is larger at MOB. This indicates that MOB keep larger sums of cash on hand and are more liquid, however, the downside of cash is it earns a very low return. Also contributing to lower profitability is the fact that MOB have lower loan to deposit ratios. Since loans are where community banks make most of their money, this is clearly a problem for the MOB.

As expected, US government deposits are larger for MOB and is of concern because of the volatile nature of government deposits. Provisions for loan losses to total operating expenses are also larger for MOB, which is indicative of the riskier loans made by MOB. MOB invest in a larger proportion of federal securities than NMOB. While these securities are less risky, they also have lower returns which hurts profitability. Finally, total assets to number of employees is smaller for MOB indicating they have fewer assets managed per employee, which could be due to their higher cost deposits.

Now that we have described these differences, we must test for statistical significance. Since the data set is broken into two subsets (MOB and NMOB), the Cochran and/or Satterthwaite t-test must be used because the subsets have unequal variances. As shown in table 2 all the variables are significantly different at the 10% level or less. In fact, all but 3 of the variables were significantly different at the 1% level (provisions for loan losses to total operating expenses, US government deposits to total deposits, and net loan charge-offs).

The next question we address is whether the different minority groups have different bank characteristics. Table 3 shows these results. The minority group with the largest number of banks in the sample is Asian, followed by Black and Hispanic. There are only 2 multiracial banks in our sample so we will not use them for this comparison. The NMOB have the most average total assets followed by Asian, Hispanic, Black, Women, Native American and Multiracial. Preferred stock is the largest for the Black and Hispanic groups while the other minority groups do not differ much from the NMOB. Very few Asian and Native American owned banks are part of a bank holding company while all of the women and multiracial banks are part of a BHC. Return on assets and equity is the highest for the women owned banks and lowest for the black and multiracial owned banks. US government deposits to total deposits is extremely high for the black owned banks and very low for the Asian owned banks. Provision for loan losses to total operating expenses is similar for all groups. Assets per employee is highest for the Asian and Hispanic owned banks and lowest for the Black owned banks. These results show us that the type of minority owned bank is a significant indicator of its efficiency and performance. This also indicates that future research endeavors should seriously consider differentiating beyond Minority ownership into race/gender. Most research to date (one exception is Lawrence (1997)) groups all minority owned banks together to compare against non-minority owned banks. These results indicate that this may not make for the best comparisons.

FUTURE RESEARCH

Previous research has been done to compare the efficiency of minority owned banks to that of non-minority owned banks. Yet, these studies have failed to specifically look at how government funding contributes to the efficiency or inefficiency of minority owned banks. Also, most of the studies have failed to specify how the minority groups differ. Therefore, further research needs to be done that compares the efficiency and profitability of each type of minority-owned bank with government funding, minority-owned banks without government funding, and non-minority owned banks without government funding.

We hypothesize that the financial institutions with government funding will be less efficient than financial institutions without government funding. Yet, since the minority owned banks are often grouped collectively in a heterogeneous manner, the results can be hard to interpret. In order to ensure more reasonable results, Clair's (1988) methodology of zip-code clusters should be used to compare banks that are located in the same zip code or in a zip code adjacent to the bank's main office. Minority banks should be grouped together not only based on location, but also based on ethnicity, size, and age. Boorman (1974) originally pointed out that it was important to analyze banks based on their relative age through time series analysis in order to distinguish whether minority-owned banks were becoming more efficient with time. The results from his study indicated that minority owned banks were increasing their levels of efficiency with time even though they were still lagging behind the non-minority owned banks. It is important to use this type of analysis again to determine whether this improvement has continued or slowed in the passing years.

CONCLUSION

The number (26 to 62) and percentage (.93% to 1.78%) of minority-owned banks has increased in the past decade, 1995-2004. This paper shows the growth in minority ownership by various racial groups. The Asian and Hispanic groups experienced the most growth while the Black group experienced the least. We segment our sample of community banks over the past decade into minority owned banks (MOB) and non-minority owned banks (NMOB). We show the averages of various bank characteristics for each group for 1995 through 2004. Then we test the significance of the differences in these characteristics and found that every characteristic was significantly different for MOB versus NMOB. Finally, we look at each minority group separately to determine if there were unique characteristics exhibited by each group. We find that each minority groups differs in most of the bank characteristics.

