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An empirical examination of the effect of statutory limitations concerning geographic expansion on bank acquisition premiums

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AN EMPIRICAL EXAMINATION OF THE EFFECT OF STATUTORY LIMITATIONS CONCERNING GEOGRAPHIC EXPANSION ON BANK ACQUISITION PREMIUMS

A Dissertation

by

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ABSTRACT

An Empirical Examination of the Effect
of Statutory Limitations Concerning
Geographic Expansion on Bank
Acquisition Premiums. (August 1988)
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For a sample of 174 holding company acquisitions, the results of both analysis of variance and covariance indicate that there is a significant relationship between bank acquisition premiums and the target state's branching, intrastate holding company, and interstate banking statutes. Larger price/book premiums are associated with targets located in states that allow entry by out-of-state bank holding companies and statewide branching, either *de novo* or through acquisition. These effects are magnified in states which also permit unlimited intrastate holding company expansion, facilitating the formation of multibank holding companies through acquisition. Further, the results indicate that intrastate holding company expansion substitutes for branching in unit banking and limited branching states.

Because the statutes form a barrier to entry, there should be an effect of these laws on bank acquisition markets. The laws affect acquisition premiums by determining the population of potential bidders. Branching and intrastate holding company expansion laws define the native population of bidders, while interstate banking laws describe the pool of potential out-of-state bidders. All else equal, larger acquisition premiums will be associated with targets located in states which have branching, intrastate holding company, and interstate banking statutes that define a larger pool of potential bidders.

Analysis of covariance is used to control for factors which are known or thought to influence bank acquisition premiums, in order to isolate the effect of the regulatory environment. The covariates included variables measuring the target market economic or operating environment and the terms of the transaction. Target financial data from the Federal Reserve income and call report data tapes were used to account for differences in financial characteristics among targets. The study period covered bank holding company acquisitions occurring in 1985 and 1986. Nonparametric analysis and tests of model adequacy indicate that the inferential techniques employed are robust and appropriate for the data sample.

DEDICATION

To my parents, Dr. Perry L. and Frances R. Adkisson, and to my husband, Dr. William W. Crockford. You are not only my family, but also my best friends. I thank God for blessing me with you.

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CHAPTER I

INTRODUCTION

The removal of statutory restrictions on geographic location has been one of the principal trends in commercial banking. While this change has taken place rapidly, it has not happened all at once. Individual states have relaxed the restrictions at different times and in different ways, creating great variety in the regulation of bank expansion within and across state lines. The simultaneous existence of this set of heterogeneous statutes provides a fertile field for testing the impact of regulation on acquisition premiums.

Traditionally, geographic restrictions took the form of branching and holding company regulations governing the intrastate expansion of banking firms. The Douglas Amendment blocked interstate holding company expansion. These policies fostered a system of relatively small, geographically localized state and national banks.

Nonetheless, in a survey of changes in state laws concerning the permissible geographic range of bank activities, Amel and Keane (1987) found that the overwhelming tendency has been the relaxation of restrictions on geographic expansion. Only nine of 210 changes since 1960 increased the legal constraints. About

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The style of the Journal of Financial Economics will be used for this dissertation.

one quarter of the states have substantially liberalized their branching policies since 1970. Many states have never regulated the expansion of multibank holding companies, but of those that do, most have eased the restrictions. Today, only Mississippi entirely prohibits multibank holding companies.

The most significant change has been the rapid evolution of interstate banking. In 1985, a Supreme Court decision in the landmark case, Northeast Bancorp v. Board of Governors of the Federal Reserve System, paved the way for interstate banking by affirming the Board's ruling that interstate compacts were permissible under the Douglas Amendment. A state may now adopt a statute allowing selective interstate holding company acquisitions. Hawke (1985) reported that, by the time of the Northeast Bancorp ruling, twenty-two states had already passed legislation permitting out-of-state entry.

Further, McDermott (1985) reports that there were over 850 bank acquisitions between 1981 and 1984, a pace of consolidation far exceeding that of most other U.S. industries. The relative size of the mergers has also increased. Several strikingly large banking combinations have occurred. For example, McDermott (1985) notes that in May, 1985, the southeast contained only one banking firm with assets in excess of $15 billion, but within two months, three more such firms were formed. Rogowski (1987) reported that of a sample of 216 mergers in 1986, thirty-

four of the targets exceeded a size of $500 million in assets. Size no longer appears to be a deterrent to acquisition.

A general upward trend in premiums has accompanied the wave of large bank mergers. Rogowski (1987) noted that price/book premiums averaged around 1.90 to 2.00 in 1986; up from about 1.70 in 1985. Alberts (1986) reported that premiums have ranged as high as 3.0 over the period 1985 to 1986, raising questions about the ultimate profitability of some acquisitions.

Significance of the Study

The amount of merger activity in the banking industry by itself justifies a study of holding company acquisitions. Deregulation of geographic expansion, including interstate banking, has been a factor in the merger wave. Nonetheless, our insight into the effects of these statutes on acquisition premiums is far from complete. The magnitude of the premium affects the ultimate profitability of the acquisition to the buyer. A more thorough knowledge of the factors which determine premiums would guide a bidder in its search for profitable acquisitions. Further, the competitiveness of the acquisition markets may influence the division of gains between bidder and target shareholders.

The implications of a study of regulatory barriers to entry, however, range beyond the private benefits. By

controlling entry into local banking markets, intrastate branching and holding company restrictions, and interstate holding company regulations affect the acquisition markets, the managerial disciplining markets for corporate control[1]. By defining the population of potential bidders for a state's targets, the statutes affect the competitiveness of bank acquisition markets.

A regulatory barrier to entry may alter the acquisition pricing mechanism, and reduce the threat of outside takeover. By influencing the competitiveness of the acquisition markets, and thereby the pricing mechanism, the restrictions on geographic expansion affect the process of getting banking resources into the hands of those who can use them best. An efficacious market for corporate control has special importance for the banking industry because of the social significance of bank soundness.

If some combinations of geographic expansion restrictions are particularly effective barriers to entry, the behavior of banks may be affected beyond the acquisition markets. While it is beyond the scope of this study to explore all of the private and social ramifications of geographic regulation, the study does examine the very fundamental issue of the impact of such regulations on the selling prices of target banking franchises.

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[1] James (1984) found a greater level of managerial expense preference behavior among banks located in states with greater restrictions on bank acquisitions.

Statement of the Problem

The principal question addressed by this study is whether branching, holding company, and interstate expansion statutes affect acquisition premiums. These laws control entry into a state's banking markets. They define the relevant population of bidders for a given state's banking firms. As a result of the Northeast Bancorp decision, there are now two methods of expansion: intrastate, and interstate. Intrastate expansion may occur through branching (including *de novo* expansion) or through holding company acquisitions. Interstate expansion takes place through holding company acquisitions.

This study examines the effects of three geographic expansion factors on price/book premiums: intrastate branching, intrastate holding company, and interstate regulations. The term "holding company regulations" is being used in the traditional, historic sense to refer to statutes governing intrastate expansion. Interstate statutes govern the expansion of holding companies across state lines[2]. In order to adequately describe the

[2] The three factors - branching, holding company, and interstate statutes - mentioned throughout this study should be interpreted as intrastate branching and holding company regulations and interstate holding company regulations. The three terms "branching", "holding company", and "interstate" were chosen to conform to historical and common usage and to emphasize that three factors, not two, are needed to describe the bidder population.

population of potential bidders for targets in a given state, it is necessary to consider intrastate and interstate holding company restrictions as two separate factors, rather than two levels of one factor. Branching and (intrastate) holding company laws determine the native population of bidders. Interstate statutes define the pool of out-of-state bidders which happens to include only holding companies.

As a state moves toward the deregulation of geographic expansion through acquisition, the pool of potential bidders widens. This should translate into higher acquisition premiums as more bidders are allowed to compete for a relatively fixed supply of targets. As Rowgowski (1987) notes, widening the population of bidders will also increase the odds that a particular bidder will value a target at its highest possible use, raising the premium offered.

If, indeed, there is a relationship between restrictions on geographic expansion and bank acquisition premiums, then a secondary set of hypotheses arises. These hypotheses concern the possible interactions between branching, holding company, and interstate regulations. For example, it has long been suggested that the holding company form of organization serves in part to circumvent state branching restrictions. Indeed, none of the states that prohibit branching also limit holding company expansion. If the multibank holding company organizational

form is a good substitute for branch banking, premiums may depend more on the combination of branching and holding company regulations in effect than on either type of restriction alone.

Thorough exploration of the impact of these regulations on acquisition premiums requires a method to examine the possible interactions between the levels of regulation, as well as to investigate the effects of each type of regulation in isolation. In other words, both main and interaction effects must be considered. A highly significant interaction may overshadow the constituent main effects in importance.

It is also desirable to utilize the existing knowledge of the determinants of acquisition premiums. A well constructed test should control for other factors which are known or thought to affect premiums in addition to the effect of geographic restrictions. This would permit us to at least approximately hold all else equal and provide a cleaner, more reliable test of the central hypothesis. A good model would also be flexible enough to allow the question to be viewed from more than one perspective, and flexible enough to accommodate secondary hypotheses.

Fortunately, the technique of analysis of covariance makes it possible to achieve these objectives. A combination of the familiar regression and analysis of variance methods, the analysis of covariance permits tests of both main and interaction effects defined by the

classification scheme of the data, while controlling for and utilizing the information about the response that is contained in one or more concomitant variables. Therefore, the premiums will be cross classified according to the branching, holding company, and interstate statutes which applied to the merger, and various financial and economic characteristics will serve as covariates.

The Current Legal Statutes

Branching, intrastate holding company expansion, and interstate banking statutes are determined by the states[3]. The states have great latitude in writing their own laws regarding bank expansion within and across their borders. As a result, a wide variety of branching, intrastate holding company, and interstate banking statutes exist. This creates a complex set of laws. However, a detailed summary of state branching, intrastate holding company, and interstate banking provided by Amel and Keane (1987) reveals some patterns and common attributes among state branching, intrastate holding company expansion, and interstate banking regulations. These patterns and common attributes suggest a natural classification scheme for state bank expansion laws.

Four mutually exclusive and exhaustive levels of branching can be identified. The four levels are

[3] Throughout this discussion, the District of Columbia is implicitly included in the general term "states".

prohibited, limited, statewide by merger only, and statewide. States which have adopted limited branching generally limit branching to some geographic area - county or SMSA - which is contiguous with a bank's home office. In the statewide-by-merger-only category, expansion through acquisition is distinguished from *de novo* expansion. In the statewide branching category, both are allowed. These differences are important because they affect the population of potential bidders.

Intrastate holding company expansion restrictions take two forms: limited and unlimited. Most states having the limited form restrict the percentage of the state's banking assets which can be controlled by any one multibank holding company. A few states, such as Tennessee and Kentucky, regulate the geographic location of holding companies. The majority of states permit unlimited intrastate multibank holding company expansion.

Three levels of interstate holding company acquisition statutes exist. These are none, regional, and national[4]. Since the Northeast Bancorp decision, the number of states which lack any provision for interstate banking has steadily declined. Most states initially elected the regional approach, and many states defined their own individual banking region, rather than agreeing on a common banking region. A few states, such as Maine and Arizona,

[4] A further distinction is sometimes made between the open and reciprocal forms of regional and nationwide banking.

chose to permit nationwide entry from the start. Many of the states which currently sanction regional interstate banking have adopted a provision for nationwide banking at a future date. Table 1 summarizes all three forms of expansion regulation by state over the test period. This table reveals the many different combinations of branching, intrastate holding company, and interstate banking laws which occur among the states. Each state's legal status is shown separately for 1985 and 1986 because some states changed their interstate banking laws during the study period.

Historical Evolution

The early banking policy of the United States fostered a system of relatively small, geographically localized state and national banks. This policy reflected a general fear of the concentration of financial power in the hand of a few large moneylords and was designed to diffuse and decentralize the economic influence of the banking industry. Accordingly, the state policy of unit banking was extended to national banks by the National Banking Act of 1864.

The McFadden Act was passed to rectify inequalities which threatened the dual banking system. When some states began to allow their own banks to branch, nationally chartered banks were at a disadvantage as the National Banking Act prohibited them from following suit. In 1927,

TABLE 1

EXPANSION STATUTES BY STATE[5]

Branching (B):

M = Statewide by merger only
S = Statewide
P = Prohibited
L = Limited

Intrastate Holding Company (H):

U = Unlimited
L = Limited

Interstate Banking (I):

N = Nationwide
R = Regional
P = None

	1985			1986		
State	B	H	I	B	H	I
AK	S	U	N	S	U	N
AL	M	U	P	M	U	P
AZ	S	U	P	S	U	N
AR	L	L	P	L	L	P
CA	S	U	P	S	U	P
CO	P	U	P	P	U	P
CT	M	U	R	M	U	R
DE	S	U	R	S	U	R
DC	S	U	R	S	U	N
FL	M	U	R	M	U	R
GA	L	U	R	L	U	R
HA	L	U	P	S	U	P
ID	S	U	R	S	U	R
IL	L	U	P	L	U	R
IN	M	L	P	M	L	R

[5] This table is based an a detailed study of state branching, multibank holding company, and interstate banking laws by Amel and Keane (1987).

TABLE 1

Continued

	1985			1986		
State	B	H	I	B	H	I
IA	L	L	P	L	L	P
KS	L	L	P	L	L	P
KY	L	L	R	L	L	N
MI	L	U	P	L	U	R
MN	L	U	P	L	U	R
MS[6]	L	*	P	M	*	P
MO	L	L	P	L	L	R
MT	P	U	P	P	U	P
NE	L	L	P	L	L	P
NH	L	L	P	L	L	R
NJ	L	L	P	L	L	R
NM	L	U	P	L	U	P
NV	S	U	R	S	U	R
NY	L	L	N	L	L	N
NC	S	U	R	S	U	R
ND	P	U	P	P	U	P
OH	L	L	P	L	L	P
OK	L	L	P	L	L	P
OR	S	U	R	S	U	R
PA	L	L	P	L	L	R
RI	S	L	R	S	L	R
SC	S	U	P	S	U	R
SD	M	U	N	M	U	N
TN	L	L	R	L	L	R
TX	P	U	P	P	U	P
UT	S	U	R	S	U	R
VT	S	U	P	S	U	P
VA	M	U	R	M	U	R
WA	S	U	P	S	U	P
WV	L	L	P	L	L	P
WI	L	U	R	L	U	R
WY	P	U	P	P	U	P
LA	L	L	P	L	L	P
MA	L	U	R	L	U	R
MD	S	U	R	S	U	R
ME	S	U	N	S	U	N

[6] Mississippi prohibits the formation of multibank holding companies.

the McFadden Act placed state and national banks on more equal terms by permitting national banks to branch within the confines of their home cities in areas where state banks were allowed to do so.

The McFadden Act of 1927 was not a green light for branching. On the contrary, the act prohibited Federal Reserve member banks, both national and state, from establishing out-of-town branches. In the aftermath of the disastrous banking failures of the 1930s, however, the anti-branching attitude in Congress relaxed somewhat because lower failure rates occurred among branch banks. Further, several states amended their laws to allow their own state-chartered banks to branch statewide. The Banking Act of 1933 liberalized the branching power of national banks, permitting them to branch within their home states according to the same policies governing state-chartered banks. The Bank Holding Company Act of 1956 acted to preserve the integrity of state branching laws by extending branching restrictions to bank holding companies. Together, the McFadden Act and the Douglas Amendment effectively blocked interstate ownership of bank holding companies.

At the state level, Amel and Keane (1987) show that about one quarter of the states have substantially liberalized their branching laws since 1970. For example, Florida prohibited branching prior to 1977, at which time it began to allow limited branching. In 1981, it permitted statewide branching. The legislative history of Alabama,

Virginia, Maine, and several other states reveals a similar gradual move toward unrestricted statewide branching. During this time, no state tightened its branching laws.

While many states prohibited branching in the earlier part of this century and have since loosened their restrictions, most states have not had laws restricting intrastate holding company expansion. This relationship is important because the holding company organizational form is a potential substitute for branch banking. Bank holding companies may have evolved in some areas because branching was prohibited or tightly controlled.

Most of the states which have conservative branching laws have set no limits at all on intrastate holding company expansion. Further, several of the states, such as Georgia and Indiana, which once limited holding companies to the ownership and control of a single bank now permit the formation of multibank holding companies. Thirty-five states, as of fall, 1987, allowed statewide expansion of bank holding companies. Fourteen permitted limited statewide expansion. Recent changes in these laws across the nation have involved relaxation of the restrictions.

On a national level, the McFadden Act and the Douglas Amendment to the Bank Holding Company Act of 1956 effectively limited interstate banking through bank holding companies, but did not entirely prohibit it. The states were given the authority to pass laws allowing interstate expansion through acquisition or *de novo* entry as they saw

fit. In 1956, the intent and effect of most state laws was to limit interstate banking.

Nearly twenty years passed before any of the states exercised the legal option given to them by the Douglas Amendment to encourage interstate banking. In 1975, Maine became the first state in the nation to pass an interstate banking law. Massachusetts adopted a reciprocal law in 1982 which permitted interstate banking, but denied access to its banks by holding companies outside the New England region. The other New England states soon adopted similar legislation and the first regional banking compact came into being.

Exclusion from the New England regional banking compact led Citicorp, the giant New York money center bank to challenge the legality of regional interstate banking, along with Northeast Bancorporation. The resulting case, Northeast Bancorp v. Board of Governors of the Federal Reserve System ushered in the era of interstate banking. In June of 1985, the Supreme Court affirmed that the Douglas Amendment abdicates federal interest in interstate banking to the state level, giving states the authority to pass laws allowing selective out-of-state entry as they see fit. This ruling opened the way for all the various forms of interstate banking now in existence.

Frieder (1986) argues that the type of geographic location legislation enacted in a state is influenced by the resident population of banking firms. For example,

large acquiring bank holding companies may favor legislation which restricts the population of bidders, in order to simultaneously reduce the competition for desirable targets and reduce the probability of becoming targets themselves. Unit banks, concerned that advancing technology has decreased the relative value of small banks, may also oppose legislation which reduces the barriers to entry in local banking markets. In contrast, if a state contains a large population of would-be targets, legislation may be enacted which increases the number of bidders.

Freider (1986) and Miller (1986) have suggested that an orderly process of evolution toward nationwide banking is behind geographic deregulation. This hypothesis brings an otherwise complex collection of state branching, intrastate holding company, and interstate banking laws into better focus. For example, while twelve of the first eighteen interstate laws involved regional approaches, Amel and Keane (1987) found that by September, 1987, statutes committing the states to nationwide interstate banking were clearly in the majority.

Conclusion

The full impact of reduced restrictions on the geographic expansion of the banking industry is yet to be determined. In fact, if the industry has been clever enough in exploiting loopholes in existing regulations, relaxation

of the restrictions may be inconsequential. Therefore, this study will address whether these regulations have any significant impact on bank acquisition markets. Merger premiums are a readily observable, unambiguous summary of a highly significant aspect of bank behavior. If branching, intrastate holding company laws, and interstate banking statutes influence the shape of the banking industry, the effect should be most apparent in this long run strategic decision.

CHAPTER II

LITERATURE REVIEW

Introduction

Since the 1960's, the banking industry in this country has been characterized by intense and persistent merger activity. Deregulation has allowed commercial banks to engage in new and nontraditional activities, permitting them to offer a larger diversity of products and services to an ever widening market. While the scope of banking operations has expanded, however, the industry itself has consolidated.

The bank merger wave has attracted a substantial measure of scholarly attention. The literature can be roughly divided into four groups: studies which explore the determinants of bank acquisition premiums, bank merger event studies, studies of individual bank performance, and market structure and performance studies. Another group of studies explores the impact of geographic expansion regulations on bank behavior.

This dissertation examines the effect of statutory limitations concerning geographic expansion on bank acquisition premiums. It draws most heavily on the studies of the determinants of bank acquisition premiums. Acquisition premiums provide summary data on bank merger behavior, as affected by state branching, intrastate

holding company, and interstate banking laws. To date, there are only a small number of studies which examine the effect of the regulatory environment on bank acquisition premiums. The bank merger event studies, the individual bank performance studies, and the market structure and performance literature are reviewed in order to provide perspective for this research.

The Impact of Geographic Expansion Regulations

Several studies have examined the ways in which state restrictions on branching and intrastate holding company expansion affect bank behavior. James (1984) analyzed bank holding company (henceforth BHC) acquisitions to determine the impact of state laws on the market for corporate control. He hypothesized that state restrictions on bank acquisitions reduced the threat of outside takeover. In the absence of a viable market for corporate control, management can engage in expense preference behavior, which is inconsistent with efficient production. James tested for regulatory-induced inefficiencies by comparing expense preference behavior in banks located in acquisition states with expense behavior in banks located in nonacquisition states.

For the purpose of the study, an acquisition state was defined as one with no statutory restriction on corporate bank stock ownership other than the Douglas Amendment bar on out-of-state acquisitions. Nonacquisition states were

those which restrict bank stock acquisitions. To control for as many sources of variability as possible, only banks located in acquisition and nonacquisition states which do not permit branching were studied.

James assumed that expense preference behavior is expressed in excessive levels of staff expenditures and occupancy expenses. Using a Cobb-Douglas production function, he estimated input demand for banks in acquisition and nonacquisition states. He found that staff expenditures and occupancy expenses were significantly lower in acquisition states, suggesting that an active acquisition market reduces managerial perquisite consumption. James concluded that relaxation of state restrictions on intrastate branching and BHC acquisitions may result in efficiency gains by promoting a more active acquisition market.

Flannery (1984) investigated state branching restrictions as an imposed source of inefficiency. In unit banking states, banks are prohibited from branching. Therefore, they may resort to other competitive devices, raising their costs above the unconstrained minimum. Because the unit banking restriction is a barrier to entry, unit banks may able to set prices above marginal cost. The resulting monopoly rents are a social cost of the limits on geographical expansion. Flannery hypothesized that unit banks located in unit banking states would be more profitable than unit banks in branching states.