While this paper does not address whether government funding of minority owned banks should continue to exist, it documents the changing environment found among minority owned banks. It is left for future research to examine and determine if government funding, which

encourages minority ownership, is supporting continued inefficiencies in MOB or whether the growth documented here in minority ownership indicates a change for the better in the future profitability and efficiencies of MOB.

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Table 1: Summary Statistics

We compute summary statistics on the minority owned and non-minority owned banks each year. The variables that we calculate and make comparisons between are defined as follows: TA = Total Assets, EC = Equity Capital divided by Total Assets, PS = Dollar amount of Preferred Stock divided by Total Assets, DIV = Dividends divided by Total Assets, NIM = Net Interest Income divided by Total Assets, NLCO = Net Loan Charge-Offs divided by Total Assets, BHC = Bank Holding Company, ROA = Net Income divided by Total Assets, ROE = Net Income Divided by Total Equity, Cash/TA = Cash divided by Total Assets, Loans/Deposits = Total Loans divided by Total Deposits, CommL/TL = Commercial Loans divided by Total Loans, USgovtdep/TD = US government deposits divided by Total Deposits, Provforloan/TOE = Provisions for loan losses divided by Total Operating Expenses, Nonfedsec/TS = Non-federal Securities divided by Total Securities, TA/#Emp = Total Assets divided by number of Employees

Year	1995		1996		1997		1998		1999	
Group	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**
Sample Size	26	2765	32	2825	35	2825	37	2874	39	2930
TA (in thousands)	186920	240773	200548	241080	204488	246388	196674	241981	195170	247075
EC	0.0840	0.0954	0.0840	0.0953	0.0920	0.0969	0.0838	0.0960	0.0775	0.0935
PS	0.0012	0.0003	0.0021	0.0003	0.0020	0.0003	0.0054	0.0002	0.0050	0.0002
DIV	0.0019	0.0067	0.0017	0.0064	0.0010	0.0066	0.0013	0.0067	0.0020	0.0069
NIM	0.0419	0.0415	0.0416	0.0413	0.0424	0.0411	0.0412	0.0398	0.0415	0.0400
NLCO	0.0049	0.0025	0.0037	0.0030	0.0032	0.0026	0.0029	0.0026	0.0033	0.0024
BHC	0.5000	0.8448	0.5313	0.8499	0.5714	0.8545	0.5946	0.8636	0.6154	0.8696
ROA	0.0056	0.0120	0.0075	0.0122	0.0079	0.0124	0.0072	0.0121	0.0069	0.0123
ROE	0.0452	0.1288	0.0700	0.1313	0.0927	0.1234	0.0850	0.1288	0.0895	0.1381
CashTA	0.0542	0.0504	0.0605	0.0496	0.0506	0.0482	0.0470	0.0474	0.0535	0.0475
Loansdeposits	0.5701	1.9407	0.6064	3.6027	0.6629	2.6016	0.6344	1.5476	0.6514	1.9176
commLtotalL	0.2621	0.1748	0.2733	0.1758	0.2321	0.1735	0.2344	0.1749	0.2259	0.1774
USgovtdepTdep	0.0596	0.0375	0.0374	0.0361	0.0290	0.0364	0.0641	0.0370	0.0620	0.0356
ProvforloanTopexp	0.0498	0.0304	0.0379	0.0365	0.0383	0.0368	0.0445	0.0381	0.0479	0.0373
nonfedTsec	0.4397	0.6509	0.4620	0.6467	0.4623	0.6400	0.6096	0.6931	0.6183	0.7004