Flannery estimated the effects of branching restrictions on bank profitability and operating costs. Unit banks located in unit banking states were matched with similar unit banks located in branch banking states. The unit banking states were further broken down into those which permit multibank holding companies and those which do not. The 1978 Functional Cost Analysis data was used to estimate translog profit and cost functions for the sample banks[7].

Flannery found that unit banks in unit banking states priced their output higher than unit banks in branch banking states. Pretax profits for unit banks in unit banking states were about twenty percent greater than their counterparts' in branch banking states. The unit banking restriction also appeared to result in higher costs. Flannery concluded that unit banks in unit banking states are constrained to produce their output with an inefficient combination of factors of production. Evidently, the unit banking restriction is an effective barrier to entry, otherwise the price inefficiency would not be sustainable.

Both James (1984) and Flannery (1984) show that regulatory restrictions on geographic expansion produce undesirable inefficiencies. The restrictions distort cost and profit behavior of individual banks and impair corrective action through the acquisition markets. However,

[7] Banks included in this sample were relatively small, having less than $189 million in total assets.

one argument in favor of restricting geographic expansion is the concern that liberal branching and holding company laws may preclude the growth and viability of newly organized banks. If a state is dominated by extensive branching or holding company structures, a *de novo* bank may never be able to gain a foothold.

Savage (1982) investigated the potential danger to new banks posed by liberal branching laws by examining total deposits and market share for sixty-seven new banks. The main hypothesis was that branching and BHC laws do not affect the total deposits and market share of new banks. Using dummy variables in a regression analysis, Savage found no consistent, significant effect of the statutory environment on the deposits and market share of new banks. Performing a similar analysis on profitability yielded the same result. He found no strong evidence to indicate that liberal branching laws injure the viability of *de novo* banks.

The three previous studies looked at the impact of state laws governing geographic expansion on bank performance. However, not all important policy decisions are made in the legislatures. Recently, several regulatory decisions have been made in the courts. Dubofsky and Fraser (forthcoming) explored two court decisions which liberalized policies concerning bank market extending acquisitions.

In 1981, the U.S. Court of Appeals for the Fifth District vacated the Federal Reserve Board's decision to deny the acquisition applications of two large BHCs, Mercantile Texas Corporation and Republic of Texas Corporation. In both cases, the Court required the Board to make four specific findings of fact to justify denying the merger applications on the grounds of probable future competition. Unable to make these findings, the Board approved the mergers.

The precedent set by the Mercantile and Republic cases suggested that the Board would find it substantially more difficult to deny future BHC merger applications on the basis of probable future competition. Therefore, these two court decisions represent a significant relaxation of the regulatory restrictions on geographic expansion. Henceforth, it would be easier for banks to engage in market-extending acquisitions.

Dubofsky and Fraser used event study methodology to examine the effect of the two court rulings on the bank acquisition market. They believed that potential targets and acquirers would be affected differently by the decisions. While the abnormal return results for target and acquirer portfolios were inconclusive around the Mercantile decision, targets significantly outperformed acquirers around the Republic ruling.

These results indicate that court decisions can significantly affect the market for bank acquisitions. The

Republic decision reinforced the ruling in the Mercantile case, redefining and removing uncertainty about the regulatory position on market extending mergers. This caused a significant and predictable response in bank stock prices, impounding the anticipated effects of regulation.

Together, the James (1984), Flannery (1984), and Dubofsky and Fraser (forthcoming) studies show that geographic regulation affects bank behavior. The results from both the James and the Flannery studies indicate that these laws contribute to inefficient production of bank output by injuring the bank acquisition markets. The restrictions are associated with distortions in the cost and profit behavior of banks, and impair corrective action through the acquisition markets.

The research of Dubofsky and Fraser reveals a significant response in the event day stock returns of potential targets to a court decision relaxing expansion restrictions. These results all imply that bank acquisition markets are affected by geographic regulation. Further, the Savage results suggest that geographic deregulation will not mean the end of *de novo* banks, which provide competition and fill a certain market niche that larger institutions may not entirely serve.

Determinants of Bank Acquisition Premiums

An acquisition premium can be defined as the difference between the bid or offer price and the target

bank's value as a separate entity. In practice, the premium is usually defined as a multiple of book value. The premium is any price paid over the book value of the target. Sinkey (1983) argued that the fundamental determinant of the magnitude of acquisition premiums is the supply and demand for targets. An increase in merger premiums could be caused by a reduced supply of potential targets, or an increased demand for acquisition partners. A central hypothesis of this dissertation is that regulatory policies which stimulate demand for merger partners and increase the population of potential bidders will lead to larger acquisition premiums.

Fraser and Kolari (1987) empirically investigated the determinants of bank acquisition premiums, with special emphasis on small bank acquisitions. They sought to determine the degree to which differences in bank acquisition premiums could be attributed to the financial and operating characteristics of target banks and the characteristics of the target's market environment.

The sample included over two hundred bank mergers which occurred in 1985. Approximately seventy-five percent of the acquisitions involved small banks[8]. The size of the premium was measured in terms of the price/book ratio. Fraser and Kolari found that premiums, classified by state, varied from a high of 3.47 times book value in Maryland to

[8] For the purpose of the study, a small bank was defined as one with less that $100 million in total assets.

a low of 1.03 in Ohio. The average premium for their sample was 1.5. They note that there was a regional effect on premium size. The largest premiums were observed for acquisitions involving banks on the two coasts.

To identify the determinants of these premiums, Fraser and Kolari classified premiums greater than 2.0 as "high" and premiums less than 1.3 as "low". Each of the two premium categories was further subdivided according to target size. This created four groups: high premium large banks, low premium large banks, high premium small banks, and low premium small banks.

The analysis focused on the findings for small target banks. Financial ratios were computed for the year prior to the acquisition. Profitability of high premium small banks was higher that of the low premium small banks. The high premium small banks also had lower loan loss ratios than their low premium counterparts. The results for the large bank groups was similar, but the differences were less pronounced. Market characteristics seemed to affect premiums less than operating characteristics.

To determine the relative importance of these characteristics in determining acquisition premiums, the data were analyzed using stepwise regression. Three variables were identified as having the most effect on premium size: net income/total assets, a measure of profitability; total equity/total assets, a measure of capital; and demand deposits/time deposits, a measure of

the cost of funds. For large banks, one market characteristic variable, percentage change in population, entered the model. It appears from this study that target financial characteristics have more influence on acquisition premiums than target market characteristics.

Rhoades (1987) also examined the determinants of bank acquisition premiums, assuming that the premium indicates attractive characteristics. His study was based on premiums paid in 1,835 bank mergers which occurred from 1973 - 1983. Premiums were defined as the ratio of purchase price to book value.

The premiums were analyzed using ordinary least squares regression. The regression model took the general form:

Price/book = *f*(target characteristics,
target market characteristics,
acquirer characteristics

Five target characteristics were selected as variables for the regression. These were rate of return, growth (measured in terms of assets), market share, earnings growth, and capital. The four target market variables were concentration, market growth, market size, and market location (SMSA or rural). Finally two acquirer characteristics were used as variables: size and growth. Rhoades chose these particular variables in an attempt to determine whether a desire for high profits or high growth drives the payment of larger premiums.

The regression was run for the whole data set and also for each year of data. In all of these equations, only three variables were consistently significant. These were target growth, the target capital/assets ratio, and target market growth. These results imply that growth may be worth a premium to the managers of the acquirer. High growth of the target bank and its market, coupled with a low capital-to-assets ratio appear to be very attractive to bidders. Combined with the insignificance of the profitability variable, this result suggests that managers may be maximizing growth instead of profits. This is in contrast with Fraser and Kolari (1987), who found the same measure of profitability, net income/total assets, to be a significant determinant of small bank premiums.

Beatty, Santomero, and Smirlock (1987) also constructed a pricing model to explain bank acquisition premiums in terms of publicly available target financial and target market characteristics. Their sample consisted of 149 matched bidders and targets from mergers which occurred during 1984 and the first three quarters of 1985. They argue that the purchase price of a bank will be a function of four factors: target financial characteristics, the operating market environment, the regulatory environment, and the way the merger is structured (taxable or nontaxable). Therefore, variables representing these factors are regressed on price/book premiums.

Of the target financial characteristics, Beatty, Santomero, and Smirlock found three variables which demonstrated a significant statistical relationship with price/book premiums at the $\alpha = 0.10$ level. These were a ratio of Treasury securities to total assets, a measure of capital, and return on equity. It should be noted that the Treasury security ratio may be correlated with the ROE measure, since the lower return provided by a portfolio composed of a high proportion of low risk securities consequently reduces the return on equity. Therefore, the regression coefficients for these variables must be interpreted cautiously.

The capital variable used in this study is not a simple equity-to-assets ratio, but rather a deviation of the target's capital ratio from the prescribed regulatory level[9]. A negative relationship is predicted between this variable and price/book premiums. Beatty, Santomero, and Smirlock suggest that targets with excess capital are not using their resources efficiently, thereby reducing their value. They found a significant negative relationship between the capital deviation variable and acquisition premiums. Together, these results imply that targets with low capital and high returns on equity command higher premiums. These are the target financial characteristics which seem to have the most influence on premiums.

[9] The deviation is measured as the target's capital to asset ratio less the six percent ratio required by regulators.

Beatty, Santomero, and Smirlock used three dummy variables to capture the target market regulatory environment. Target markets were classified according to whether they were located in unit banking states, or not; according to whether state law permitted multibank holding companies, or not; and according to whether electronic banking was allowed, or not. Of these, only the unit banking variable proved to be significantly related to price/book premiums. They speculate that targets in unit banking states are worth more because the unit banking restriction reduces competition in operating markets. The barrier to entry raises premiums by providing successful bidders with access to a protected niche. These findings are consistent with the Flannery (1984).

This simple set of binary variables may not adequately summarize the target regulatory environment. The statutes governing geographic expansion are a very detailed, complex set of laws. For example, there are several types of state branching laws, the implications of which are lost when the design merely indicates if the target state restricts the industry to unit banking. Furthermore, the design used in this study does not account for possible interactions between the variables. Unit banking restrictions may have one effect in states which also allow multibank holding companies and another effect in states which do not. If a more detailed classification system had been used to

capture the regulatory environment, more differences may have been revealed.

Of the target market characteristics, only one was significant - the Herfandahl index. It appears positively related to price/book ratios. Targets in more concentrated markets appear more desirable. Of course, target market concentration and the ability of bidders to gain access to these markets is very much a function of the regulatory environment. Geographic regulations determine which bidders may enter a state's banking markets. Thus, concentration effects may be confounded with regulatory effects. If there is a significant correlation between state bank expansion regulations and concentration of its banking markets, then these regression results may be compromised.

The terms of the purchase were measured by two variables, which together captured the taxability of the transaction. In general, a pure cash transaction or one involving both cash and stock has tax implications for the selling shareholders. Therefore, lower premiums should be observed for pure stock mergers which escape taxation. However, as Beatty, Santomero, and Smirlock note, the pure stock structure may leave the selling shareholders in an undiversified position, causing them to demand a higher premium in a pure stock transaction. In the actual regression, both variables had a significant negative relationship to acquisition premiums. This result discounts the tax argument and indicates that sellers prefer cash.

Cash terms provide sellers with a certain and readily diversifiable position.

Rowgowski and Simonson (forthcoming) regressed variables representing target financial characteristics, target market concentration, the terms of the transaction, and the regulatory environment on price/book premiums. Their results indicate that target financial characteristics play a significant role in determining bank acquisition premiums. However, neither the Herfindahl index nor the terms of the transaction appeared significant. Although they constructed two different proxies for the regulatory environment, only one of the interstate banking dummy variables was significant at the ten percent level.

Overall, the results from these studies are similar. Target financial characteristics and target market characteristic are important in determining bank acquisition premiums[10]. The target capital ratio appears significant in all of the studies. Concentration was not significant in the Rhoades (1987) study, but did appear important in the Beatty, Santomero, and Smirlock paper. Unfortunately, they do not reveal how they defined the target market. This may make a difference.

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[10] Fraser (1978) showed that unit and branch banks differ in their financial characteristics, although some of these differences diminish after controlling for market economic factors. A test of the impact of branching, intrastate holding company, and interstate banking statutes on bank acquisition premiums should account for target financial and target market economic characteristics.

Together, the studies confirm the Beatty, Santomero, and Smirlock hypothesis that premiums are a function of target financial characteristics, target market characteristics, regulatory environment, and structure of the transaction. While all of the studies employed regression techniques, Fraser and Kolari (1987), who used stepwise regression, conducted the most powerful tests. They also characterized the target and its market with variables which are unlikely to be correlated or confounded with other model parameters.

Phillis and Pavel (1986) constructed logit models to distinguish banks which engaged in interstate acquisitions from those which were simply spectators. They also attempted to identify characteristics which separate acquirers from targets. These models indicated that size, number of branches, and statewide share of deposits were significant in predicting whether an institution will be a player or a spectator. Given that a bank is a player, size determines if it will be a target or an acquirer.

To gain further insight, Phillis and Pavel tried to identify determinants of interstate acquisition premiums. They regressed financial, structural, and demographic variables on the purchase premium[11]. Five variables were significant: net spread, consumer mortgage loans, fee

[11] Purchase premiums were defined as the ratio of price paid for a target to the target's total assets. This is the purchase price divided by the book value of assets, rather that the conventional book value of equity.

income, net loan charge-offs, and statewide deposit share. Net spread, fee income, and net charge-offs are related to the target's profitability. Statewide deposit share was the only significant structural variable. Interstate banking laws, classified as regional or national, were included in the analysis but were not significant. Since the test period extended from late 1981 to August, 1985, the interstate legal environment may have been too underdeveloped to permit a meaningful test. (The pivotal Northeast Bancorp case was decided June, 1985). These results, which concern strictly interstate acquisitions, are generally compatible with the other three studies.

Bank Merger Event Studies

The following studies analyze bank merger or holding company acquisitions using standard event study methodology. This analysis involves a comparison between the actual returns of merging firms and the returns that are predicted from the market-line or beta relationship between risk and return and centers on shareholder wealth effects. These studies are reviewed because they shed some light on the possible sources of gains to merger and therefore upon the determinants of acquisition premiums.

Usually, the results from the bank merger event studies agree with the evidence for nonfinancial mergers[12].

[12] See Jensen and Ruback (1983) for a review of the empirical evidence concerning mergers of nonfinancial corporations.

Target shareholders gain, while acquiring shareholders loose or receive a normal announcement period return. Neely (1987), for example, reached these conclusions in a study of bank and holding company acquisitions, confirming that the wealth effects are generally similar for financial and nonfinancial mergers.

Swary (1981) examined the effect of BHC acquisition of mortgage firms on shareholder wealth. As BHCs already provide a major portion of mortgage banking services, their acquisition of mortgage companies may produce market power.

When BHCS compete for existing merger rents, their shares should not show positive abnormal performance at the announcement. However, if competition among bidders is reduced by high regulation and transaction costs, then abnormal returns to the acquiring BHC may result. Swary's basic hypothesis was that a BHC can benefit from a mortgage company acquisition to the extent that the Federal Reserve Board's regulatory process results in a noncompetitive acquisition market.

The event period extended from the announcement to the culmination - successful merger or Board denial. Daily returns were used to evaluate twenty-five acquisition applications over a period of thirty-two weeks. Using standard market model returns, Swary found that stockholders of acquiring BHCs do not realize abnormal returns following the announcement of a mortgage firm acquisition. This is the typical result found for mergers

in unregulated industries. The Board's regulation of BHC mergers did not appear to affect the competitive nature of the acquisition market. Swary attributed the insignificant bidder returns to competition for targets, and refuted a market power theory.

Swary (1983) researched BHC acquisition of nonbank firms. BHC expansion into nonbank activities may be viewed as financing a given investment with equity instead of loans. Equity participation is desirable if the merger is synergistic. There may be some economies of scope in the joint production of banking services and closely related products which use the same information as an input.

Another motivation is risk shifting. By financing nonbank activities through merger rather than loans, the BHC can increase its returns. Ordinarily, increased returns come at the price of increased risk. However, federal deposit insurance premiums are determined by the level of deposits, not the riskiness of the BHC's investments. *Ceteris paribus*, if the outcome to its riskier activities is favorable, the greater return will not be offset by higher insurance premiums. If the outcome is unfavorable, the Federal Deposit Insurance Corporation may attempt to prevent the BHC and its nonbank subsidiaries from failing. The regulatory distortion of normal market forces creates a unique source of merger gains in the banking industry. Swary investigated these possibilities with a sample of

seventy-four merger applications, spanning the years 1971 through 1976.

In this event study, Swary found that stockholders of acquiring BHCs earn normal returns during the pre- and postannouncement periods, but earn significantly positive returns around the announcement day. BHC stockholders received significantly negative returns on the decision date when the Board denied the merger application. These findings support the notion that gains to merger stem from efficiency improvements. Since these mergers involve the union of firms producing compatible, but not identical products, the positive returns are probably not due to market power.

To summarize, both of Swary's studies examine the impact of regulation on bank holding company acquisitions. The findings are quite consistent with the general evidence for nonfinancial mergers - bidding shareholders do not experience abnormal positive announcement day returns. In the mortgage company study, the absence of significant announcement day returns for acquiring BHCs was interpreted as evidence of a competitive market for merger targets. Swary felt that the Federal Reserve Board's policy did not produce a noncompetitive acquisition market. If market power motivates the merger, then all of the excess value of this power is competed away in the bidding process. Of course, bidders would also receive insignificant returns if there was no market power to begin with. Returns would also

be insignificant if synergistic gains were capitalized over a long-term acquisition scheme.

In the nonbank merger study, there is strong evidence that regulation circumvents normal market forces and creates unique merger gains in the banking industry. If these merger markets are very competitive in spite of regulatory restrictions, then why are the gains to the acquirer not competed away in the nonbank firm study? The extent to which regulation harms the competitiveness of the acquisition market is unclear; yet it is important as it influences the expected magnitude of acquisition premiums. The more competitive the market, the larger the premiums will be as all surplus is wrested from acquirers.

Trifts and Scanlon (1987) employed standard event methodology with market model returns to investigate the wealth effects of interstate bank mergers and to explore the competitiveness of the market for interstate acquisitions. They examined stock price data for twenty-one interstate holding company acquisitions. Their test period extended from 1982 to 1985.

The results for targets agreed with the evidence on nonfinancial mergers. Target shareholders experienced significant announcement period returns, although there was a strong indication of information leakage in the ten weeks prior to the event. In tests of acquirer returns, they found the usual result that acquisition has a minimal

effect on bidder shareholder returns. Acquirer announcement period returns were very slightly negative.

While the overall result for acquirers was essentially neutral, a closer look at their sample revealed that the mergers were not a homogeneous group. Some bidders acquired a relatively small target; others acquired a relatively large one. For bidders pursuing a relatively large target, the pre-announcement returns were strongly and significantly positive. The actual announcement period return was insignificant and very slightly negative. In contrast, shareholders of banks acquiring relatively small targets experienced insignificantly negative pre-announcement day returns and significantly negative announcement day returns.

Why does the market react negatively to the smaller mergers? Trifts and Scanlon suggest that a relatively larger target with a more extensive distribution network and a larger customer base may be a more valuable acquisition. These mergers may represent real opportunities to obtain benefits from geographic expansion.

An alternative explanation, which they do not explore, is market segmentation. Trifts and Scanlon note that the bidders engaged in the smaller acquisitions in their sample are predominantly large institutions traded on the New York and American exchanges. Those acquiring relatively larger targets are themselves smaller and traded over the counter.

Large, listed bank holding companies have long expanded across the nation in various ways. The market for targets attractive to these banks may be very competitive. Since an acquirer is normally as big or bigger than its target, the smaller the target, the greater the pool of bidders. Further, states populated by smaller banks have tended to adopt legislation which increases the number of potential bidders.

Conversely, the markets in which OTC banks make acquisitions may be protected by regional compacts, making these markets less competitive, and allowing acquirers to make "good deals". Further, because of the size issue, the larger the target, the smaller the pool of bidders, and therefore, the smaller the premium. If the market for larger acquisitions was not distorted by regional legislation, the OTC banks would face very stiff competition from some very large, listed BHCs and the abnormal returns reported for these OTC acquirers would be bid away. Thus, interstate statutes can segment the acquisition market, harm its competitiveness, and produce abnormal returns for the protected acquirers. Indeed, this is almost certainly the purpose of regional compacts.

James and Wier (1987) researched the effects of competition in the acquisition markets on the division of gains between bidders and targets. Regulations that increase the number of potential bidders may intensify *ex*

post competition[13] among bidders, reducing the expected gain to the successful bidder. The degree to which *ex post* competition reduces acquisition search activity depends on the substitutability of the bidders. If the bidders are substitutes, then *ex post* competition should increase the target's share of the acquisition gains. Likewise, James and Wier propose that if there are substitutes for the original target, then *ex post* competition should increase the bidder's portion of the gains.

James and Wier used event study methodology to test these theories on the division of gains in thirty-nine bank acquisitions. Potential bidders were defined as banks within the same state or within the same interstate banking region for intrastate and interstate acquisitions, respectively. Potential bidders were further constrained to be larger than the acquired bank. Alternative targets were defined as banks in the same state as the acquired bank.

Using market adjusted returns, James and Wier found the usual pattern of announcement day returns: targets received a significant excess return over the two day period, while acquirer returns were insignificantly affected by the announcement. This indicates that most of the gains went to the targets.

Hypothesizing that the division of gains depends on the substitutability of targets and bidders, James and Wier

[13] *Ex post* competition is competition for targets which have already been identified by an initial bidder.

modeled the impact of the number of potential bidders and targets on the announcement period returns to bidders and targets. They found a significant negative relation between the abnormal announcement period return for targets and the number of alternative targets, and a significant positive relation between bidder returns and the number of alternative targets. There was a significant negative effect of the number of potential bidders on the return to bidders.

Although there was not a corresponding relationship between target returns and the number of alternative bidders, these results support the substitutability hypothesis, indicating that the number of potential bidders and targets determine the division of gains. To explore this further, James and Wier estimated the relationship between dollar value change and the number of alternative bidders and targets. They repeated this analysis using total value change.

In both cases, they found a positive relationship between the target's value change and the number of potential bidders. This result is compatible with the central hypothesis of this study - the larger the pool of bidders, the larger the premium. A greater number of substitute targets was associated with a smaller value change for the target and a greater change for the bidder. Competition among bidders and targets appears to determine the division of the acquisition gains. The population of

bidders and targets depends, of course, on the branching, intrastate holding company, and interstate statutes governing geographic expansion in the target state.

Impact of Merger on Individual Bank Performance

Early studies of bank mergers were very concerned with the regulatory aspects of the question. One of the key questions asked was a social one: Was there any evidence for the creation of monopoly power through merger? Mergers were examined for indications of consolidation, concentration, and market power. The inspiration for these studies was a period of strong merger activity in the 1960's. Between 1960 and 1965, approximately 900 commercial banks were absorbed. In the Fourth Federal Reserve District alone, the number of banks declined by more than ten percent. This led to a fear of generalized consolidation and resulted in several studies dealing with the cause and effect of this merger movement. While the social and regulatory aspects are important in their own right, this literature also provides insight into bank financial characteristics which influence merger activity.

Smith (1971) compared the performance of merging banks with a sample of non-merging banks. Since changes in performance might reflect performance changes over time for all commercial banks, a non-merging bank of the same general asset size and geographical location was matched

with each merging bank. This created a paired sample, for which performance of both groups was compared in the pre- and post-merger year.

Mean differences and standard errors of selected banking ratios formed the basis of the comparison. Smith found that the two groups differed only slightly in their asset structures and loan portfolios. Nonetheless, post-merger revenue for merged banks was significantly higher than that of the matched non-merging sample. However, merging banks had significant increases in operating expenses which offset the higher revenues. Thus, there was no significant difference in the post-merger profitability of the two groups. Smith may have failed to detect a difference in profitability because his post-merger comparison period is too short. The gains to merger may take more than a year to realize. Presumably, the acquirer desires the merger because it is a way to increase profits.

Smith found no significant differences in the pricing behavior of merging and non-merging banks. His results do not support a market power theory. The increased revenues for merged banks are consistent with increased efficiency and synergy. The absence of immediate higher profitability in the combined banks may be due to initial start up costs.

Rhoades and Yeats (1974) also explored consolidation in the banking industry. They looked at the growth rates, including and excluding merger, for different sizes of banks. Size and growth were measured in terms of deposits

from December, 1960 to December, 1971. All U.S. commercial banks were grouped into one of six size categories, according to December, 1971 deposits, and a random sample of one hundred banks from each size class was selected. Merging banks within the sample were identified.

Rhoades and Yeats data show that banks in the two largest size classes ($100,000,000 - $499,000,000 and greater than $500,000,000 in deposits) accounted for 85% of the acquisitions and 98% of the acquired assets. The largest class, alone, accounted for 77% of acquired bank assets. The heavy concentration of acquisitions in the largest class suggest that merger growth is relatively important for large banks. Hence, the concern over consolidation.

When the net growth rates, exclusive of merger, were examined, Rhoades and Yeats found that the largest class grew internally at a significantly lower rate than all the other classes. For the second largest size category, the netting out of growth from merger had a greater impact on the growth rate. In other words, when merger growth was excluded, banks in the largest group grew at the lowest rate, but banks in the second largest group experienced the greatest percentage decline in growth rate. Removing the effects of merger had more impact on growth rates of banks in the second largest group.

It is quite possible that a bank grows internally at first, to the limits of its local deposit base. Once the

base is fully exploited, acquisitions provide a way to enter new geographic markets. A bank may attain a certain size in the process of realizing all economies available through internal growth. Beyond this size, because of geographically localized markets, further economies must be realized externally. Banks in the two largest size classes may have exhausted all the gains to internal growth, explaining the greater importance of acquisitions to these two groups.

Rhoades and Yeats concluded that the vast majority of mergers involve large banks. While this implies consolidation of the banking industry, they found that the vigorous internal growth of medium sized banks offset the influence of acquisitions and led to overall deconcentration of the industry during the test period.

In a comment on the Rhoades and Yeats study, Moyer (1976) suggested that the structure of the banking industry naturally limits concentration through merger. He argued that mergers are limited by: (1) a declining number of markets in which the acquiring bank is not already represented; (2) a general reduction in the number of independent banks not already affiliated with a large bank - i.e., a declining number of targets; and (3) increased regulatory resistance to acquisition. He felt the main limiting factor was the decline in the number of suitable targets. Once again, state branching, intrastate holding company, and interstate banking laws will influence where a

bidder may look for targets. In sum, Rhoades and Yeats and Moyer provide evidence against the need to heavily regulate mergers in order to protect the public good. Smith's work and that of Rhoades and Yeats indicated that the bank mergers studied did not substantially alter the industry structure.

Rhoades (1986) re-examined the performance question using regression techniques to analyze bank acquisitions from the period 1968 to 1978. Using several years of pre- and post-acquisition data, he investigated the hypothesis that the acquired firms tend to be poor performers before the merger, and the companion issue of whether the operating performance of the target is improved after the merger. He measured performance in terms of profitability, operating expenses, and changes in market share.

In the regression analysis, Rhoades used the three performance measures as dependent variables. He predicted performance as a function of acquisition (merged or not merged), concentration, size, share of deposits, loan/asset ratio, capital/asset ratio, deposit growth, and legal status (branch or unit banking). All of the variables except the binary acquisition measure were included as controls.

Rhoades found that the acquired banks were generally no more or less profitable than other banks before the merger. Further, the acquired banks' profitability did not appear to be improved by the merger. The acquisition

variable was insignificant in both pre- and post-merger regressions.

The operating expenses/total assets ratio was used to capture operating efficiency. Again, the acquisition variable was insignificant. Rhoades concluded that the acquired firms did not appear to be unusually inefficient prior to the merger, nor were they more efficient than nonacquired banks in the four to six years following the acquisition.

Finally, Rhoades looked at changes in market share as a function of acquisition, under the assumption that a firm offering better prices or superior products and services will grow at the expense of its rivals. Market share served as a blanket measure of improved efficiency. In Rhoades' sample, growth of acquired banks' market share was indistinguishable from that of other banks, both before and after the merger. He concluded that potential targets do not differ in their performance from other banks in either the pre- or post-merger period.

This conclusion is probably too strong. Using Rhoades' regression equation, performance can not be predicted from a bank's acquisition status. Rhoades' test results say only that performance does not significantly depend on whether the bank is acquired, regardless of whether the relationship is measured before of after the merger. This is the expected result if there are high performing banks which have not participated in a merger, as well as high

performing combined banks. Similarly, no difference would be found if there are poor performing unmerged banks and poor performing combined banks.

To test the hypothesis that targets are poor performers prior to the merger, the regression should model acquisition status as a function of pre-merger performance[14]. Similarly, to test the hypothesis that merger improves target performance, the pre- and post-merger performance of target banks could be compared using paired t-tests.

Running the regression with the performance as a function of acquisition status does not enable us to tell whether acquisition improves performance. Acquisition status will be insignificant if the post-acquisition performance of targets is the same as nonacquired banks. This does not tell us that target performance was not improved. If targets are significantly poor pre-merger performers, and then have their performance raised to the average level as a consequence of merger, then target performance is improved by merger, and target operating characteristics are important in determining which banks will be acquired, but this test will fail to detect it.

Therefore, the influence of target financial characteristics on merger behavior can not be ruled out. It

[14] The model should take the form: Acquisition status = *f*(pre-merger performance), where acquisition status has two levels, target and unmerged.

is quite possible that the operating attributes of targets differentiate them from banks which remain unmerged.

In conclusion, the individual bank performance studies used financial ratios, among other techniques, to investigate the effects of merger on market power and bank efficiency. The studies generally found some efficiency gains, but little evidence of monopoly power. The studies also suggest that targets are different from bidders and from nonmerging banks. This finding indicates that target financial characteristics are important in determining which banks constitute desirable target franchises. The more desirable characteristics a bank has, the higher the premium should be, all else equal.

Market Structure and Performance

The market structure and performance literature examines the impact of bank mergers in terms of market power and economies of scale and scope. These studies, exhaustively reviewed by Gilbert (1984), find only mild support for a market power thesis and modest economies of scale and scope.

The first concern of this research is that merger may lead to increased monopoly power. The basic hypothesis is that concentration harms competition by increasing the probability of collusion. Banks in concentrated markets may use their market power in undesirable ways. This may be

manifested in monopoly profits, lower interest rates on deposits, higher service charges, and higher loan rates.

The market structure and performance hypothesis has special relevance for regulation of geographic location. On the one hand, relaxing the regulatory constraints on geographic expansion lowers the barriers to entry. This could have a procompetitive effect. The increased threat of entry may alone be sufficient to ensure competitive levels of output and pricing of bank products and services. At the same time, deregulation increases the pool of potential bidders for acquisitions, promoting a robust market for corporate control.

On the other hand, expansion that takes place through acquisition, rather than *de novo* entry, exacerbates an established consolidation trend in the banking industry. Some observers are concerned that the industry will one day be dominated by a tight oligopoly of giant banks that are mostly uncontrollable and socially irresponsible. Expansion through acquisition may contribute to the formation of giant banks, insulated from the threat of takeover and failure by their enormous size.

The generic test measuring the relationship between bank performance and market structure models performance as a function of concentration. The consensus belief, summarized in Gilbert's review, is that concentration is the relevant measure of market structure. In this survey of forty-four studies, market areas were generally defined as

counties for rural banks and as SMSAs for urban banks. However, Gilbert notes that the relevant market can exist at the state level when there is a possibility of mutual forbearance[15]. This condition may arise in states that allow branching or reciprocal interstate banking.

Although the choice of bank performance measures differed across the studies, Gilbert reports that three measures were consistently found to be significantly related to concentration. These were loan rates, deposit rates, and profit rates. Higher loan rates and higher bank profits tend to be associated with more concentrated markets. Lower deposit rates were often found in concentrated markets, while the effect of concentration on service charges was insignificant.

Rhoades and Rutz (1982) looked specifically at the impact of BHCs on local market rivalry and performance in terms of competition and concentration. They analyzed price and profit data for 1,511 banks. Assuming that less competitive markets have fewer participants and that banks in less competitive markets can deduce rival reaction functions, Rhoades and Rutz hypothesize that less competitive markets will experience fewer rank changes among competing banks. Rivalry is measured by the number of times that the top banks in a market change rank.

[15] Mutual forbearance occurs when a few banks face each other in several markets and agree to limit their competitive behavior. Whalen and Mugel (1986) provide evidence that acquisition does not increase the probability of mutual forbearance.

Using Tobit analysis, Rhoades and Rutz found a very significant positive relationship between rivalry and BHC participation in bank markets. They suggest that the turnover in market leadership may be caused by acquisition activity among BHCs. Obviously, state branching and holding company expansion laws determine the extent to which BHCs can engage in this behavior. Rivalry and competition may be expressed through acquisition. Relaxation of the restrictions on geographic expansion may intensify this form of rivalry and drive up premiums. Rhoades and Rutz also found no evidence that BHC presence affects bank profitability.

Hanweck and Rhoades (1984) investigated the hypothesis that the presence of large banks in a market limits rivalry and contributes to poor price and profit performance among banks. The concern is that the very large bank has greater financial power that its smaller rivals. The larger bank has a "longer purse" and "deeper pockets" than the small bank and it may use its greater resources to intimidate the small banks, with adverse competitive effects.

Rivalry and profit and price performance were modeled as a function of dominant firm participation in a market. Their results indicated that prices tend to be higher in markets where large, dominant banks operate. In contrast to Rhoades and Rutz (1982), Hanweck and Rhoades found that rivalry was lower in markets containing a large, dominant bank and several smaller rivals. However, markets

containing more than one large competing BHC would have been included in the Rhoades and Rutz study, but excluded from Hanweck and Rhoades. Although one may think of the typical BHC as a large, dominant firm, the apparently conflicting results for the effect of rivalry may be caused by differences in experimental design.

In summary, the bank market structure and performance literature provides some evidence for the market power rationale that concentration has adverse effects on competition. However, while the relationship may be statistically significant, it appears weak. A large increase in concentration caused only a small change in performance. Thus, the hypothesis is supported, but its practical importance remains in doubt.

The second group of studies reviewed by Gilbert (1984) focus on the cost structure of the banking industry in order to determine if the market structure that is consistent with efficient production is also conducive to competitive pricing. These are tests for economies of scale and scope. Though the precise relationship between concentration and market power has not been determined, theory suggests it depends on the number and size of firms in a market. Economies of scale and scope are natural conditions giving rise to concentrated market structures.

The early research related bank costs to balance sheet measures. For example, Horvitz (1963) calculated operating cost ratios from financial statement data for banks grouped

according to size, measured in terms of assets. He found that larger banks had lower costs.

Benston (1965a, 1965b) used the Federal Reserve's Functional Cost Accounting (FCA) data to estimate separate cost functions for each category in the FCA data with a Cobb-Douglas functional form. Measuring output as the number of accounts served, Benston found evidence of economies of scale for most categories of bank products.

Gilbert points out that the Cobb-Douglas form is probably too restrictive because it does not allow estimation of U-shaped cost curves. The function restricts the conclusion to either economies or diseconomies of scale throughout the range of output. The costs of producing each category of output are also assumed to be independent; therefore, no economies of scope are considered in the model. Further, since dummy variables were used for branching status, the procedure held the effect of organizational form on costs constant at each level of output. It did not allow for a possible interaction between organizational form and output level which may affect costs.

A more refined approach was used by Benston, Hanweck, and Humphrey (1982). They abandoned the restrictive Cobb-Douglas form in favor of the more general translog form. Use of the translog functional form allowed them to obtain U-shaped cost curves, reflecting both economies and diseconomies of scale. Interaction between number of

offices and output was directly specified in the model. They found significant diseconomies of scale for unit banks with total deposits in excess of $50 million. They estimated the minimum optimal bank size as between $10 and $25 million. Branch banks with more than $25 million in deposits had significant diseconomies.

A problem with the translog function is that it becomes zero if one of the products is not produced. Substitution of a scalar of composite production (e.g., an index) for a vector of actual output precludes the detection of economies of scope. Gilligan, Smirlock, and Marshall (1984) and Gilligan and Smirlock (1984) test specifically for economies of scope.

To circumvent the problem of not having all products produced by all banks, Gilligan, Smirlock, and Marshall devised a test of the separability of the product cost functions. This test required the relative marginal costs associated with the outputs to be independent of the level of input prices. The translog cost functions were estimated separately for branch and unit banks using ordinary least squares regression and imposing a homogeneous input price restriction.

Both the Gilligan, Smirlock, and Marshall and Gilligan and Smirlock studies found significant decreasing ray average costs[16] for banks up to $25 million in deposits.

[16] Decreasing ray average cost is a definition of economies of scale. Let T = {(x,y)/y can be produced from x} be a generalizable technology set. Let L and G be scalars. T

Between $25 and $100 million, they find evidence of constant ray average cost. Deposit size beyond $100 million appeared to be associated with diseconomies of scale, with unit banks more severely affected than branch banks[17]. The separability test gave strong indications of economies of scope as well.

The basic conclusion from these cost studies is that economies of scale in banking, while they may be significant in statistical tests, are quite modest. This conclusion held across the various levels of branching. The minimum optimal size appears to be relatively small. To quote Gilbert (1984), "Thus, for most banking market areas, there is no trade-off between the objective of low market concentration and efficient production of banking services." He concludes that policies which restrict bank mergers do not impose inefficiency on the banking system. Thus, economies of scale do not appear to provide justification for increased size. Economies of scope similarly appear small, but this is an issue which has only begun to be explored.

One final note must be made on the economies of scale and scope literature. All of the studies reviewed here,

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exhibits economies of scale if and only if there exists a G such that for all L, $1 < L < G$. This implies that there is a $G > L$ with (Lx, Gy) for all T. Whenever the input(s) x are multiplied by L, the output(s) y increase by $G > L$.

[17] This is in remarkable agreement with Benston, Hanweck, and Humphrey, who supposedly biased their economies of scale estimates by confounding them with economies of scope.

except for Horvitz (1963), use the Functional Cost Accounting data for estimating cost functions. The FCA data is compiled through the Federal Reserve. Volunteer member banks supply the program with detailed information concerning the number and activity of their deposit and loan accounts and a breakdown of their expenses by category.

This provides a rich and ready data source for researchers. However, these banks may not be representative of the whole population. Since they are volunteers to the program, they are not a random sample. Further, as Gilbert points out, almost all of the participating banks have total assets of less than $1 billion. For these reasons the conclusion of modest economies of scale and scope may not be generalizable to the largest banks.

Summary

Regulatory restrictions on geographical expansion of banking firms appear to adversely affect bank performance. In some cases, the restrictions may lead to cost inefficiencies by crippling the market for corporate control, allowing expense preference behavior among managers to go undisciplined. Cost inefficiencies may also occur when branching restrictions force banks to pursue alternative methods of competition or induce banks to use inefficient combinations of inputs. The regulatory constraints may also lead to price inefficiency. By

creating a substantial barrier to entry, the restrictions sustain prices above the competitive level in some markets.

Further, there is no evidence that severe expansion regulations are needed to protect new banks. There is little reason to believe that removal of the restrictions would lead to the demise of new banks. Most significantly, the Dubofsky and Fraser study highlights the potential role of the courts in determining the regulations on geographic expansion. They establish that a court ruling can substantially alter the bank acquisition market.

The empirical research documents that abnormal positive announcement period returns accrue to target shareholders, while acquiring shareholders usually neither gain nor loose. This neutral effect on acquirer returns could be due to the possibility that the transaction represents an exchange of one asset for another. In a competitive acquisition market, the acquisition premium would be exactly equal to the marginal value of the investment. Alternatively, acquisition markets may contain known, established bidders for whom an individual merger is merely a single step in a long run acquisition scheme. For these bidders, the expected value of their long run strategy may already be reflected in stock prices.

In some of the bank merger event studies, however, the acquisition is not a neutral event for acquiring stockholders. It was suggested that regulatory constraints limit the competitiveness of bank merger markets such that

all of the gains to merger are not bid away in higher and higher premiums. Policies which reduce the population of potential acquirers and increase transaction costs may harm the competitiveness of bank merger markets.

Bank performance studies focused on how merger affects performance. Many of these were tests for monopoly power, interesting because of the regulatory implications. There were some indications from these studies that merger improves efficiency, implying that the gains to merger may be worth a premium. These studies found little evidence for gains in market power through merger.

The market structure and bank performance literature investigated the issue of concentration, whether it affects performance in socially undesirable ways, and whether it is a natural consequence of economies of scale and scope. Obviously, acquisition can increase concentration. The economies are a potential benefit; market power is a potential danger.

If the economies are significant, then the mergers are desirable and the premiums should reflect the efficiency gain. If the threat of monopoly power is significant, then the acquisitions should be controlled, perhaps even at the expense of harming the competitiveness of the bank merger markets. The evidence from this literature is that economies are modest and that increased concentration has only a mild effect on performance.

There are relatively few studies of the determinants of bank acquisition premiums. These represent an alternative way to examine the sources and magnitude of the gains to merger and measure the efficiency of bank acquisition markets. Premiums should be a function of bank financial characteristics, target market economic characteristics, the structure of the transaction, and the regulatory environment. The evidence is mixed, but several significant variables have been identified. These are target financial characteristics - relative size, profitability, growth, and capital. Market characteristics require further investigation, particularly in regard to regulatory constraints. Similarly, the effects of the terms of the transaction await additional study.

CHAPTER III

METHODOLOGY

Introduction

This chapter describes the sample data set and the statistical modeling and analysis techniques used to examine the effects of branching, holding company and interstate regulations on bank acquisition premiums. Sample construction methods and selection criteria are presented first, followed by formal development of the hypothesis and discussion of analytical methods used.

The final data set is composed of three subsets, each containing a different type of information. The three subsets consist of merger information, financial data, and target market data. The financial data subset contains balance sheet and income statement information which is used to construct financial ratios. The target market data subset consists of information describing the branching, holding company, and interstate banking laws that apply for each merger. This subset also contains data pertaining to the general economic condition of each target's market area. The nature and significance of each of the three subsets is discussed.

Four statistical methods - regression, analysis of variance, analysis of covariance, and nonparametric techniques - are used to model the acquisition premium and

test hypotheses regarding the impact of restrictions on geographic expansion. Stepwise regression, in combination with correlation analysis, is used to model the premium and identify possible covariates.

The premiums are then examined employing analysis of variance in a full factorial model. Branching, holding company, and interstate laws are modeled as the treatments affecting acquisition premiums. The tests are repeated with the covariate to improve the precision of the analysis. The model is then reformulated to permit custom hypothesis testing. Finally, nonparametric tests of the main effects are performed as a check, since these tests do not require normality. Model adequacy is explored with residual analysis and the heterogeneity of slopes test.

Sample Selection

The initial sample of mergers considered for this study consisted of all holding company acquisitions reported in Bank Expansion Quarterly for the years 1985 and 1986. The Supreme Court sanctioned interstate banking in June, 1985 by ruling in the Northeast Bancorp case to uphold the right of the states to permit various forms of interstate banking. Therefore, 1985 was chosen as a starting point; 1986 was the last year for which a complete set of data was available.

The 1985 and 1986 mergers were examined and those involving failing institutions or other special

circumstances (for example, partial acquisitions) were excluded. The first pass resulted in a sample of 408 ordinary acquisitions, including both intrastate and interstate targets. To build the merger information subset, transaction data, as published in the Bank Expansion Quarterly, were recorded for each merger.

These data included the names and locations of each buyer and target, and the premium paid expressed as the price/book and price/earnings ratios. The terms of the transaction were recorded as the percentage of the purchase price paid in cash. It is a coincidence that the terms for the mergers in this study involve only cash, common stock, or a combination of cash and common stock. Other securities are sometimes used.

This study sought to consider and control for the various financial characteristics of the targets that may affect the magnitude of the acquisition premiums. For example, Rhoades (1987) found a significant relationship between acquisition premiums and target asset growth and target capital/assets ratios. Fraser and Kolari (1987) found that premiums may also be significantly influenced by such financial ratios as net income/total assets, demand deposits/time deposits, and total loans/total assets.