TAnumemp	2161.89	2559.81	2265.76	2614.96	2431.54	2712.81	2506.67	2758.56	2470.80	2861.96
Year	**2000**		**2001**		**2002**		**2003**		**2004**	
Group	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**	**MOBs**	**NMOBs**
Sample Size	36	2980	39	3092	44	3217	53	3324	62	3415
TA (in thousands)	205682	248998	211405	255312	243038	260947	258671	263576	258448	268431
EC	0.0805	0.0970	0.0865	0.0973	0.0885	0.1001	0.0946	0.0994	0.0948	0.1003
PS	0.0045	0.0002	0.0034	0.0002	0.0026	0.0002	0.0022	0.0002	0.0017	0.0002
DIV	0.0039	0.0068	0.0029	0.0061	0.0030	0.0060	0.0031	0.0065	0.0046	0.0058
NIM	0.0433	0.0392	0.0392	0.0374	0.0389	0.0380	0.0380	0.0366	0.0390	0.0367
NLCO	0.0033	0.0023	0.0029	0.0026	0.0024	0.0028	0.0023	0.0028	0.0017	0.0022
BHC	0.6111	0.8701	0.6667	0.8768	0.6818	0.8788	0.6604	0.8842	0.6935	0.8837
ROA	0.0093	0.0118	0.0084	0.0109	0.0088	0.0115	0.0107	0.0115	0.0108	0.0116
ROE	0.1179	0.1262	0.1036	0.1158	0.1044	0.1208	0.1157	0.1197	0.1162	0.1193
CashTA	0.0447	0.0445	0.0570	0.0471	0.0522	0.0478	0.0609	0.0451	0.0467	0.0387
loansdeposits	0.6869	1.4039	0.6994	0.9942	0.7321	0.9945	0.7736	1.0670	0.8069	1.0036
commLtotalL	0.2180	0.1761	0.2113	0.1710	0.1744	0.1633	0.1639	0.1601	0.1481	0.1553
USgovtdepTdep	0.0664	0.0346	0.0662	0.0377	0.0563	0.0420	0.0531	0.0452	0.0418	0.0433
ProvforloanTopexp	0.0369	0.0374	0.0479	0.0466	0.0648	0.0595	0.0585	0.0574	0.0461	0.0490
nonfedTsec	0.5938	0.6937	0.6960	0.7430	0.6585	0.7603	0.6989	0.7716	0.6618	0.7715
TAnumemp	2724.84	3103.64	2755.36	3245.59	3161.88	3508.8	3171.75	3605.89	3416.83	3788.18

Table 2: MOBs versus NMOBs T-test Statistic

Since the data set is broken into two subsets (MOBs and NMOBs), the Cochran and/or Satterthwaite t-test must be used because the subsets have unequal variances. These tests determine if these differences found in Table 1 were significant. The variables are defined as: TA = Total Assets, EC = Equity Capital divided by Total Assets, PS = Dollar amount of Preferred Stock divided by Total Assets, DIV = Dividends divided by Total Assets, NIM = Net Interest Income divided by Total Assets, NLCO = Net Loan Charge-Offs divided by Total Assets, BHC = Bank Holding Company, ROA = Net Income divided by Total Assets, ROE = Net Income Divided by Total Equity, Cash/TA = Cash divided by Total Assets, Loans/Deposits = Total Loans divided by Total Deposits, CommL/TL = Commercial Loans divided by Total Loans, USgovtdep/TD = US government deposits divided by Total Deposits, Provforloan/TOE = Provisions for loan losses divided by Total Operating Expenses, Nonfedsec/TS = Non-federal Securities divided by Total Securities, TA/#Emp = Total Assets divided by number of Employees