Therefore, in order to utilize the existing knowledge of the determinants of bank acquisition premiums, the initial sample of 408 buyers and targets was matched against income and call report data tapes provided by the

Federal Reserve. These tapes contain balance sheet and income statement data for each reporting bank and holding company.

Two years of financial data were extracted from the tapes for each buyer and target to create a more accurate picture of each entity's' financial performance. For example, for the mergers occurring in 1985, balance sheet and income statement data for 1981 and 1984 were collected. Following the technique of Rhoades, this permitted several ratios to be expressed as three year averages. This is desirable because unusual and nonrecurring items may occasionally distort financial statement data. Even if there are no unusual items, the three year averages may provide a better summary of the entity's performance over time. Some evidence suggests that buyer financial characteristics may influence acquisition premiums; therefore, to be included in the sample, an acquisition was required to have the full two years of financial data for the buyer as well as the target.

The final sample consisted of those mergers for which financial statement data were available for both the target and the buyer for the year preceding the merger and for the year ending three years prior to the year preceding the merger. For 1985 mergers, these are the years 1981 and 1984. For 1986 mergers, the years 1982 and 1985 were used. The year preceding the merger was chosen as an anchor point

because the acquisition decision may be influenced by its financial condition at that point in time.

The transactions under study are holding company acquisitions; although Bank Expansion Quarterly often records the buyer as the lead bank of the holding company, the buyers are actually holding companies. Many are multibank holding companies. Some of the targets in the final sample are also multibank holding companies, but most are individual banks or one-bank holding companies.

When a merger involved a multibank holding company, financial data for all the constituent banks[18] were summed according to the Federal Reserve highest holding company number, a code on the tapes which represents the highest organizational level. Although buyers and targets are identified in this study by the lead bank names, the financial data used is that for the holding company, compiled by aggregating the data for its banking subsidiaries[19].

To summarize the sample construction procedure, an acquisition was included in the final data set if:

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[18] While it is possible for a bank holding company to contain nonbank subsidiaries, financial data on these were not available. Rangan (1986) has shown that omission of the nonbank subsidiaries results in little effect on the summary measures.

[19] Recall that transactions wherein only part of the target's assets are sold were excluded. The acquisitions included in the sample involve only those transactions in which all of the target's banking assets were acquired.

1. It was reported in Bank Expansion Quarterly during 1985 or 1986. This time frame was chosen to select mergers affected by the Northeast Bancorp ruling.

2. The transaction was ordinary in the sense that no special circumstances were involved. Failing institutions and partial acquisitions were excluded.

3. Two selected years of financial data were available on the Federal Reserve income and call report data tapes for both the target and buyer. This permits consideration of both buyer and target financial characteristics and allows formulation of selected financial ratios as three year averages.

This procedure resulted in a final sample of 174 acquisitions. The target market data subset was then constructed. This subset contains information on the branching, holding company, and interstate expansion laws that apply to each merger. These laws are summarized and chronicled for each state in an article by Amel and Keane (1987), forming the basis for the classification schemes used in this study.

Interstate banking laws were divided into three types: regional reciprocal, nationwide, and none. This classification scheme reveals the nature of the statute and the population of potential bidders. In a state with no provision for interstate banking, the population of buyers includes only those located within the target's state.

In a state with a regional reciprocal interstate statute, the set of potential bidders is larger; any would-be acquirer in the region can bid for the state's targets. When nationwide interstate banking is in effect, no potential buyers are excluded on the basis of their

geographical location. Because the provision in effect at the time of the merger determines the population of bidders, "regional" and "regional with nationwide trigger" laws were grouped together.

State laws governing branching also define the set of bidders for a given state's banking firms by influencing the geographical locations a banking firm may occupy. Usually, the branching laws are classified as prohibited, limited, or statewide. However, to better capture the impact on merger premiums, this study employed a more detailed classification.

Branch banking laws were classified as prohibited, limited, statewide by merger only, and statewide. The limited group was surprisingly homogeneous. These branching provisions generally limit branch banks to the same SMSA or county which houses the home office. The statewide-by-merger-only form prohibits statewide *de novo* expansion. Obviously, this type of branching policy should affect the pool of acquirers. In contrast, the statewide form does not distinguish between *de novo* branching and branching through acquisition, and the prohibited form does not permit a bank to branch at all.

Holding company laws also influence geographic expansion and, therefore, the set of bidders for a state's targets. Indeed, in some states, holding companies may have been formed as a mechanism to circumvent the branching restrictions. For example, Texas prohibited branching by

banks until January, 1987; and yet the bank acquisition market has been quite active because the state does not impose geographic restrictions on its holding companies. A holding company can operate subsidiary banks located in different geographical areas of the state.

The holding company laws fall into two groups: limited and unlimited. With the unlimited form, holding companies are not restricted geographically. In the limited form, holding companies are generally restricted as to the percentage of a state's banking assets which can be controlled by any one firm. In other words, size, rather than location, is limited. Rarely, holding company acquisitions are limited to certain areas of a state.

This study hypothesizes that the population of potential bidders affects the magnitude of the acquisition premium - the larger the pool of bidders, the higher the premium. The pool of potential bidders is defined by the target state's branching, holding company, and interstate statutes. Together, these laws determine entry into a state's banking markets, both in terms of which banking firms may enter and how entry may occur. Therefore, each observation in the final data set was tagged to denote the branching, holding company, and interstate laws in effect in the target's state during the year of the acquisition[20]. The three-way classification of each observation is

[20] Some states revised their statutes between 1985 and 1986, many adopting some form of interstate banking.

referred to as the legal status and it is the primary effect investigated.

Rhoades (1987) and others have suggested that premiums may be influenced by target market characteristics. For example, buyers may perceive targets located in rapidly growing markets as more desirable. Targets located in urban areas and targets located in regions enjoying an economic boom may command higher premiums than their less favorably located counterparts. Therefore, target market data was included in the data set to account for the influence of these factors.

For each target market, a variety of information was gathered from the County and City Data Book, which contains census data. If the target was located in an SMSA, the relevant market was defined as that SMSA. If the target consisted of a single bank not located within an SMSA, the target market was defined as the county in which the bank was located. If the target had multiple subsidiaries located in more than one SMSA or county, then the target market was defined as the target's state[21].

Population, per capita income, and population growth rate were recorded for each target market. Population, in combination with the target market definition, defines the relative size, urbanization, and economic integration of the target market. Per capita income was chosen because it

[21] These target market definitions are consistent with those used by Rhoades (1987), Fraser and Kolari (1987) and James and Wier (1987).

is a familiar proxy for economic well-being. Growth, measured as the rate of change in population over time, is also a measure of the economic climate and was included because buyers may be growth maximizers.

In addition, a binary variable indicating whether an acquisition provided the buyer with access to a new geographic market was included. The locations of all banking subsidiaries of both the buyer and the target were compared. If the target occupied any locations not previously occupied by the buyer, the acquisition was deemed "market extending" and the variable took the value of 1.00. If all target subsidiaries were located in markets previously occupied by the buyer, the variable was recorded as 0.00. The number of target subsidiaries was also noted.

To summarize, the final data set consisted of 174 observations of holding company acquisitions. Each observation contains three subsets of information: merger information, including the participants' identities, premiums paid, and terms of the transaction; financial statement data for both the target and buyer; and target market data. Target market data includes both the legal and economic status of the market area. Financial data and target market economic status data were included to allow for financial and economic characteristics which are known or thought to influence acquisition premiums in addition to the influence of the target market's legal status.

Development of the Hypothesis

The purpose of this study is to investigate the impact of regulations governing geographic expansion on bank acquisition premiums. These regulations take the form of state branching, holding company, and interstate banking statutes. As discussed in the data set construction section, these laws can be classified into various levels, based on a state-by-state listing given in Amel and Keane (1987). The levels describe which banks may enter a market and how that entry may occur. Obviously, a set of statutes that greatly influences entry is likely to have far ranging impact on many facets of bank behavior.

These laws affect bank acquisition markets by defining the population of potential bidders. This study examines the hypothesis that these laws affect acquisition premiums by determining the size of the pool of potential bidders. The central hypothesis is that acquisition premiums will be higher for targets in states which have branching, holding company, and interstate banking laws which allow a larger population of potential bidders. The larger that population, the higher the premium should be, all else equal. States which have more liberal policies toward geographic expansion will see higher prices paid for their target banks.

Sinkey (1983) suggested that premiums are determined, as any other price, by the forces of supply and demand.

Since at a given point in time, the supply of targets in a state is fixed, the size of the premiums depends on the strength of demand. This is why the hypothesis focuses on the legal status of the target state and the population of potential buyers it defines. While it may be useful to include market price data for the target in the analysis, such data was generally not available because the stocks of these banks are usually not publicly traded.

Acquisition premiums can be defined in several ways. However, the ratio of price to book value, or PB ratio has been accepted as the standard in the literature[22]. Therefore, to maintain comparability with other studies, PB was selected as the measure of premiums for the purpose of this analysis. Thus the central hypothesis may be formally stated as:

PB = *f*(branching, holding company, and interstate laws)

= *f*(target market legal status)

These are classification variables suitable to analysis of variance. However, because it may be desirable to control for other, concomitant variables that are known or thought to influence premiums, the principal statistical technique employed was analysis of covariance. This is a practical way to attain the *ceteris paribus* condition and formally incorporate target financial characteristics and target

[22] See Kolari and Fraser (1987) and Rhoades (1987). Tests described in this study were repeated using price/earnings as the premium measure with results similar to and in agreement with those obtained using the price/book ratio.

market economic characteristics into the model. An initial analysis of variance of the full model was followed by an analysis of covariance.

Analysis of Variance

Analysis of variance partitions the variation in the observed responses into parts associated with treatments or factors which are determined by the data classification scheme. The procedure permits testing of the equality of several means without the increase in type I error[23] which accompanies a series of t tests on all possible pairs.

The first step was to model PB as a function of three factors, or treatments - branching, holding company, and interstate laws. There were four levels of branching: prohibited, limited, statewide by merger only, and statewide. The two levels of holding company restrictions were limited and unlimited. Finally, there were three levels of interstate banking provisions - none, regional, and nationwide.

None of the factors were nested; instead, all were crossed. Further, since the response may be influenced by the combination or interaction of the treatments, the full factorial design with fixed effects was used. The model may be written as

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[23] A type I error occurs when the null hypothesis is rejected when it is true.

$$PB_{ijkl} = \mu + I_i + B_j + H_k + (IB)_{ij} + (IH)_{ik} + (BH)_{jk} + (IBH)_{ijk} + \varepsilon_{ijkl}$$

$i = 1,2,3$

$j = 1,2,3,4$

$k = 1,2$

$l = 1,2,\ldots,n$, n equals the number of observations

PB is the response premium, expressed as price/book value, μ denotes the overall mean, I_i represents the effect of the *i*th level of the interstate factor, B_j is the effect of the *j*th level of the branching treatment, H_k denotes the effect of the *k*th holding company factor, $(IB)_{ij}$ is the interaction between interstate and branching laws, $(IH)_{ik}$ is the interaction between interstate and holding company laws, $(BH)_{jk}$ represent the effect due to the interaction between branching and holding company laws, $(IBH)_{ijk}$ is the three-way interaction, and ε_{ijkl} is a random error component.

There are several advantages to the full factorial design. The full model allows formal testing of the interaction effect, something which is not possible with one-way models. An interaction occurs when the effect of one factor depends on the level of another factor[24]. Because a strong interaction may mask the significance of the main effects, one-factor-at-a-time designs can lead to erroneous conclusions. Moreover, knowledge of an

[24] The effect of a factor, termed a *main effect*, is defined by Montgomery (1984) as the change in the response produced by a change in the level of the factor.

interaction may be more useful than knowledge of a main effect. Therefore, the factorial design is necessary when interactions are suspected.

For example, holding companies may exist in part to circumvent state branching laws. If this is so, there should be a significant interaction between holding company and branching restrictions. Observed PB ratios may depend on the combination of branching and holding company regulations in effect. A secondary hypothesis in this study involves investigation of these interactions.

The full factorial design is also more efficient than one-way designs, requiring fewer observations for adequate estimation of the treatment effects. Since the effects of a treatment or factor are estimated at several levels of the other factors, the resulting conclusions are valid over a range of experimental conditions.

All of the factors under consideration are fixed. Therefore, the test statistics for each main effect and interaction are one-tailed F tests formed by dividing the mean square for each effect by the error mean square. The specific hypotheses tested in the analysis of variance for the full model are given below:

H_o: $I_1 = I_2 = I_3 = 0$

H_a: at least one I_i not equal to 0

In words, the null hypothesis is that the mean responses associated with each level of interstate banking regulation are equal, (no effect of interstate regulations), and the

alternative is that at least one level of the interstate treatment means is different from the others. Similarly, the hypotheses for intrastate branching and holding company laws may be written as

H_o: $B_1 = B_2 = B_3 = B_4 = 0$

H_a: at least one B_j not equal to 0

H_o: $H_1 = H_2 = 0$

H_a: at least one H_k not equal to 0

The interaction hypotheses take the same form and are given by:

H_o: $(IB)_{ij} = 0$ for all i,j

H_a: at least one $(IB)_{ij}$ not equal to 0

H_o: $(IH)_{ik} = 0$ for all i,k

H_a: at least one $(IH)_{ik}$ not equal to 0

H_o: $(BH)_{jk} = 0$ for all j,k

H_a: at least one $(BH)_{jk}$ not equal to 0

H_o: $(IBH)_{ijk} = 0$ for all i,j,k

H_a: at least one $(IBH)_{ijk}$ not equal to 0

Again, the null hypotheses involve a statement declaring all treatment means equal, while the alternative declares that at least one treatment mean significantly differs from the others.

One problem with employing analysis of variance (and analysis of covariance) to financial and economic data involves unequal numbers of observations for the treatment combinations. In controlled experiments, the researcher can apply various experimental design techniques to determine

an optimum number of observations per cell. Ideally, there will be an equal number of observations in each cell and all possible combinations of factor levels will be represented, creating a balanced design.

However, circumstances beyond the researcher's control may result in an unbalanced design. In this study, treatment combinations were observed, not induced. Thus, the data is unbalanced - there are unequal numbers of observations per factor combination. Further, some of the possible combinations are missing. For example, no state which prohibits branching also limits geographic expansion of its holding companies. When there are empty cells and substantial variability in the number of observations per cell, the data must be analyzed as an unbalanced design and special techniques used to derive the sums of squares for each main and interaction effect.

The exact method for dealing with unbalanced data entails representing the analysis of variance model as a regression model with dummy variables indicating treatment levels. As Freund, Littell, and Spector (1986) note, the dummy model is overspecified. It contains more parameters than can be uniquely estimated and yields a singular **X'X** matrix. Solutions can be obtained nonetheless by using the generalized inverse method[25].

[25] This is method is explained in detail by Freund, Littell, and Spector (1986). The generalized inverse and estimable function method is used by the General Linear Models procedure in the SAS computer software system. SAS was used throughout this study.

F values are calculated using the mean square error. The Type III sums of squares are used because the analysis does not depend on the number of observations in each cell. Since each effect is adjusted for all the other effects, the main effects can be compared even in the presence of interactions.

The analysis of variance F tests tell if any of the treatment means differ from each other. A significant F ratio indicates that the null hypothesis should be rejected since one or more of the factors significantly affects the response. It does not reveal which mean or means differs from the others. Multiple comparisons are made to explore differences between groups of means when the overall model F tests are significant. When the data are unbalanced, differences between factor means may be contaminated by functions of other factors, such as the number of observations in a cell. Thus, it is necessary to form means which have been adjusted to remove the effects of other factors.

The adjusted means are called the LS or least squares means. LS means are estimators of the expected class or subclass means for the balanced design. These least squares estimates of the marginal means correspond to the class and subclass arithmetic means used in balanced designs. Generally, the LS means are not equal to the unadjusted means when the data are unbalanced because the raw means are a function of sample sizes.

LS means tables were constructed for main and interaction effects. The tables contain paired comparisons of the various combinations of adjusted means. Specific contrasts were formed to test hypotheses regarding the branching x holding company regulation interactions.

Analysis of Covariance

Analysis of covariance was the primary statistical method employed in this study. Analysis of covariance can be thought of as a combination of analysis of variance and regression. The analysis of covariance model contains both treatment group indicators (also called group variables) and concomitant, continuous variables. The concomitant variables are called the covariates. Analysis of covariance provides a way to adjust treatment means for the effects of other variables that may affect the response. According to Montgomery (1984), if this adjustment is not made, the covariate may inflate the error mean square and obscure true differences in the response.

Freund, Littell, and Spector (1986) note that this adjustment takes two forms. First, variation in the response which is associated with the covariate is removed from the error variance. This produces more precise estimates and more powerful tests. Secondly, group means are adjusted to correspond to a common value of the covariate, thus permitting an equitable comparison between

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the groups. In short, analysis of covariance improves the precision of comparisons between treatment means.

Because financial and economic characteristics have been shown to affect acquisition premiums, analysis of covariance was used to control for these variables and approximate the *ceteris paribus* condition. The analysis of covariance model can be written as

$$PB_{ijkl} = \mu + I_i + B_j + H_k + (IB)_{ij} + (IH)_{ik} + (BH)_{jk} + (IBH)_{ijk} + \beta X_{ijkl} + \varepsilon_{ijkl}$$

and all treatment effects are defined as before in the analysis of variance. The only difference is the addition of a covariate, X, and the associated linear regression coefficient, β. This is the full factorial model with a single covariate. Multiple covariates, if needed, can be incorporated into this basic model.

The first task in the analysis of covariance involved specification of a meaningful covariate. Financial ratios were formed from the financial statement data, according to previous studies of the determinants of bank acquisition premiums. See Table 2 for a description of these ratios. For example, all statistically significant ratios in Rhoades (1987) and Fraser and Kolari (1987) were calculated. Other commonly used ratios, such as the Du Pont ratio, were also included.

Other concomitant variables could be observed with the premium, but there are two key advantages to using this

TABLE 2

FINANCIAL RATIOS[26]

Ratio	
EARN	((net income2 - net income1)/net income1 * 100)/3
AVNI	(net income1 + net income2)/2
AVTA	(total assets1 + total assets2)/2
PROF	AVNI/AVTA
GROW	((total assets2 - total assets1) /total assets1 * 100)/3
DUPONT	(net income2/total assets2) /(1 - (total deposits2/total assets2))
CAP	((total equity1 + total equity2)/2) /((total assets1 + total assets2)/2)
F1	net interest income/total assets
F2	demand deposits/time deposits
F3	total loans/total assets
F4	commercial and industrial loans /total assets

[26] Ratios denoted with the letter F are from Fraser and Kolari (1987). All others except the Dupont ratio are from Rhoades (1987).

sort of data. First, the financial and economic data, as well as the premium measure itself, do not depend on the judgement of outside investors and speculators (as can be the case for stock price data in event studies). Secondly, these variables are unaffected by whether the mergers actually work out as managers hoped. The results do not depend on the realization of managerial expectations - a problem encountered in bank performance studies of mergers. Three year averages and percent change formulations were used when possible to present a more accurate summary of firm and market characteristics.

Several items from the raw balance sheet and income statement data were considered for the covariate, including measures of size, such as average total assets and total deposits, and measures of portfolio composition, such as cash and short term securities and commercial and industrial loans. Other characteristics such as provision for possible loan losses, net charge-offs on loans, and dividend policy measures were also included in this part of the analysis.

Raw financial statement data, financial ratios, and target market economic data were screened to identify potential covariates. A correlation matrix was constructed, giving the correlation of each variable with PB and with every other variable. A total of 102 variables were included. To be considered as a candidate for the covariate, an independent variable had to be highly

correlated[27] with the premium, but lowly correlated with other candidates. However, variables which were shown to be significant determinants of price/book ratios in both the Fraser and Kolari (1987) and Rhoades (1987) studies were included regardless of their correlation with the response.

Obviously, a meaningful covariate must be useful on its own for predicting the premium. However, if the independent variables are correlated among themselves, a condition called multicollinearity, the regression sums of squares and the parameter estimates will be adversely affected and accurate results difficult to obtain. To avoid this problem, the covariate candidates were required to have low correlation among themselves. Fortunately, this criterion did not prove excessively restrictive. Most of the variables that were highly correlated with PB had little correlation with each other.

Finally, it is necessary that the covariates themselves be relatively unaffected by the treatments. Otherwise, partitioning out the variance in the response attributable to the covariate would simultaneously partition out the treatment response we wish to isolate. Such a construction is contradictory for it tests for the treatment effect while at the same time controlling for the treatment effect by holding it constant!

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[27] The term "highly correlated" is interpreted in the relative sense. Variables with a correlation coefficient of 0.20 or greater were considered highly correlated to the response vis-a-vis the other variables. No variable had a coefficient greater than 0.45.

In some cases, it was intuitively apparent that a variable selected on the basis of its correlation statistics would be affected by branching, holding company, and interstate banking statutes. For example, whether a buyer is able to gain a foothold into a new market area or is limited to acquisitions in its home market is determined by these laws. Thus, the target market variable indicating whether the acquisition is market extending for the buyer, while meeting the correlation criteria, is not a suitable covariate.

When it was not known whether a variable was affected by the treatments, an analysis of variance using the covariate candidate as the dependent variable was performed and those variables significantly affected ($\alpha = 0.05$) by the treatments were eliminated. In summary, to be considered for the covariate, a variable must be highly correlated with the dependent variable, PB, and unaffected by the treatments. Further, the potential covariates must be relatively uncorrelated among themselves.

Stepwise regression was used to select from the variables which met the candidate criteria those which should be included in the analysis of covariance model. The premium was modeled as a function of the covariate candidates. Several stepwise regression methods exist. The maximum R^2 improvement (MAXR) method was chosen because it is considered superior to the other stepwise model selection techniques and is almost as good as all possible

regressions. (The large number of independent variables under consideration precluded computing all possible regressions.)

The MAXR method finds the best one variable model, the best two variable model, and so forth, producing a series of models where "best" is defined as the maximum improvement in R^2. For all models of each size, each of the variables in the model are compared with each of the variables not in the model to determine if removing one variable and replacing it with another improves R^2. MAXR evaluates all possible switches, determining for each size, the combination of variables which gives the maximum R^2 improvement.

Using $\alpha = 0.05$ as the significance level, the models produced by the MAXR stepwise regression were used to identify a covariate structure. The models were evaluated on the basis of the significance of the variables. The largest model containing only variables significantly related to the premium defined the best model. The largest model was selected to avoid omitting any variables with significant predictive properties. This combination of variables was used to form the covariate used in the analysis of covariance model.

In some senses, the combination of variables identified by the MAXR stepwise procedure constitute the

optimal set of those under consideration.[28] By definition, the set provides the maximum improvement in R^2, the coefficient of multiple determination. The adjusted R^2 statistic indicates the amount of variation in the premiums that is explained by the dependent variables. Selecting the largest model containing only significant variables helps to prevent inclusion of superfluous variables and omission of important ones. The intent of the whole covariate construction process is to identify a reasonable, workable set of variables with significant premium explanatory powers in the absence of a well developed financial theory.

The MAXR stepwise regression identified four variables with a significant linear relationship to the price/book premium. Because no model selection technique is guaranteed to produce the best model, the four variable model was again fit as a multiple regression with PB as the dependent variable. Further tests revealed that an interaction term should be included. As an extra check, quadratic terms were also fit, but these did not improve the model.

The final covariate was not a single concomitant variable, but rather a complex covariate structure composed of four variables and an interaction term. The analysis of covariance model can accommodate multiple covariates. The Type III sums of squares are fully adjusted, both for the

[28] It is always possible that the true optimal set contains variables which were not considered or recorded.

treatment means and for the individual regression coefficients.

The analysis of covariance model contains all of the elements of the analysis of variance model of less-than-full rank. Therefore, the considerations discussed above for the analysis of variance for the unbalanced design also hold for the analysis of covariance. Once again, the generalized inverse and estimable functions techniques were required. As Freund, Littell, and Spector note, however, the regression coefficient β is not affected by the singularity of the $\mathbf{X'X}$ matrix. Therefore, the estimates of the βs are unique.

The overall F tests are formed using the mean square error as the denominator. The hypotheses concerning the within class equality of the main and interaction effects are the same as those described above for analysis of variance. Additionally, the hypothesis H_0: $\beta = 0$, a test of the regression coefficient measuring the linear relationship between the covariate and the response, is examined using an F ratio as the test statistic. These tests reveal only whether at least one of the treatment means differs from the others. They do not indicate which mean or means are different. Therefore, means separations techniques are applied when the initial F tests are significant.

As in the analysis of variance for unbalanced data, comparisons between treatment means utilizes the adjusted,

or least squares means. Because these means are not independent, Duncan's, Tukey's and other ranking procedures are inappropriate. Least squares means tables were formed to provide pairwise comparisons of the significant effects.

The model was then reformulated to reduce the number of empty cells. The full factorial model, including all three treatments and all possible interactions, was embedded in this first analysis of covariance. The full factorial has the dimensions 3 x 4 x 2 for the levels of interstate, branching, and holding company laws, respectively. Some of the possible combinations of restrictions do not exist, hence the empty cells. The presence of empty cells diminishes the analysis. The content of the empty cell can only be estimated, rather than observed.

Fortunately, the results from the first analysis of covariance suggested a way to recast the model and reduce the number of empty cells, while improving the informational content of the model. Using $\alpha = 0.05$, neither the initial analysis of variance nor the analysis of covariance revealed a significant interaction between interstate and branching laws or a significant interaction of interstate and holding company laws. Likewise, neither model found a significant three-way interaction.

This strongly suggests that the effect of branching and holding company expansion statutes on PB does not depend in any substantial way on the level or type of the

accompanying interstate statute. However, both models indicate that there may be a significant interaction between branching and holding company laws. The F ratios for these effects are significant at the $\alpha = 0.10$ level but not at the $\alpha = 0.05$ level in both analyses. The presence of empty cells may obscure the B x H interaction, since two of the eight possible combinations were not observed.

To reduce the number of empty cells and further explore the B x H relationship, the model was reformulated using the six combinations of branching and holding company laws as a single treatment with six levels. The reformulated model resulted in a two-way structure without interaction. The model may be written as

$$PB_{ijk} = \mu + I_i + \tau_j + \beta_1 X1_{ijk} + \beta_2 X2_{ijk} + \beta_3 X3_{ijk} + \beta_4 X4_{ijk} + \beta_5 X3X4_{ijk} + \varepsilon_{ijk}$$

$i = 1,2,3$

$j = 1,2,3,4,5,6$

$k = 1,2,\ldots,n$, n equals the number of observations

where I_i represents the ith level of interstate banking law, τ_j represents the jth combination of branching and holding company regulations. The five covariates are given by X1, X2, X3, X4 and X3X4, where X3X4 is an interaction term. The regression coefficients for the five covariates are represented by β_1, β_2, β_3, β_4, and β_5, and ε_{ijk} is the random error term. The six levels of τ_j, representing the six observed combinations of branching and intrastate holding company expansion laws follow:

τ_j	Holding company	Branching
LL	Limited	Limited
LM	Limited	Statewide by merger only
UP	Unlimited	Prohibited
UL	Unlimited	Limited
UM	Unlimited	Statewide by merger only
US	Unlimited	Statewide

The interaction term I x τ was dropped because, as mentioned above, neither the full analysis of variance model nor the full analysis of covariance model indicate an interaction between interstate and holding company or branching laws.

Least squares means tables again provide pairwise comparisons of the main effects. Since the main effect τ_j actually represents a combination of branching and holding company regulations, the LS means table for τ_j provides insight into the interrelationship between these two factors.

Multiple comparisons across the τ_j provide further information on the B x H interaction. However, because the LS means are not independent, means separation techniques or range tests like Duncan's and Tukey's tests can not be used. Contrasts[29], however, are quite suited to this

[29] Montgomery (1984) defines a contrast as a linear combination of the treatment totals such that the elements of the coefficient vector sum to zero.

situation and were used to form custom hypothesis tests to yield better information about the factor effects. Indeed, contrasts are more powerful than range tests and are preferred when specific hypotheses are suggested by the treatment structure.

For example, to construct a contrast of the two levels of holding company expansion regulations and determine whether the mean PB ratios are significantly different across the levels of branching,

define $\beta = (\beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6)'$.

The contrast is

$$\mathbf{L}(\beta) = -2\mu_1 - 2\mu_2 + \mu_3 + \mu_4 + \mu_5 + \mu_6$$

$$= -2\tau_1 - 2\tau_2 + \tau_3 + \tau_4 + \tau_5 + \tau_6$$

Other contrasts of this basic form permitted comparisons of groups of treatment means.

Model Adequacy and Nonparametric Tests

As a final check, three more analyses were made. First, the full factorial analysis of variance model and both the full and revised analysis of covariance models were subjected to residual analysis. Residuals, calculated as the difference between the actual and predicted premiums, were plotted against the predicted premiums and also against each dependent variable as a model adequacy check[30].

[30] See Montgomery (1984) for an in depth treatment of residual analysis.

If the model is adequate, the points in these plots will be randomly distributed, not forming any particular pattern. If the model is not appropriate - it has the wrong form, or the assumptions of the model are violated - the nature of the pattern may suggest corrective action. This test also exposes outlier observations so that they can be examined to determine their influence on the model and if a data recording error has been made.

In the analysis of covariance, the response is assumed to be linearly related to the covariate, and the slope of this linear relationship is assumed to be constant across all treatments. Analysis of covariance tests for differences in intercepts assuming a constant regression relationship among the treatment groups. When the assumption is met, the regression relationship takes the form of a series of parallel lines. According to Freund, Littell, and Spector (1986), the validity of the ordinary analysis of covariance requires homogeneous slopes.

Therefore, it is desirable to test the regression relationships among the groups to see if they are, indeed, constant. This test is the test for *heterogeneity of slopes*. A successful test requires that the β coefficients for the treatment x covariate terms equal zero over all levels of a given treatment.[31] Because of the tremendous

[31] As described by Freund, Littell, and Spector (1986), regression relationships which differ among treatment groups actually reflect an interaction between the treatment groups and the covariates.

number of terms this would involve for a full factorial model containing three treatments and five covariates, only interactions between the covariates and significant treatment effects were tested. In other words, terms involving I x H, I x B, and I x B x H were dropped. The covariate GRO, representing target market growth, was also dropped since there is no reason to believe that banking laws are related to changes in population. Only GRO was dropped from the heterogeneity of slopes test for the revised model.

As a final check, nonparametric methods were applied. The analysis of variance and analysis of covariance models assume that the true distribution from which the data came is normal or at least symmetrical. The errors are assumed to be normally and independently distributed with mean zero and constant variance, σ^2. When these assumptions are seriously violated, the models will not be good descriptions of the data. However, the true distribution is generally unknowable. Therefore, it may be desirable to apply nonparametric methods which do not require normality.

The Kruskal-Wallis procedure provides a nonparametric F-test analysis of variance. The null hypothesis is that the treatments are identical. The alternative hypothesis is that some of the treatments produce larger responses than the others. This is a powerful one-way test with good statistical properties. Ott (1977) reports that this test

is efficient and that it does not produce a smaller chance of correctly finding a significant result.

To construct the Kruskal-Wallis test, the observations are ranked or scored from low to high. Wilcoxon scores were used and tied values resolved by assigning the average score to the affected ranks. This process is called a rank transformation. The Kruskal-Wallis test is equivalent to performing an ordinary one-way analysis of variance on the ranks.

Montgomery (1984) recommends that analysis of variance be performed on both the original data and the ranks when there are concerns about outliers and/or normality. When both methods yield similar results, the assumptions of the parametric model are probably reasonably well satisfied and the standard analysis is satisfactory. Thus, if the results of two procedures are in agreement, the validity of the parametric results is confirmed and the suitability of the parametric model is verified.

CHAPTER IV

RESULTS

Introduction

To provide an overall impression of the effects of geographic restrictions on acquisition premiums, this chapter opens with a general description of the data. It is hypothesized that the variation in the magnitude of observed price/book premiums is significantly related to three factors or treatments: branching and holding company regulations, which define the population of intrastate bidders, and interstate statutes, which determine the population of out-of-state bidders. The larger the population of potential bidders, the larger the premiums should be, all else equal. Therefore, the geographic distribution of the various levels of each of the three factors is presented first.

Each acquisition was classified according to the combination of branching, holding company, and interstate statutes in effect in the target's state at the time of the transaction. This process specified the treatment groups. The frequency distribution of acquisitions across the various treatment levels is presented. The distribution of mean price book premiums is superimposed on this to give a general impression of which factor combinations are associated with the largest average premiums. Some familiar

descriptive statistics are provided to give a general impression of the data.

The general description of the data is followed by the results of the inferential statistic techniques used to model the premiums. The analysis of variance for the full factorial model is presented first, along with the associated LS means table. The LS means table provides pairwise comparisons of adjusted treatment means.

Analysis of covariance was performed to improve the precision of the means comparison. The results of the analysis and the covariate construction procedure are given in detail for both the full and revised models. Multiple comparisons and custom hypothesis test results are also presented. The outcome of residual plots and results of the test for heterogeneity of slopes are provided as measures of model adequacy. Finally, the results of nonparametric one-way analysis of the main effects are presented.

Description of the Data

The final data set consisted of 174 bank holding company acquisitions involving targets in thirty-seven states and the District of Columbia[32]. Seventy-five of these acquisitions took place in 1985; the remaining ninety-nine occurred in 1986. Only eight of the acquisitions took place in the months preceding the June,

[32] Throughout this discussion, the District of Columbia is implicitly included in the general term "states".

1985 Supreme Court decision in the Northeast Bancorp case. Twenty-four of the sample targets, or approximately fourteen percent, were publicly traded, illustrating the need for an alternative to market information in determining a valuation process for bank mergers.

Among these states included in the study, four levels of branching, two levels of intrastate holding company regulations, and three levels of interstate banking statutes are represented. The central hypothesis is that these laws affect the magnitude of acquisition premiums by determining the population of potential bidders for a state's banking franchises. The larger the pool of potential bidders, the higher the premiums will be, all else equal. The levels summarize a very large and detailed set of laws. A state may adopt any combination of these statutes at its discretion; therefore, the distribution of the different levels of geographic expansion regulations across the nation forms a patchwork pattern.

For the purpose of this study, four mutually exclusive and exhaustive levels of branching were defined, based on a detailed description provided by Amel and Keane (1987). The four levels of branching were prohibited, limited, statewide by merger only, and statewide. Other classifications may be possible, but this set was chosen because it provides fairly homogeneous levels and a suitable description of the population of potential bidders. For example, states which have adopted limited

branching generally limit branching to some geographic area - county or SMSA - which is contiguous with a bank's home office. In the statewide-by-merger-only category, expansion through acquisition is distinguished from *de novo* expansion. In the "statewide" category, both are allowed. These differences are important because they affect the population of potential bidders.

None of the states included in the study substantially revised their branching or intrastate holding company expansion regulations over the two year period covered by this study. Looking first at the branching regulations, the smallest group, in terms of number of states adopting this level of branching, was the prohibited category. Only three of the thirty-eight states in the study (approximately 8%) prohibited branching during 1985 and 1986: Colorado, Montana, and Texas[33].

Six states in the study group, representing about 16%, permitted statewide branching through merger only. Several of these states are located along the east coast: Alabama, Connecticut, Florida, and Virginia. This group also includes Indiana and South Dakota.

Eleven states, about 29% of the study group, allow statewide branching. In contrast with the previous group, these states do not require that statewide branching take place only by merger; in these states, *de novo* branching is

[33] Texas adopted branching on a limited basis effective 01/01/87.

an alternative to expansion through acquisition. This group includes several of the western states - Alaska, Arizona, California, Nevada, Oregon, and Washington. The other members of this group are located on the east coast. These states include Alabama, Maryland, Maine, New York, South Carolina, and the District of Columbia.

The majority of states in the study allowed limited branching in 1985 and 1986. Eighteen states - about 47% of the states in the sample - had statutes falling within this level of branching. The group contains states in several different regions. For example, in the central U.S., Illinois, Kansas, Michigan, Minnesota. Missouri, Nebraska, Ohio, and Wisconsin limit branching. In New England, Massachusetts and New Hampshire have limited branching. Southern states in which this level of the branching factor is represented include Georgia, Kentucky, Louisiana, and Tennessee. Other states which permit limited branching include Pennsylvania and New Jersey in the middle Atlantic region and Oklahoma and New Mexico to the west.
Figure 1 shows the states coded according to the four levels of branching. Figure 2 shows the proportion of mergers in the study group represented by each level.

Intrastate holding company expansion restrictions take two forms: limited and unlimited. Most states having the limited form restrict the percentage of the state's banking assets which can be controlled by any one holding company. A few states, such as Kentucky and Tennessee, regulate the

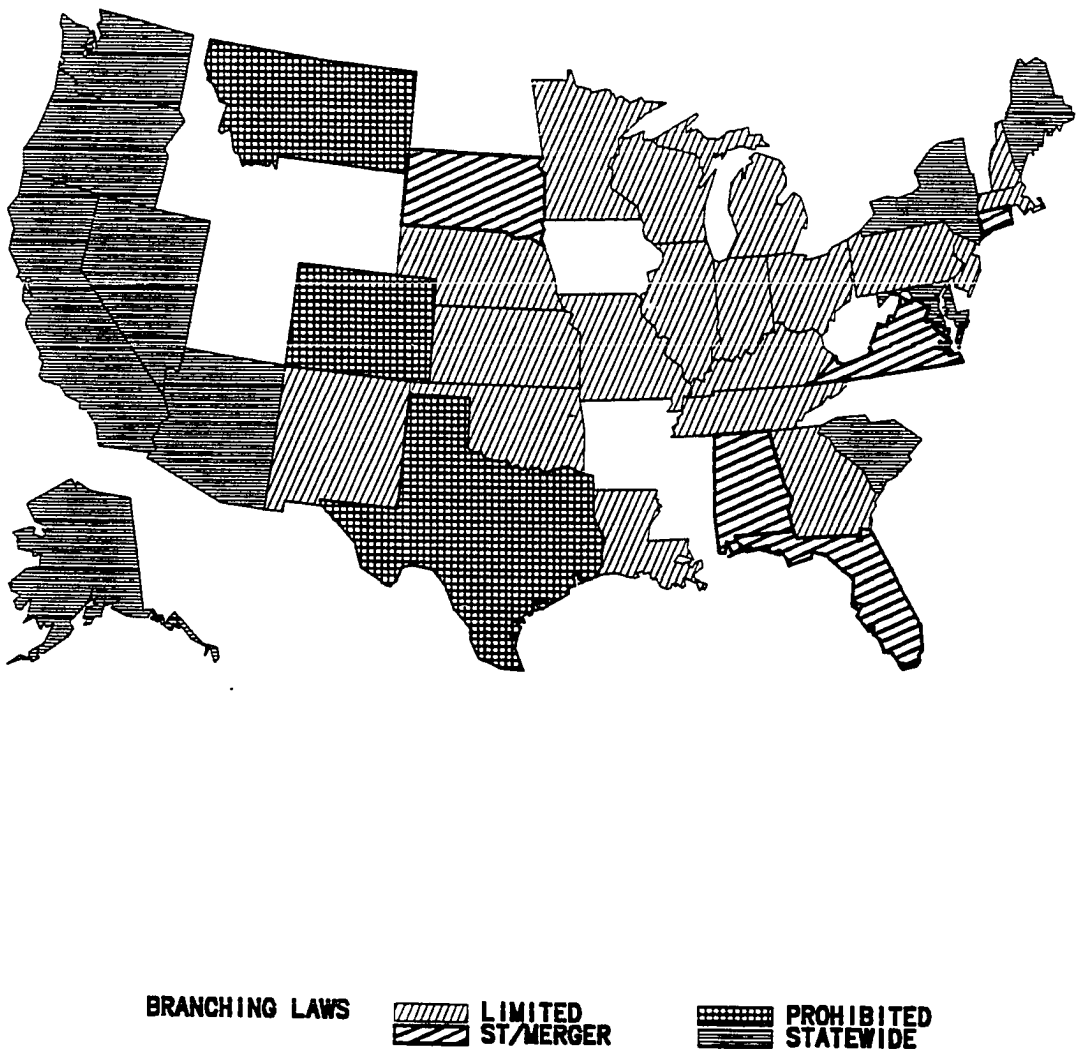

FIGURE 1

1985-86 STATE BRANCHING LAWS

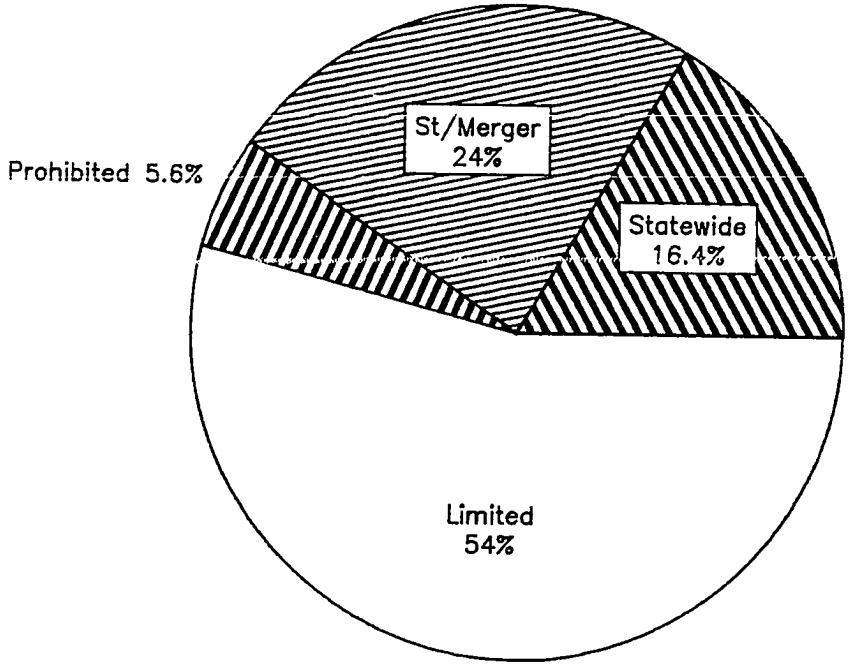

FIGURE 2

ACQUISITIONS BY BRANCHING LEVEL

geographic location of holding companies.

The majority of states in the sample chose not to limit intrastate holding company expansion. Twenty-six of the thirty-eight states, or about 68% of the sample fell into the unlimited level of the holding company factor. The remaining twelve states impose some limitations on intrastate holding company expansion. See Figure 3 for a display of the states in the sample coded by level of the holding company factor. Figure 4 shows the proportion of mergers in the study represented by each of the two levels.

Unlike the branching and intrastate holding company expansion regulations, which were unchanged across the states over the study period, ten of the sample states and the District of Columbia revised their interstate banking laws from 1985 to 1986. In every case, the states adopted a more liberal policy toward interstate acquisitions within their borders. All but one of the changes involved a move from one level of interstate banking to the next adjacent level, reflecting a gradual shift toward nationwide banking[34].

For the purpose of the study, three levels of interstate holding company acquisition policies are defined. These levels are none, (indicating states which have not yet adopted an interstate banking statute),

[34] For example, many of the regional statutes in place during 1985 and 1986 contained the so-called "national trigger", in which nationwide banking is permitted after a transitional period of regional banking.