Variable Name	Group	Mean	T-Value	P-Value		Variable Name	Group	Mean	T-Value	P-Value
TA	MOB	221835	-4.29	<.0001		ROE	MOB	0.098	-5	<.0001
	NMOB	252122					NMOB	0.1249		
		-30287						-0.027		
EC	MOB	0.0875	-7.23	<.0001		CashTA	MOB	0.0526	3.41	0.0007
	NMOB	0.0972					NMOB	0.0464		
		-0.01						0.0061		
PS	MOB	0.0029	5.34	<.0001		Loansdeposits	MOB	0.6986	-6.31	<.0001
	NMOB	0.0002					NMOB	1.666		
		0.0027						-0.967		
DIV	MOB	0.0027	-14.26	<.0001		CommLtotalL	MOB	0.2054	5.2	<.0001
	NMOB	0.0064					NMOB	0.1697		
		-0.004						0.0357		
NIM	MOB	0.0404	3.37	0.0008		USgovtdepTdep	MOB	0.0531	2.22	0.0268
	NMOB	0.039					NMOB	0.0388		
		0.0014						0.0144		
NLCO	MOB	0.0029	1.74	0.083		ProvforloanTopexp	MOB	0.0481	1.76	0.0784
	NMOB	0.0026					NMOB	0.0435		
		0.0003						0.0046		
BHC	MOB	0.6253	-10.04	<.0001		NonFedTsec	MOB	0.5865	-4.38	<.0001
	NMOB	0.8685					NMOB	0.7028		
		-0.243						-0.116		
ROA	MOB	0.0086	-8.46	<.0001		TAnumemp	MOB	2797.9	-3.95	<.0001
	NMOB	0.0118					NMOB	3105.7		
		-0.003						-307.8		

Table 3: Bank Characteristics by Minority Group

This table addresses whether the different minority groups have different bank characteristics. The variables are defined as: TA = Total Assets, EC = Equity Capital divided by Total Assets, PS = Dollar amount of Preferred Stock divided by Total Assets, DIV = Dividends divided by Total Assets, NIM = Net Interest Income divided by Total Assets, NLCO = Net Loan Charge-Offs divided by Total Assets, BHC = Bank Holding Company, ROA = Net Income divided by Total Assets, ROE = Net Income Divided by Total Equity, Cash/TA = Cash divided by Total Assets, Loans/Deposits = Total Loans divided by Total Deposits, CommL/TL = Commercial Loans divided by Total Loans, USgovtdep/TD = US government deposits divided by Total Deposits, Provforloan/TOE = Provisions for loan losses divided by Total Operating Expenses, Nonfedsec/TS = Non-federal Securities divided by Total Securities, TA/#Emp = Total Assets divided by number of Employees

Race	Non-Minority	Black	Women	Hispanic	Asian	Native American	Multiracial
Sample Size	30247	121	17	81	167	15	2
TA (in thousands)	252122	193472	165598	240170	248582	133349	103492
EC	0.0972	0.0855	0.1050	0.0863	0.0874	0.0915	0.0929
PS	0.0002	0.0072	0.0004	0.0032	0.0003	0.0000	0.0000
DIV	0.0064	0.0026	0.0046	0.0029	0.0026	0.0017	0.0056
NIM	0.0390	0.0426	0.0449	0.0375	0.0397	0.0394	0.0460
NLCO	0.0026	0.0035	0.0017	0.0019	0.0032	0.0012	0.0049
BHC	0.8685	0.8017	1.0000	0.6790	0.4790	0.0667	1.0000
ROA	0.0118	0.0065	0.0137	0.0102	0.0088	0.0105	0.0066
ROE	0.1249	0.0759	0.1298	0.1217	0.0980	0.1170	0.0709
CashTA	0.0464	0.0567	0.0640	0.0565	0.0449	0.0729	0.0397
loansdeposits	1.6660	0.6080	0.8067	0.6466	0.7788	0.6728	0.8738
commLtotalL	0.1697	0.2100	0.2032	0.2046	0.2075	0.1607	0.1458
USgovtdepTdep	0.0388	0.1248	0.0258	0.0533	0.0008	0.0939	0.0045
ProvforloanTopexp	0.0435	0.0407	0.0469	0.0433	0.0558	0.0419	0.1009
nonfedTsec	0.7028	0.6431	0.1182	0.8134	0.4180	1.0000	.
TAnumemp	3106	1988	2849	3174	3258	2173	2412