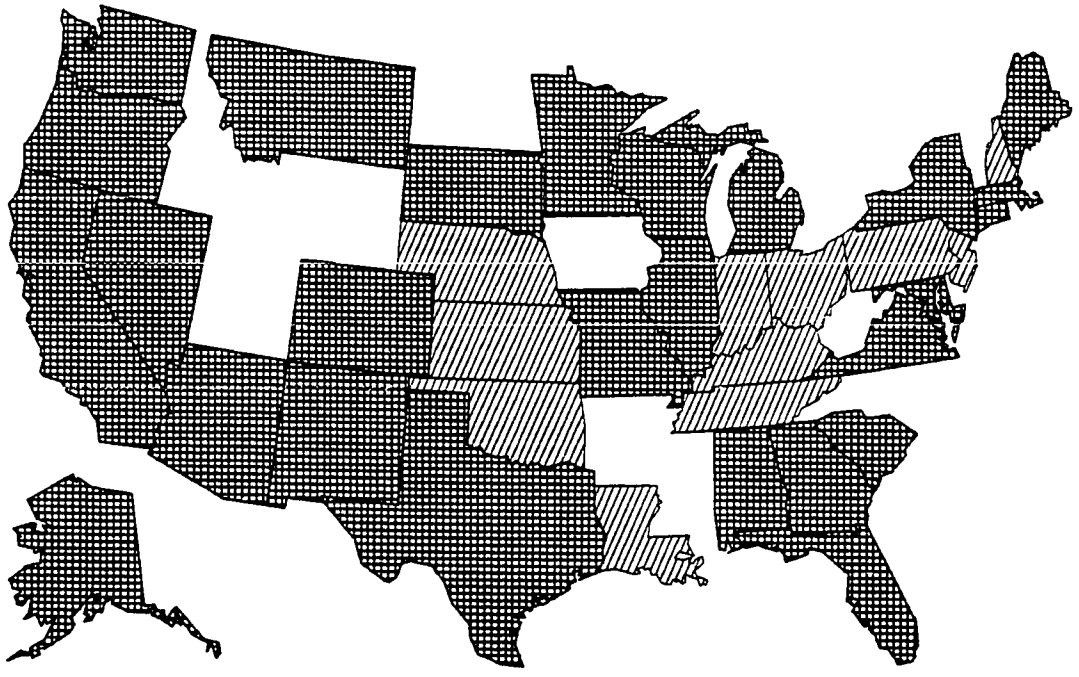

FIGURE 3

1985-86 INTRASTATE HOLDING COMPANY EXPANSION LAWS

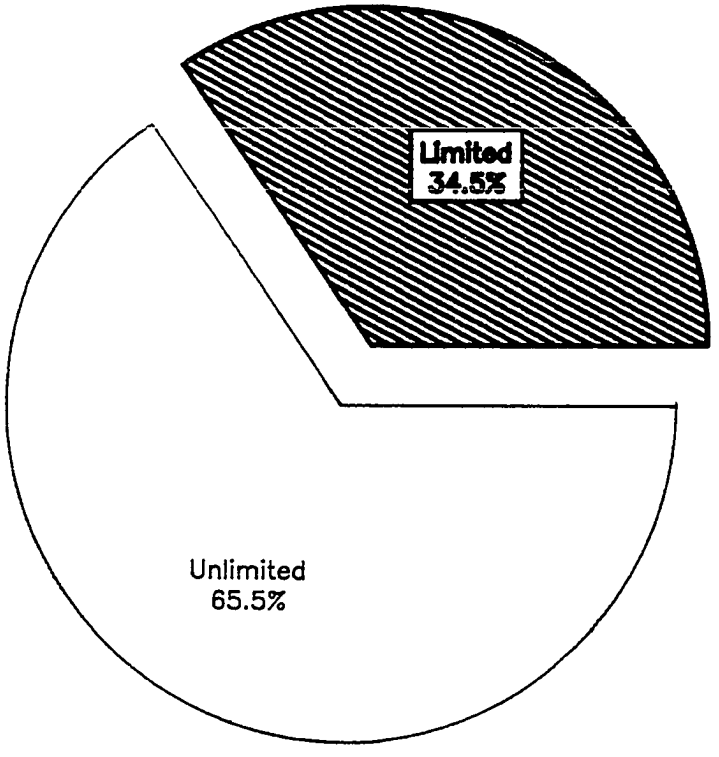

FIGURE 4

ACQUISITIONS BY HOLDING COMPANY LEVEL

regional, and national[35]. Arizona made the transition all at once, having no provision for interstate acquisitions in 1985, but adopting a nationwide interstate statute in 1986. Kentucky and the District of Columbia changed from the regional to the national form of interstate banking during the study period. Indiana, Michigan, Minnesota, Missouri, New Hampshire, New Jersey, Pennsylvania, and South Carolina had no statutes providing for acquisitions within their boarders by out-of-state holding companies in 1985, but permitted interstate holding company acquisitions at the regional level in 1986.

Thus, in 1985, twenty-two of the sample states had no provision for interstate acquisitions. By 1986, this number had fallen to only twelve. The number of states permitting nationwide bidding for their banking firms almost doubled, increasing from four states in 1985 to seven in 1986. Twelve of the thirty-eight states in the sample allowed regional interstate entry in 1985. This number increased to nineteen in 1986. See Figures 5 and 6 for a display of the states coded by their interstate banking statutes in 1985 and 1986. Figure 7 gives the total distribution of mergers in each group.

The intrastate holding company and branching regulations together determine the in-state, or native

[35] No distinction is made between the reciprocal and open forms of regional and nationwide interstate banking because the gains from a finer classification are outweighed by the statistical problems associated with the creation of a larger number of empty cells in the factorial analyses.

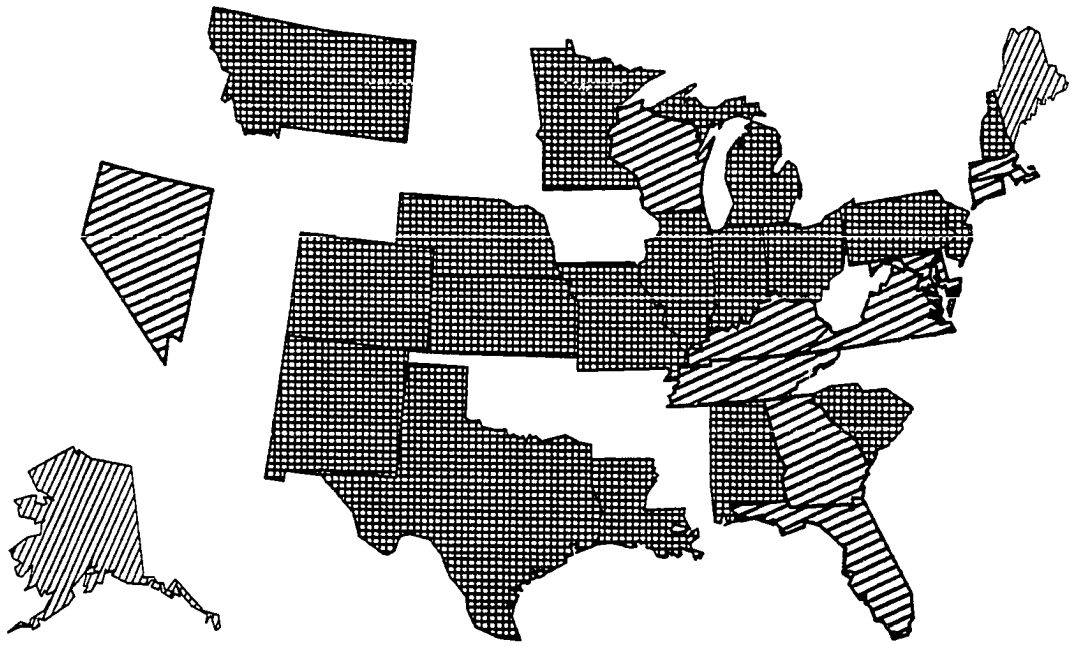

FIGURE 5

1985 INTERSTATE BANKING LAWS

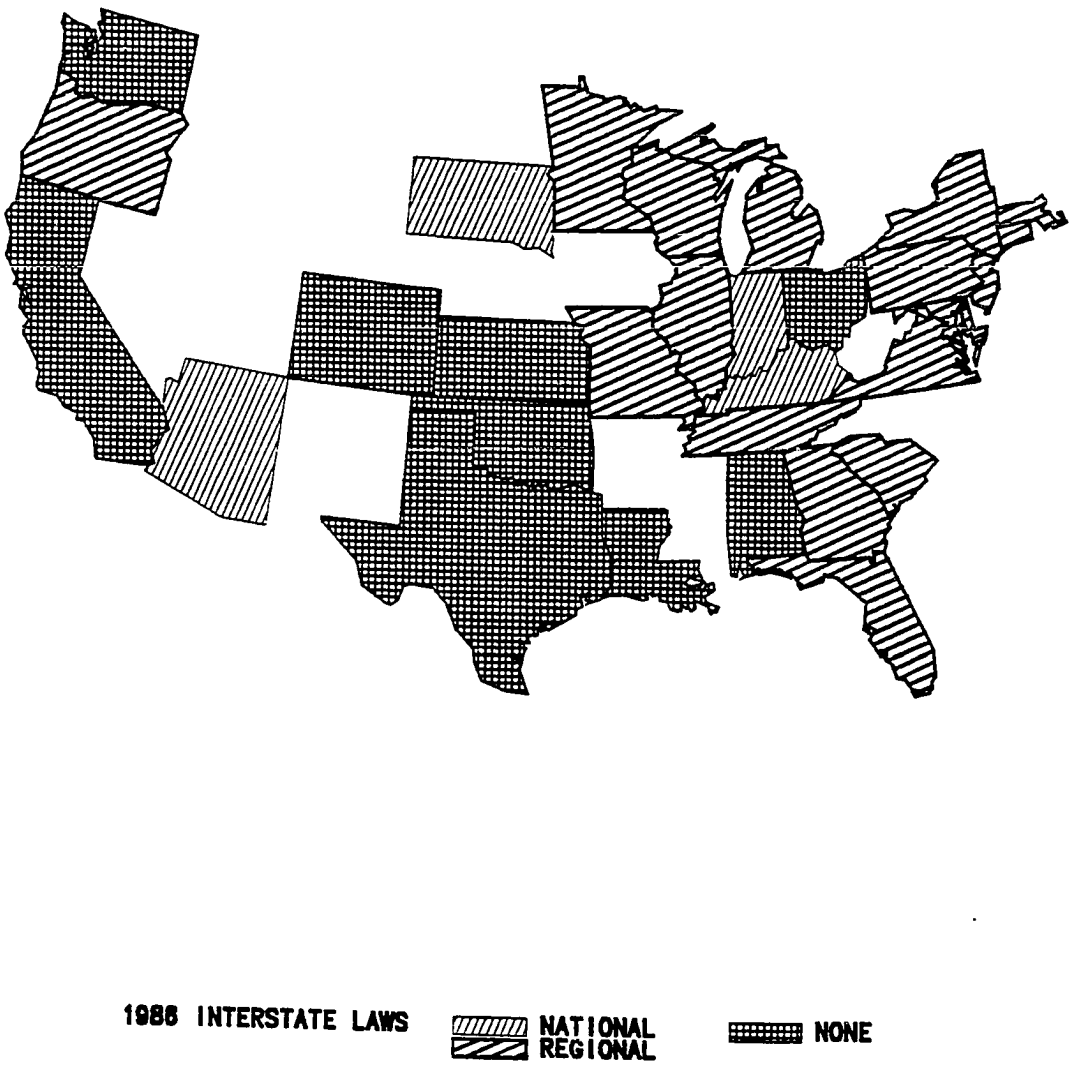

FIGURE 6

1986 INTERSTATE BANKING LAWS

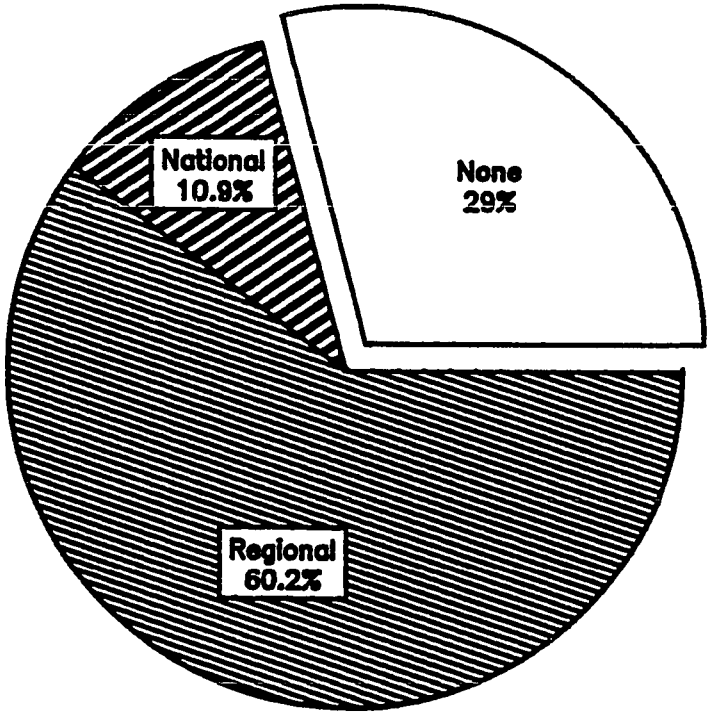

FIGURE 7

ACQUISITIONS BY INTERSTATE LEVEL

population of bidders. The hypothesis will be supported if higher acquisition premiums are associated with unlimited holding company expansion. Within a level of intrastate holding company regulation, the highest premiums should be observed for targets in states with statewide branching by merger only. The hypothesis is supported if the second highest premiums are observed for the statewide branching group. Finally, the hypothesis predicts that the lowest premiums will result when branching is prohibited, all else equal, and within a level of intrastate holding company regulation. Limited branching should yield the second lowest price/book premiums.

Mean price/book premiums are examined across the four levels of branching[36]. Twenty-five of the 174 acquisitions took place in states allowing statewide branching. Price/book ratios for this group averaged 2.1320, the highest among the four levels. The premiums ranged from 1.2900 to 2.2900. The second highest premiums were observed for the statewide-by-merger-only group, which had a mean price/book ratio of 1.9451, with a range from 1.0000 to 3.7000, (the largest premium observed in the study).

Together, these means suggest that premiums are higher in those states with more liberal attitudes toward geographic expansion. According to the hypothesis, the highest premiums should be observed in the statewide and

[36] The mean premiums reported in this section are the raw means, unadjusted for any other factors which may influence the magnitude of the price/book ratio.

statewide-by-merger-only groups, all else equal, as both of these levels of branching do not restrict the home state population of bidders. However, the statewide-by merger only level of branching should produce slightly higher premiums by constraining all branching to acquisitions. Any banking firm seeking to branch must compete with all other banking firms in the state for the desirable targets.

In states having statewide branching, *de novo* expansion is available as an alternative to acquisition. Beyond a certain price, it is reasonable to assume that some holding companies would choose to create their own branches, rather than buy existing franchises. Indeed, more acquisitions were observed for those states which require branching to take place through acquisition. There were forty-three observations in the statewide-by merger-only group, as opposed to twenty-five for the statewide level. The statewide-by-merger-only group also contains the single largest premium observed.

The limited and prohibited groups had similar and lower unadjusted mean premiums. Price/book ratios averaged 1.7460 in states which prohibit branching and averaged 1.7753 in states which limit it. Premiums ranged from 1.4300 to 2.4400 in the prohibited level. The range of price/book ratios for the limited level of branching extended from a minimum of 0.8100 to a maximum of 3.3800. Ninety-six of the acquisitions in the study occurred in

limited branching states, while only ten occurred in states which prohibit branching.

Again, the lower mean premiums for these two levels of branching provide initial support for the hypothesis that higher premiums will be observed in states which adopt geographic expansion statutes that maximize the population of potential bidders for their banks. According to the hypothesis, for a given level of holding company law, premiums should be lowest in the states which prohibit branching. Obviously, states which limit branching also limit the native pool of bidders. Some of the state's own banking firms will be legally excluded from the competition by reason of their geographic location. States which prohibit branching restrict the population of bidders even further, by closing off one avenue of expansion and eliminating individual banks from the population of bidders.

Certain vehicles may exist to circumvent branching restrictions. For example, the holding company form of organization may serve as a substitute for branching in states where branching is limited or prohibited. Further, because both branching and holding company laws must be considered to adequately specify the intrastate, or native, population of bidders for a state's targets, this discussion must extend to the distribution of mergers over the various combinations of branching and holding company expansion regulations.

Examining the two levels of intrastate holding company statutes alone reveals some differences. The unlimited level has a mean price/book ratio of 1.9600. With 112 acquisitions contributing to this mean, the unlimited level contains a clear majority of the observations. Price/book ratios for the unlimited group ranged from 0.8100 to 3.7000. For the states which limit expansion of holding companies within their borders, premiums averaged 1.6985 and ranged from 1.0000 to 2.8100. This group contained sixty-two acquisitions.

Although eight combinations of the levels of branching and intrastate holding company laws are possible, only six were actually observed. No state which prohibited branching also limited intrastate holding company expansion. On the other end of the spectrum, none of the states which permit statewide branching also limit holding company expansion. The branching = prohibited, holding company = limited and the branching = statewide, holding company = limited combinations did not occur.

Of the observed B x H combinations, the largest average premium was recorded for those states which allow statewide branching by merger only and unlimited intrastate holding company expansion. The mean price/book ratio for this group was 2.2355 over twenty-two observations ranging from 1.0000 to 3.7000. Conversely, the lowest mean premiums were observed for the states which sanction statewide branching by merger only and limit holding company

expansion. These premiums averaged 1.6410 and ranged from 1.0000 to 2.2700. The group included twenty-one acquisitions. Table 3 summarizes the six B x H means.

These means suggest that the observed premiums may depend on the combination of branching and holding company regulations, as much or more than on the level of either factor alone. It is reasonable to suspect an interaction effect because branching and holding company laws together describe the within state pool of potential bidders.

The out-of-state population of bidders is defined by the target state's interstate banking statutes. These regulations determine which out-of-state holding companies may compete for the state's desirable banking franchises. The highest average raw mean premium, 2.0864, was observed for the states which permit national entry. This level of interstate banking defines the largest population of out-of-state bidders. Competition for the targets in these states is not confined to only those holding companies located in a certain region. Price/book ratios for the nationwide group ranged from 1.0000 to 2.9200, with a total of fourteen observations.

The mean price/book ratio for acquisitions in states having the regional form of interstate banking was almost as high. Premiums for the regional expansion group averaged 1.9825 times book value, and ranged from 0.8100 to 3.7000. The regional group included 108 observations, by far the majority of the acquisitions. This group may contain a

TABLE 3

B x H MEANS

Branching	Holding Co.	Mean	N	Range
Limited	Limited	1.7280	41	1.0000 - 2.8100
Limited	Unlimited	1.8105	55	0.8100 - 3.3800
Prohibited	Unlimited	1.7460	10	1.4300 - 2.4400
St/merger	Limited	1.6410	21	1.0000 - 2.2700
St/merger	Unlimited	2.2355	22	1.0000 - 3.7000
Statewide	Unlimited	2.1320	25	1.2900 - 2.9200

larger number of observations than the nationwide group simply because a larger number of states in the study sanction interstate acquisitions on the regional level. Interstate banking is relatively new and many states have decided to try it on a regional basis first, before moving on to nationwide banking.

As expected, the lowest average price/book ratio was recorded for the acquisitions occurring in states which have no provision for interstate expansion. These states exclude out-of-state holding companies from their bank acquisition markets. This study hypothesizes that the reduced competition translates into reduced premiums, and indeed, the mean unadjusted premium for this group was only 1.5675 times book. Premiums for the states with no interstate statute ranged from 1.0000 to 2.6000. Fifty-two acquisitions occurred in this group.

The patterns formed by the raw means suggest that the magnitude of acquisition premiums may, indeed, depend on the branching, holding company, and interstate expansion regulations in effect in the target state. However, simple comparison of the unadjusted mean is inadequate because other factors besides the legal status of the target market may influence premiums. Further, differences in the number of observations per group cloud the analysis of the raw means.

To take these considerations into account, and to allow comparisons across groups of several means and

treatment levels, inferential statistical techniques were applied. These techniques included analysis of variance and analysis of covariance.

Analysis of Variance

Three models were use to explore the effects of branching, intrastate holding company, and interstate regulations on price/book premiums. The initial analysis took the form of a full factorial analysis of variance. This model allows formal testing of both main and interaction effects.

The results of the full factorial analysis of variance are summarized in Table 4. Since all of the factors or treatments are fixed and crossed, the F tests are formed by dividing the Type III sums of squares for each main and interaction effect by the mean square error for the model. The results of these tests indicate that there are significant main effects of both the interstate and branching factors. At the $\alpha = 0.01$ level, the null hypothesis that there is no treatment effect of interstate banking regulations on acquisition premiums - the means for all three levels of interstate laws are equal - must be rejected. At least one of the interstate group means differs significantly from the others.

Similarly, the null hypothesis regarding the equality of the means for all four levels of the branching factor is rejected ($PR > F = 0.0187$). There is a significant main

TABLE 4

ANALYSIS OF VARIANCE

FULL FACTORIAL MODEL

Source of Variation	df	Sum of Squares	Mean Square	F Value
Model	13	15.8829	1.2218	4.53
Error	160	43.1742	0.2698	
Corrected Total	173	59.0572		

Source of Variation	df	Type III Sums	F Value	PR > F
I	2	4.1070	7.61	0.0007
B	3	2.7717	3.42	0.0187
H	1	0.5545	2.05	0.1537
B x H	1	1.0490	3.89	0.0504
I x B	3	1.9647	2.43	0.0675
I x H	1	0.5848	2.17	0.1429
I x B x H	1	0.1913	0.71	0.4010

effect of branching on observed price/book value or PB ratios. At least one of the levels of branching is associated with a higher mean premium. There is no significant main effect of intrastate holding company expansion regulations. According to this test, the null hypothesis should be accepted. The means for the limited and unlimited groups are not significantly different.

The absence of a significant main effect for the holding company treatment does not mean that holding company regulations have no effect on acquisition premiums, however. The great advantage of the factorial model is that the corresponding Type III sums of squares for each effect are fully adjusted for all other effects in the model. Because PB ratios were modeled with the full factorial design, the sum of squares used to form the F test for the holding company main effect was fully adjusted for interactions with the interstate and branching factors.

The analysis reveals a significant interaction (α = 0.05) between the levels of branching and holding company regulations. When the sum of squares for the main effect of the holding company level is fully adjusted for the B x H interaction, the main effect appears insignificant. This suggests that knowledge of the interaction effect may be more important than knowledge of the main effect. The effect of intrastate holding company regulations appears to depend more on the combination of branching and holding company statutes than on holding company laws alone.

Thus, in the test for an interaction between holding company and branching factors, the null hypothesis of no interaction is rejected. Differences between the means for the four levels of B are not the same across all levels of H, indicating that the effect of each of the four types of branching depends on the level of holding company regulation with which it is paired. This is the expected result, since branching and holding company laws together determine intrastate expansion and define the in-state or native set of potential bidders. Further, if holding companies act as substitutes for branching, then there should be a significant interaction between these two treatments.

The analysis reveals no significant three-way interaction between the factors. In addition, the null hypothesis of no interaction effect between the interstate and holding company factors and between the interstate and branching factors can not be rejected. There does not appear to be a significant I x H, I x B, or I x H x B interaction. The F tests indicate that the price/book means within these subgroups do not significantly differ.

In summary, the initial analysis of variance reveals significant main effects for branching and interstate factors and a significant interaction between branching and holding company factors. Acquisition premiums appear to significantly depend on the type of interstate and branching laws in effect in the target state. The total

effect of a particular level of branching depends on whether intrastate holding company expansion is limited or unlimited[37].

While the F tests indicate that some of the treatment means are different, the analysis does not indicate which means differ. Therefore, least squares means[38] tables were constructed for the significant main effects and the B x H interaction. The tables provide pairwise comparisons of the various treatment means and are displayed in Table 5.

Of the LS means for the three levels of interstate banking regulations, targets in the states allowing regional interstate acquisitions had the highest mean premium, averaging 2.0678 times book value. With an average acquisition premium of 1.9779, the national interstate banking group was a close second. The means for these two groups are not statistically different. However, targets in the states with no provision for interstate expansion brought significantly lower premiums. Averaging only 1.5889 times book, the mean premium for this level is lower than the mean premium of both the national and regional groups at the $\alpha = 0.05$ level of significance.

Looking across the levels of branching, one finds that

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[37] Because the factorial design contains some missing cells, the Type IV sums of squares were also calculated. F tests using these sums yield identical conclusions.

[38] Unequal cell sizes require that comparisons be made using the adjusted, or LS means. Range tests are inappropriate. These issues are discussed in detail in the methodology section.

TABLE 5

LEAST SQUARES MEANS

ANALYSIS OF VARIANCE MODEL

Interstate	Price/book LS Mean	Prob > |T| I/J	H_0: Mean(I)=Mean(J) 1	2	3
National	1.9779	1	.	0.0235	0.5891
None	1.5889	2	0.0235	.	0.0001
Regional	2.0678	3	0.5891	0.0001	.

Branching	Price/book LS Mean	LS mean Number
Limited	1.7353	1
Prohibited	2.0353	2
St/Merger	1.8289	3
Statewide	2.1053	4

Prob > |T| I/J	H_0: Mean(I)=Mean(J) 1	2	3	4
1	.	0.1118	0.3435	0.0037
2	0.1118	.	0.3106	0.7416
3	0.3435	0.3106	.	0.0546
4	0.0037	0.7416	0.0546	.

TABLE 5

Continued

Holding company	Branching	Price/book LS Mean	LS mean Number
Limited	Limited	1.7713	1
Limited	St/Merger	1.5426	2
Unlimited	Limited	1.6993	3
Unlimited	Prohibited	2.0353	4
Unlimited	St/Merger	2.1152	5
Unlimited	Statewide	2.1053	6

Prob > |T| H_0: Mean(I)=Mean(J)

I/J	1	2	3	4	5	6
1	.	0.1197	0.5352	0.1729	0.0183	0.0162
2	0.1197	.	0.2469	0.0253	0.0005	0.0008
3	0.5352	0.2469	.	0.0946	0.0021	0.0040
4	0.1729	0.0253	0.0946	.	0.7149	0.7416
5	0.0183	0.0005	0.0021	0.7149	.	0.9510
6	0.0162	0.0008	0.0040	0.7416	0.9510	.

the statewide form of branching is associated with the largest adjusted mean premium. Targets in this group had an average price/book ratio of 2.1053. Interestingly, the second highest average premium, 2.0353, was observed for the group in which branching was prohibited. The difference between the means for these two levels of branching is not statistically significant.

It appears that acquisition premiums for targets in states which prohibit branching are essentially the same as premiums for targets in states which permit statewide branching. At first glance, this seems incongruent with the central hypothesis since prohibition of branching constitutes a stronger restriction on intrastate expansion than does statewide branching. However, the prohibited level of branching only occurs with the unlimited form of intrastate holding company regulation.

The apparent equality of the adjusted treatment means strongly suggests that unlimited intrastate holding company expansion substitutes for branching. Since no states in the study that allow statewide branching also limit intrastate holding company expansion, the only treatment source of variation in the T test of these means is the variation due to differences in branching laws.

Inspection of the LS means table reveals that the limited level of branching is associated with the lowest average premium. The mean PB ratio of 1.7353 is significantly lower than the mean for the statewide group,

but not significantly different from the means for the prohibited or statewide-by-merger-only groups.

The pairwise comparisons for the main effect of branching should be interpreted in light of the significant B x H interaction. The effect of the holding company treatment depends on the level of branching with which it is associated. Alternatively, the effect of a particular level of branching is modified by the accompanying holding company statute.

Inspection of the LS means table for the B x H combinations reveals a significant pairwise comparison which illustrates the importance of the interaction. In the LS means table for the main effect of branching, the mean premium for the statewide-by-merger-only group is deemed significantly lower than the mean for the statewide branching group. This is disturbing because *de novo* expansion is an available alternative to acquisition in states which allow statewide branching. Since expansion is constrained to occur through acquisition in the statewide-by-merger-only form of branching, mean premiums for this group should be higher, or at least not different from, mean premiums for the statewide form. The LS means table for the B x H interaction shows that the statewide-by-merger-only branching level occurs with both the limited and unlimited form of intrastate holding company regulations. The mean premium for the unlimited x statewide-by-merger-only combination is 2.1152, the largest

mean in the table. The mean of the unlimited x statewide group is 2.1053. There is no significant difference between these means. In contrast, premiums for targets in states which limit holding company expansion while permitting statewide branching through acquisition only averaged only 1.5426 times book value, the lowest mean in the table. This mean is significantly lower than both the unlimited x statewide-by-merger-only group and the unlimited x statewide group. This result is consistent with the hypothesis that larger premiums are associated with larger pools of potential bidders.

In some respects, it is remarkable that the results of the analysis of variance conform so well to the hypothesis that price/book value ratios are a function of branching, intrastate holding company, and interstate banking laws. This model does not account for any of the financial or economic variables which are known to determine price/book ratios. Further, the analysis is reduced by the presence of empty cells. Only six of the eight possible B x H combinations were observed. The treatment effects may be strong enough to appear in spite of the inadequacies of the model.

Analysis of Covariance

Analysis of covariance was employed to improve the precision of the tests and formally model financial and economic factors. Based on the results of the full model

analyses of variance and covariance, the model was reformulated to reduce the number of empty cells. The analysis of covariance was repeated with the new model.

The first step involved identifying a covariate structure. Since a number of target financial and target market characteristics have been shown to affect price/book premiums, the covariate was not restricted to a single variable. The objective was to control for those variables which affect premiums in addition to the treatment effects.

Coefficients of simple correlation were calculated to measure the linear association between each independent variable and the response and between each of the independent variables and all other independent variables. Independent variables having correlation coefficients of less than |0.2000| with the price/book ratio were eliminated from consideration unless they were significantly related to price/book ratios in previous studies. To avoid multicollinearity problems in the regression analysis, covariate candidates were also required to be lowly correlated among themselves.

The correlation criteria reduced the number of independent variables to eight. This set included five buyer characteristics: size (in terms of total assets), net income, liquidity, total deposits, and deposit growth. Two target financial characteristics - growth (in terms of assets) and capitalization - met the correlation criteria.

The terms of the transaction, measured as percent cash paid for the target, also met the criteria.

Interestingly, none of the target market economic variables had correlations of more than |0.2000| with price/book ratios. However, because studies by Rhoades (1987) and Fraser and Kolari (1987) indicate that these variables are important in determining price/book ratios, three target market economic variables were retained at this stage of the analysis[39]. Two additional target financial ratios which were significant in both studies, but which did not met the correlation criteria, were also retained[40]. These were target earnings and profitability.

The Du Pont ratio was included, although it does not meet the correlation criteria, because it takes into account known interactions between the other financial ratios. Lee (1985) shows that single equation ratio analysis may be subject to simultaneous equation bias when a firm's financial ratios are jointly determined. In this case, the single ratios, considered individually, may not provide the best summary of the firm's financial characteristics.

The Du Pont system escapes this problem by considering the ratios together. Because it is an accepted method of summarizing several of a firm's financial characteristics

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[39] The three variables are target market population, income, and growth.

[40] These ratios are described in Table 2 of Chapter 3.

into a measure of return on investment, the Du Pont ratio was considered for inclusion as a covariate in the final model. The addition of the target's Du Pont ratio brought the total number of potential covariates at this point to fourteen: five buyer financial characteristics, five target financial characteristics, three target market economic characteristics, and the terms of the transaction.

Not only must a meaningful covariate be useful for predicting premiums, it must also be relatively unaffected by the treatments. This criterion effectively eliminated all of the buyer characteristics from consideration. Three of the five buyer characteristics are directly related to size - total assets, total deposits, and deposit growth. These variables are obviously affected by the firm's acquisition scheme which, in turn, is determined at least in part by branching, holding company, and interstate banking statutes. The target growth variable was eliminated for similar reasons; the ability of targets to increase in size is affected by their ability to expand geographically.

The requirement that the covariate be unaffected by the treatments also eliminated the concentration ratio from the model. Several previous studies, including Rhoades (1987), included a measure of market concentration in an attempt to gauge the extent to which market power motivates mergers. Obviously, however, market concentration will be affected by the intrastate branching and holding company and interstate banking statutes in effect across the

states. The ability of banking firms to make market concentrating and market extending mergers is affected by these treatment factors.

For example, the limited level of branching confines bank expansion to a narrowly defined geographic area, most often the SMSA or county in which the bank's home office is located. On the other hand, the limited level of intrastate holding company statutes most often limits the percentage of a state's banking assets which can be controlled by any one banking firm, requiring bidders to look out of state for expansion beyond a certain critical level. The interstate opportunities for any given state's holding companies are, of course, determined by the laws of the other states. Whether or not a banking firm can expand beyond the location of its home office depends on the state branching, intrastate holding company, and intrastate banking laws; the set of target markets accessible by any given bidder is defined by these statutes.

By controlling entry, these laws affect the concentration of local banking markets; therefore, introduction of a measure of market concentration as a covariate in the model is inappropriate. Furthermore, the distribution of acquisitions in this study discounts the influence of market power. Only 27.59% of the acquisitions in the sample were not market extending. The adjusted mean price/book ratio for these acquisitions was 1.7769, while the adjusted mean for the market extending mergers was

1.9011. There is no significant difference between these means (PR > F = 0.2109).

For similar reasons, dummy variables denoting the region in which each acquisition occurred could not be included as covariates. The regions in which a given holding company can make acquisitions are governed by the treatment factors. Instead, the target market economic variables serve to measure regional differences. Continuous variables such as target market population, growth, and per capita income should provide a more accurate measure of regional economic characteristics than a series of binary indicator variables and are unlikely to be significantly affected by branching, intrastate holding company and interstate banking statutes.

Thus, eight variables - four target financial variables, three target market economic variables, and the terms of the transaction - entered the stepwise regression to identify a covariate structure. Using maximum improvement in R^2 as the selection criterion, the best one, two ,three, four, five, six, seven, and eight variables models of price/book ratios were identified. Using α =.10 as the level of significance to reduce the possibility of excluding an important variable, the largest model containing only significant variables was chosen for further analysis. The model identified by the stepwise regression procedure is:

PB = *f*(TDUP2, TCAP, TERMS, GRO)

where PB is the price/book ratio, TDUP2 is the target's Du Pont ratio for the year before the acquisition, TCAP represents the target's capitalization ratio, TERMS summarizes the percent of the acquisition price paid in cash[41], and GRO is the change in population in the target market. Correlation coefficients for these variables are presented in Table 6.

The Du Pont ratio (TDUP2), a measure of return on investment in the year of the acquisition, is positively correlated to the price/book ratio, indicating that targets providing higher returns bring higher premiums. All of the remaining three variables are inversely related to the price/book ratio. Both Fraser and Kolari (1987) and Rhoades (1987) found that low target equity to total asset ratios are associated with high premiums; the negative correlation coefficient for the variable TCAP is consistent with these findings. Rhoades notes that the industry consultants who arrange bank acquisitions generally regard a target with a low capital-to-assets ratio as a "good buy". These targets provide acquirers with the chance to gain control of a large block of assets through the buy-out of a relatively small equity position. The potential benefits of high leverage may also contribute to the perception.

The negative relationship between TERMS and the

[41] TERMS ranges from 0.00 to 1.00, taking a value of 1.00 for a pure cash transaction and 0.00 for a transaction involving entirely common stock. Many acquisitions involved both cash and common stock.

TABLE 6

CORRELATION COEFFICIENTS

Variables Identified by Stepwise Regression

Variable:	PB	TDUP2	TCAP	TERMS	GRO
PB	1.0000	0.1060	-0.2578	-0.2174	-0.1445
TDUP2	0.1060	1.0000	0.2799	0.1515	-0.0562
TCAP	-0.2578	0.2799	1.0000	0.2958	0.0236
TERMS	-0.2174	0.1515	0.2958	1.0000	0.0199
GRO	-0.1445	-0.0562	0.0236	0.0199	1.0000

premium is also satisfying. The sign of the correlation coefficient indicates that the higher the percent of the acquisition price paid in cash, the lower the premium will be. Higher premiums are paid when the terms of the transaction involve greater percentages of common stock. This is due to the uncertainty which accompanies the value of stock.

The sign of the correlation between price/book ratios and the target market growth variable, GRO, is more puzzling. GRO represents the percentage change in population in the target market area. Higher premiums appear to have been paid for targets located in areas in which the population declined during the years prior to the acquisition. It would seem that targets in rapidly growing markets would bring higher premiums. However, it is possible that the markets having population declines were expected to grow again, having recently passed through a trough. Indeed, many of the east coast metropolitan markets in the sample experienced population declines in the late seventies and early eighties, but went on to prosper during the years of the study.

Because no model selection technique is guaranteed to identify the best model, the basic four variable model was subjected to residual analysis and interaction and quadratic terms were added in an attempt to improve the fit. No variance stabilizing transformation was indicated; however, these tests did reveal an interaction between the

target capitalization ratio and the terms of the transaction. Therefore, the final covariate was composed not of a single concomitant variable, but rather a covariate structure composed of four variables and an interaction term. The statistics for the covariate structure fit as a regression on PB are given in Table 7.

All four variables and the interaction term are significant at the $\alpha = 0.10$ level. Three of the variables, TDUP2, TCAP, and TERMS have a highly significant linear relationship to the premium. The signs and the magnitudes of the parameter estimates are consistent with the correlation coefficients reported in Table 5. While significant, the impact of the target market growth variable, GRO, on acquisition premiums is only slightly negative.

Of all the variables, the target capital ratio, TCAP, appears to have the greatest impact on acquisition premiums. The impact of TCAP is augmented by the terms of the transaction. A closer look at the TCAP x TERMS interaction reveals that the lowest premiums were observed for pure cash acquisitions involving targets having a high equity-to-assets ratio. Conversely, the highest premiums were recorded in pure common stock transactions for targets with low capital ratios.

The model predicts that targets with low capital ratios will bring higher premiums and the greater the percentage of the purchase price paid in common stock, the

TABLE 7

REGRESSION OF COVARIATES ON PB

Variables Selected by Stepwise Regression

Source of Variation	df	Sum of Squares	Mean Square	F Value
Model	5	11.1155	2.2231	7.75
Error	155	44.4729	0.2869	
Corrected Total	160	55.5883		

Source of Variation	df	Type III Sums	F Value	PR > F
TDUP2	1	3.8074	13.27	0.0004
TERMS	1	2.4063	8.39	0.043
GRO	1	0.8604	3.00	0.0853
TCAP	1	4.0519	14.12	0.0002
TERMS x TCAP	1	1.4001	4.88	0.0286

R-SQUARE = 0.2000

TABLE 7

Continued

Parameter	Estimate	T for H_0: Parameter=0	PR > |T|
Intercept	2.6087	10.23	0.0001
TDUP2	4.1310	3.64	0.0004
TERMS	-1.0000	-2.90	0.0043
GRO	-0.0038	-1.73	0.0853
TCAP	-12.8447	-3.76	0.0003
TERMS X TCAP	9.2879	2.21	0.0286

PREDICTION EQUATION:

Premium = 2.6087 + 4.1310(TDUP2) - 1.0000(TERMS)

-0.0038(GRO) - 12.8447(TCAP) + 9.2879(TERMS X TCAP)

higher still the premium will be. Cash terms reduce the premium. For a given capital-to-assets ratio, the greater the percentage of the purchase price paid in common stock, the higher the premium will be. However, the difference between the predicted premium in a pure cash transaction and the predicted premium for a pure stock premium is greater for low capital banks than for high capital banks. The lower the target's capital-to-assets ratio, the greater the difference between the predicted premiums for cash and stock transactions. Rhoades (1987) expressed concern that the larger premiums associated with low capital-to-assets targets would reduce the ultimate value of the acquisition to the buyer. However, it appears that many of the higher premiums paid for low capital targets take the form of common stock, which has a less certain value than cash.

The R^2 value for this model, which measures the variation in the price/book premium that is explained by the model, is 0.2000. While this is not an extremely high value, socioeconomic models seldom yield as high coefficients of determination as do models in the physical sciences. The magnitude of R^2 for the regression of the covariates on the premium is comparable with that of other model in this field.

The next step in the investigation was to incorporate the covariate into the full factorial model in an analysis of covariance framework. The covariates serve to improve the precision of the analysis by controlling for extraneous

sources of variation which might mask the treatment effects under investigation. Therefore, no treatment interaction effects were dropped in the first analysis of covariance. While it is hoped that the addition of the covariates will improve the ability of the analysis to detect the effects of the levels of branching, intrastate holding company, and interstate banking laws on acquisition premiums, the modification does not alter the number of missing cells. Statistics for this model are presented in Table 8.

Examination of the Type III sums of squares for the main treatment and interaction effects yields conclusions which are very similar to those reached for the factorial analysis[42]. Once again, at the $\alpha = 0.05$ level of significance, the analysis reveals significant main effects for the branching and interstate factors. Rejecting the null hypothesis that all of the group means are equal, we conclude that a significant portion of the observed variation in premiums can be explained by differences in branching and intrastate expansion regulations. At least one of the levels of branching produces a mean premium which differs from the others. The mean premium for at least one of the three interstate banking factors differs from the others.

Further, the effect of branching is modified by the associated level of intrastate holding company law. The

[42] The same hypothesis tests based on the Type IV sums of squares, which take into account the missing cells, yield identical conclusions.

TABLE 8

ANALYSIS OF COVARIANCE

FULL FACTORIAL MODEL

Source of Variation	df	Sum of Squares	Mean Square	F Value
Model	18	23.2670	1.2926	5.68
Error	142	32.3214	0.2276	
Corrected Total	160	55.5883		

Due to missing data, only 160 observations could be used.

Source of Variation	df	Type III Sums	F Value	PR > F
I	2	1.5662	3.44	0.0347
B	3	2.9069	4.26	0.0065
H	1	0.6298	2.77	0.0984
B x H	1	1.2837	5.64	0.0189
I x B	3	1.5668	2.29	0.0805
I x H	1	0.4801	2.11	0.1486
I x B x H	1	0.1171	0.51	0.4743
TDUP2	1	2.2552	9.91	0.0020
TCAP	1	3.4775	15.28	0.0001
TERMS	1	1.2140	5.33	0.0224
GRO	1	1.9245	8.45	0.0042
TCAP x TERMS	1	0.8451	3.71	0.0560

analysis of covariance confirms that there is a significant interaction between branching and holding company regulations. However, no significant main effect of holding company regulations alone is found. The effect of intrastate holding company expansion statutes depends very much on the level of branching with which they are combined.

There is no significant interaction between branching and interstate factors, or between holding company and interstate factors. Nor is there a significant three-way interaction. Since this model holds the extraneous variation due to the covariates constant, these conclusions concerning the main and interaction effects can be made with more confidence than those previously stated.

F tests of the covariates confirm that they are all significantly related to the premium, indicating that the analysis benefitted from the inclusion of these variables. Each explains a significant portion of the variation in price/book ratios. While the solution to the normal equations does not yield unique, unbiased estimates for the treatment effects or the intercept when the generalized inverse is employed, the procedure does produce the best linear unbiased estimates for the covariate parameters. Covariate parameter estimates from the analysis of covariance are shown in Table 9.

These estimates are very similar to those obtained from the regression of the covariate variables on

TABLE 9

COVARIATE PARAMETER ESTIMATES

FULL FACTORIAL ANALYSIS OF COVARIANCE

Parameter	Estimate	T for H_0: Parameter=0	PR > |T|
TDUP2	3.3657	3.15	0.0020
TERMS	-0.7328	-2.31	0.0224
GRO	-0.0059	-2.91	0.0042
TCAP	-12.1388	-3.91	0.0001
TERMS X TCAP	7.4476	1.93	0.0560

price/book ratios. The covariate parameter estimates produced with the analysis of covariance are all slightly smaller than the corresponding estimates from the regression model, except for the variable GRO. The effect of target market growth on premiums appears slightly greater in the analysis of covariance model. However, the effect is small in both models, relative to the other variables.

The parameter estimates indicate that the target's capital-to-assets ratio has the most impact on premiums among the covariates. The effect of TCAP is modified by the terms of the transaction. The R^2 for the full factorial analysis of covariance is 0.4186. Like the analysis of variance, the F tests of the main and interaction effects in the analysis of covariance tell us only if at least one of the group means differs from the others. The F test does not indicate which mean or means differ. Because there are unequal numbers of observations per treatment group, the adjusted, or least squares means are used to make paired comparisons between group means. Table 10 displays the LS means from the analysis of covariance.

After controlling for the covariates, the adjusted means for the three levels of interstate banking appear more tightly grouped. The largest mean was smaller, and the smallest mean was larger. The largest average price/book ratio, 2.0357, was observed for targets in states permitting regional interstate banking. The smallest mean

TABLE 10

LEAST SQUARES MEANS

ANALYSIS OF COVARIANCE, FACTORIAL MODEL

Interstate	Price/book LS Mean	Prob > |T| H_o: Mean(I)=Mean(J) I/J	1	2	3
National	1.9842	1	.	0.0909	0.7735
None	1.6696	2	0.0909	.	0.0007
Regional	2.0357	3	0.7735	0.0007	.

Branching	Price/book LS Mean	LS mean Number
Limited	1.7394	1
Prohibited	2.1117	2
St/Merger	1.8249	3
Statewide	2.1386	4

Prob > |T| H_o: Mean(I)=Mean(J) I/J	1	2	3	4
1	.	0.0384	0.3589	0.0042
2	0.0384	.	0.1379	0.8996
3	0.3589	0.1379	.	0.0371
4	0.0042	0.8996	0.0371	.

TABLE 10

Continued

Holding company	Branching	Price/book LS Mean	LS mean Number
Limited	Limited	1.7839	1
Limited	St/Merger	1.5301	2
Unlimited	Limited	1.6950	3
Unlimited	Prohibited	2.1117	4
Unlimited	St/Merger	2.1198	5
Unlimited	Statewide	2.1386	6

Prob > |T| H_o: Mean(I)=Mean(J)

I/J	1	2	3	4	5	6
1	.	0.0723	0.4402	0.0747	0.0163	0.0192
2	0.0723	.	0.1947	0.0058	0.0001	0.0004
3	0.4402	0.1947	.	0.0314	0.0009	0.0032
4	0.0747	0.0058	0.0314	.	0.9687	0.8996
5	0.0163	0.0001	0.0009	0.9687	.	0.9095
6	0.0192	0.0004	0.0032	0.8996	0.9095	.

premium, 1.6696, was recorded for targets in states with no provision for interstate banking.

While the ranking of the three interstate group means in the analysis of covariance is identical to the ranking obtained with the analysis of variance model, the results of the pairwise comparisons are somewhat altered. The difference between mean premiums for the regional and none levels of the interstate factor is still highly significant. However, the difference between treatment means for targets in states which had not adopted an interstate banking statute and targets in states with nationwide interstate banking is significant at the α = 0.10 level, but not at the α = 0.05 level. Thus, the difference appears somewhat less significant after controlling for the effect of the covariates. Nonetheless, the overall impression is that premiums are greater in states which admit out-of-state bidders than in states which do not.

Examination of the group means from the analysis of covariance for the four levels of branching reveals that the adjusted means for the limited and the statewide-by-merger-only levels are nearly identical with those obtained in the analysis of variance. The LS means for both the prohibited and statewide levels of branching appear larger in the analysis of covariance than in the analysis of variance.

Nonetheless, the overall ranking of the means is the same in both analyses. The statewide form of branching is associated with the largest average price/book ratios. The second largest mean premium was recorded for the prohibited group, followed by the statewide-by-merger-only group. The lowest mean premium occurred for targets located in limited branching states.

At the $\alpha = 0.05$ level, T tests of the LS means from the analysis of variance show a significant difference only between the mean premiums for the limited and statewide levels of branching. The difference between the means for the statewide and the statewide-by-merger-only groups is nearly significant. In contrast, paired T tests of the LS means from the analysis of covariance allow three differences to be declared at the $\alpha = 0.05$ level of significance.

After removal of extraneous variation attributable to the covariates, the mean premium for the limited branching group is significantly lower than the means for both the statewide and the prohibited levels of branching. Further, the mean acquisition premium for the targets in states with the statewide-by-merger-only form of branching was significantly lower than the mean for the statewide branching group.

No significant differences can be observed between the limited and the statewide-by-merger-only group or between the prohibited and the statewide group. Once again, the

absence of any real difference between the means for the prohibited and the statewide groups, averaging 2.1117 and 2.1386 respectively, strongly suggests that unlimited intrastate holding company expansion can substitute for branching. The prohibited level of branching only occurs with the unlimited level of intrastate holding company expansion. Evidently, unlimited holding company expansion overwhelms the prohibition on branching, resulting in premiums approximately as large as those observed in states restricting neither branching nor intrastate holding company expansion.

The LS means table from the analysis of covariance for the B x H interaction supports all of the differences revealed in the analysis of variance for this effect. The analysis of covariance LS means table reveals the same seven significant paired differences among the six branching x holding company combinations. These differences must be interpreted cautiously, simply because the chance of finding significant differences increases with the number of comparisons made. Nonetheless, the paired tests confirm the analysis of variance conclusions and show the importance of the B x H interaction. The tests support the hypothesis that larger premiums are associated with targets located in states which define a larger population of potential bidders.

Hypothesis testing of both the full factorial analysis of variance and analysis of covariance lead to satisfyingly

similar conclusions. Results from both models support the central hypothesis that larger price/book premiums are paid in acquisition markets which contain a larger number of potential bidders, and that the population of potential bidders is, in turn, determined by the branching, intrastate holding company, and interstate laws in effect in the target state. Evidently, the main effects of branching and interstate banking regulations and the branching x holding company interaction are so strong that they appear even when other factors which influence premiums are not controlled.

Both of these models, however, contain several empty cells because only six of the eight possible combinations of intrastate branching and holding company regulations were actually observed. The presence of empty cells in a full factorial design weakens the discriminatory ability of the analysis. While tests of the main and interaction effects based on Type IV sums of squares, which are designed for models containing empty cells, provide conclusions identical to those obtained with the Type III sums of squares, this modification is not a perfect substitute for the missing observations.

Fortunately, the full analysis of covariance model can be reformulated in a way that reduces the number of cells. This process involves considering each of the six combinations of branching and intrastate holding company expansion restrictions as a single treatment. This is

justifiable in the theoretical sense, as both statutes together define the intrastate population of bidders.

The reduced model consists of two main effects: I, the interstate factor, with three levels describing the out-of-state pool of potential bidders; and TRT, the combined branching and holding company factor, which describes the native population of potential acquirers and has six levels. Because neither the full factorial analysis of variance nor analysis of covariance indicated a significant interaction between interstate and intrastate holding company treatments, between interstate and branching treatments, or between all three factors, these terms were dropped from the reduced model. Thus, the model became a two-factor model without interaction. The covariate structure remained intact.

Another advantage of the two-factor analysis of covariance model is it that facilitates construction of custom hypothesis tests to compare groups of means, in addition to the simple paired comparisons provided by the LS means table. Contrasts can be constructed for the two-factor model to compare several B x H combinations at once. Several contrasts are suggested by the treatment structure and these will be examined.

The sums of squares and F tests for the main effects and the covariate statistics are shown in Table 11. A separate LS means table of the main effects for this model is not given because the LS means for the three levels of

TABLE 11

ANALYSIS OF COVARIANCE

TWO-WAY MODEL

Source of Variation	df	Sum of Squares	Mean Square	F Value
Model	12	20.4714	1.7060	7.19
Error	148	35.1169	0.2373	
Corrected Total	160	55.5883		

Source of Variation	df	Type III Sums	F Value	PR > F
I	2	2.9356	6.19	0.0026
TRT	5	6.3672	5.37	0.0001
TDUP2	1	1.3508	5.69	0.0183
TCAP	1	5.3200	22.42	0.0001
TERMS	1	2.2817	9.62	0.0023
GRO	1	0.8604	3.63	0.0588
TCAP x TERMS	1	1.3025	5.49	0.0205

interstate banking estimated by the two-way model are identical with the adjusted means for the factorial analysis of covariance. Similarly, the LS means for the six TRT effects are identical with the LS means for the B X H interaction reported in Table 10.

Consistent with the previous models, results of hypothesis testing of the two-way analysis of covariance model indicate significant main effects of the interstate factor and of the TRT factor on price/book premiums. The three levels of interstate banking statutes are unchanged from before. The six levels of TRT are LL, LM, UL, UM, UP, and US where the first letter of the treatment name denotes the level of intrastate holding company regulation - limited or unlimited. The second letter identifies the level of branching: L = limited, M = statewide-by-merger-only, P = prohibited, and S = statewide. Because TRT represents the combinations of holding company and branching laws, the main effect of TRT is a measure of the B x H interaction and the B and H main effects, uncompromised by missing cells.

The effects of the levels of branching and intrastate holding company regulation can be extracted with contrasts. For example, we hypothesized that the unlimited form of intrastate holding company expansion functions to override restrictions on branching. Contrasting the two levels of TRT for which intrastate holding company expansion is limited with the four in which it is unlimited, the null

hypothesis that the mean responses are equal is rejected. The mean premiums for LL and LM, considered together, are significantly lower than the mean premiums for UL, UM, UP, and US (PR > F = 0.0001).

The unlimited holding company group, however, contains two levels of branching which are not represented in the limited holding company group. Therefore, the contrast was repeated, dropping US and UP. The mean premium for the LL,LM group was significantly lower than the UL,UM group (PR > F = 0.0089). Unlimited intrastate holding company expansion appears to result in higher acquisition premiums over all levels of branching.

Together, these contrasts show the importance of intrastate holding company regulations in determining acquisition premiums. Ignoring intrastate holding company laws for the moment, if average premiums increase as the population of bidders increases, then the highest premiums should be observed in states which allow statewide branching by merger only. The second highest premiums should occur with statewide branching, since de novo expansion provides an alternative to acquisition. The third highest premiums should be observed for the limited branching group, and the lowest premiums should be recorded in states which prohibit branching all together. In actuality, the third highest mean premium of all six groups was observed for the states which prohibit branching, violating the order predicted from branching alone. These

states also permit unlimited holding company expansion, suggesting holding company structures can effectively substitute for branching.

The order of means within the limited holding company group is consistant with that predicted from the branching laws. The mean premium for the LL group is not from the LM mean at the $\alpha = 0.05$ level. Within the unlimited holding company group, the predicted order is nearly preserved, except that UP and UL are switched. According to the hypothesis, the mean premium for the prohibited branching group should be lower than the limited branching group. Instead, the UP mean is greater than the UL mean (PR > F = 0.0314). This may be due to the presence of more holding company activity in the states that prohibit branch banking. The contrast which compares the UL group with all other treatments in the unlimited holding company group confirms that the UL mean premium is the lowest (PR > F = 0.0001). However, contrasting US and UM with UL and UP shows that the average premium for US and UM combined is significantly greater than the mean for UP and UL considered together (PR F = > 0.0695). Although the highest mean premium was recorded for the US treatment group, there is no significant difference between the US and UM groups.

Overall, the evidence from these tests supports the central hypothesis. Larger acquisition premiums were observed in states with branching and intrastate holding company statutes which define a larger population of

potential bidders. The larger the pool of bidders, the larger the premiums. Exploration of the B x H interaction revealed that the combination of branching and holding company statutes is very important. The contrasts strongly suggest that statutes permitting unlimited holding company expansion reduce the negative impact of branching restrictions on acquisition premiums. Premiums are universally higher when intrastate holding company expansion is unlimited.

The effects of interstate banking regulations are superimposed on the TRT effects. The hypothesis predicts that premiums will be higher in states which admit out-of-state buyers to their acquisition markets than in states which do not. Contrasting the regional and national banking groups with the group lacking any provision for interstate banking shows that premiums are higher in states which permit interstate banking. The difference in mean premiums is highly significant (PR > F = 0.0056). No significant difference is apparent between the regional and national forms of interstate banking. This may be due simply to the newness of interstate banking[43].

The solution to the normal equations resulted in slightly different parameter estimates for the covariates. These estimates are also given in Table 12. T tests of H_0:

[43] The large money center banks, the most experienced with nationwide banking, have been for the most part legally excluded from the interstate banking party. Most of the holding companies in this study probably had little prior experience outside their traditional banking regions.

TABLE 12

COVARIATE PARAMETER ESTIMATES

TWO-WAY ANALYSIS OF COVARIANCE

Parameter	Estimate	T for H_0: Parameter=0	PR > |T|
TDUP2	3.3657	3.15	0.0020
TERMS	-0.7328	-2.31	0.0224
GRO	-0.0059	-2.91	0.0042
TCAP	-12.1388	-3.91	0.0001
TERMS X TCAP	7.4476	1.93	0.0560

Parameter = 0 require the rejection of the null hypothesis for each hypothesis. The test results indicate that each of the four covariate variables has a significant linear relationship with the premium. There is also a significant interaction between TCAP and TERMS. This indicates that the covariates should remain in the new model.

Model Adequacy and Nonparametric Tests

Residual plots were constructed for each of the models. Residuals were plotted against the fitted values and against the individual covariates. In each case, the residuals appeared structureless, forming a fairly random pattern. Thus, the plots indicate that the models used in the analysis are reasonable representations of the relationship between premiums and the treatments and the covariates.

An additional test is required for the analysis of covariance. The ordinary analysis of covariance assumes that the regression relationship between the response and the covariates is stable over all treatment levels. Because regression relationships which differ among treatment groups reflect an interaction between the treatments and the covariates, the test for heterogeneity of slopes is modeled as a series of interaction terms. Both the full, factorial and the two-way analysis of covariance models were subjected to the heterogeneity of slopes test. For each model, no significant interaction between any of the

treatments and the covariates was found. Therefore, the standard analysis of covariance is appropriate for each model.

Finally, nonparametric tests were used to verify the main affects. The parametric methods of analysis assume that the true distribution from which the data comes is normal, or at least symmetrical. If this assumption is seriously violated, parametric models are not suitable. Lee (1985) reports that financial ratios are normally or log-normally distributed[44]. However, because the true distribution for the study data is unknown, the Kruskal-Wallis test was applied to the main effects. (It is not normally applied to interaction effects). In separate tests, this nonparametric analysis of variance confirmed the main effect of the interstate banking treatment (PR > F = 0.0001) and the main effect of branching (PR > F = 0.0316). A main effect of intrastate holding company law was also indicated (PR > F 0.004), but this result must be considered in light of the known B x H interaction.

The nonparametric tests confirm the findings of the parametric procedures. This validates the conclusion that price/book premiums depend on the regulations governing the geographic expansion of banking firms in the target state. By defining the population of potential bidders, these regulations affect the competitiveness of bank acquisition

[44] Both of these distributions are symmetrical and suited to parametric analysis.

markets, and thereby the magnitude of the premiums. The nonparametric tests yield the same results as the parametric tests, confirming that parametric procedures are suited to the data. In this case, the power of the parametric tests is comparable to the power of the nonparametric tests.

Summary

Three models were fit to a sample of 174 bank holding company acquisitions to examine the effect of branching, intrastate holding company, and interstate banking regulations on price/book premiums. Higher premiums will be paid for target banking firms located in states which have statutes defining a larger population of potential bidders, all else equal. When a state's bank expansion regulations permit a larger number of potential bidders to enter its bank acquisition markets, higher premiums result.

Tests using the analysis of variance model, even though unadjusted for financial and economic characteristics which are known to affect premiums, indicate that the three types of regulation affect price/book premiums. This model reveals significant main effects of interstate and branching laws and a significant interaction between branching and intrastate holding company statutes. Premiums were significantly lower for targets in states with no provision for interstate banking

than for targets located in states which admit out-of-state bidders to their acquisition markets.

Results from paired tests on the four levels of branching must be interpreted in light of the B x H interaction. Within the unlimited class of intrastate holding company expansion, the statewide-by-merger-only branching group had the highest mean premium, followed by the statewide group. The difference between the means of these two groups is not statistically significant, but this is nonetheless the ranking predicted by the hypothesis. lower mean premiums were recorded for the prohibited and limited branching groups. The mean for the prohibited group was higher than that of the limited branching group, but the difference was not significant. The fact that the unlimited holding company, prohibited branching group had the third highest mean of the six B x H combinations, a mean not significantly different from the statewide or the statewide-by-merger-only groups, strongly suggest that the holding company form of organization effectively substitutes for branching. Overall, the analysis of variance results are consistent with the hypothesis that larger premiums are associated with larger pools of bidders.

Five covariates were used in both the full and reduced analysis of covariance model to control for financial and economic factors which influence premiums beyond the legal statutes under primary investigation. The five covariates

were the target's Du Pont and capitalization ratios, the terms of the transaction, the target market growth, and the interaction between the terms and the target's capitalization ratio.

The results of the full model analysis of covariance were very similar to those obtained with the full model analysis of variance. Once again, adjusted mean premiums were significantly higher when out-of-state bidders were not barred from entry into a state's bank acquisition markets. Results from the full analysis of covariance model confirm the significance of the main effect of branching and the B x H interaction. T tests on the LS means from the full model analysis of covariance show the same paired differences after adjustment for the covariates.

Higher average premiums tend to be associated with the unlimited level of holding company regulation. Within a level of intrastate holding company regulation, the hypothesis predicts that the highest mean premium, based on the size of the population of potential bidders, should be associated with branching statewide-by-merger-only, followed by statewide branching, limited branching, and finally, prohibited branching. Both the full factorial analysis of variance and analysis of covariance support this ranking, except that in both cases, the mean premium for the prohibited branching group exceeds the mean for the limited branching group within the unlimited level of the intrastate holding company factor.

Since both full models contain several empty cells due to the fact that only six of the eight possible B x H combinations are actually represented in the data, a reduced model was used in which the six combinations were considered as treatments. This modification reduced the number of empty cells and permitted construction of contrasts to compare groups of treatment means. Contrasting the regional and national interstate banking groups with the group for which there is no provision for interstate banking confirmed the hypothesis that premiums are higher when there is an out-of-state pool of bidders.

TRT captures the B x H interaction. Contrasts confirm that unlimited intrastate holding company expansion produces higher premiums than those that result when intrastate holding company expansion is limited. In the limited form, some of the native holding companies may be excluded from the acquisition markets. The smaller population of bidders results in smaller premiums.

Within a level of the holding company factor, the order predicted on the basis of branching regulations is preserved, except that the prohibited and limited groups within the unlimited holding company group are switched. This may be due to the presence of well developed holding company structures in the states which prohibit branching. Indeed, the results from all three models provide consistent evidence that unlimited holding company expansion substitutes for branching and serves to overcome

the negative impact of branching restrictions on acquisition premiums.

In conclusion, analysis of all three models produced remarkably consistent results. Each model revealed the same significant main and interaction effects. Evidently, the main effects of branching and interstate laws and the B x H interaction are so strong that they appear even without controlling for concomitant variables which also influence premiums. The two-way analysis of covariance allowed the formation of contrasts to permit a more thorough investigation of the relationship between price/book premiums and geographic expansion regulations.

Overall, tests of all three models strongly support the hypothesis that premiums are larger in states which have statutes defining a larger population of potential bidders. The secondary hypothesis that unlimited holding company expansion can substitute for branching is also uniformly supported. The models provide a series of increasingly powerful tests of these hypotheses. Model adequacy tests indicate that the inferential techniques employed are appropriate to the data.

CHAPTER V

CONCLUSION

Summary

The purpose of this study has been to empirically investigate the effect of geographic expansion statutes on bank acquisition premiums. Acquisition premiums were related to the branching, intrastate holding company, and interstate banking laws which were in effect at the time of the merger in the target state. The central hypothesis was that larger price/book premiums would be associated with targets in states which define a larger population of potential bidders, all else equal.

The analysis of covariance confirms that acquisition premiums are a function of the target's financial characteristics, target market economic characteristics or operating environment, the terms of the transaction or structure of the merger, and the regulatory environment. This finding is in agreement with Beatty, Santomero, and Smirlock (1987), who suggested that bank acquisition premiums would be determined by these four factors. In order to isolate the effects of geographic regulation on price/book ratios, target market financial characteristics, target market economic characteristics, and the terms of the transaction were modeled as covariates. Analysis of covariance holds the effects of the covariates constant,

controlling for factors which are known or thought to influence premiums, in addition to the statutory environment.

The results of the full, factorial analysis of covariance, in which premiums are modeled as a function of the various levels of branching, intrastate holding company, and interstate laws, show a strong main effect of interstate and branching statutes on price/book ratios. Targets located in states which open their bank acquisition markets to out-of-state holding companies bring higher purchase prices. The larger population of potential acquirers increases the competitiveness of the acquisition market and drives up premiums. The effect of interstate banking laws on premiums is so strong that it was detected by the full factorial analysis of variance which does not control for any of the other factors which affect premiums.

The main effect of branching laws was also apparent in both the full analysis of variance and the analysis of covariance. However, there is a significant interaction between branching and holding company expansion regulations. The effect of branching laws is modified by the accompanying holding company statutes. Again, premiums are systematically higher when state law defines a larger population of potential bidders.

Contrasts between the six combinations of branching and intrastate holding company statutes show that premiums are uniformly higher in states which permit unlimited

intrastate holding company expansion. Within a level of the intrastate holding company factor, branching laws which facilitate greater entry into the acquisition markets generally result in higher premiums. The higher than expected premiums for targets in states which prohibit branching but allow unlimited intrastate holding company expansion indicate that holding company structures substitute for branch banking.

Although it is not necessary to control for the concomitant variables in order to isolate the effects of geographic expansion statutes, the model developed in this study shows that target financial characteristics, target market economic characteristics, and the terms of the transaction all significantly affect premiums. The covariates summarize each of the three factors which affect premiums in addition to the regulatory environment. The analysis indicates that the target's capital ratio and return on investment are important determinants of price/book ratios.

Apparently, there is a significant relationship between the structure of the merger and the target's capital ratio. The highest premiums were observed for pure common stock transactions involving targets with low capital ratios. The nature of the relationship between premiums and the terms of the transaction is open to further investigation. It is obvious from this study that

premiums depend significantly on the structure of the merger and on the capital position of the target.

Finally, higher premiums are paid for targets which have provided their previous owners with healthy returns on investment. Oddly, higher premiums were observed for targets located in markets which experienced declines in population, but perhaps these are markets which have passed through an economic trough and are expected to resume robust growth.

The F tests and contrasts provided by the analysis of covariance models, both full and two-way, are robust, allowing comparisons of groups of means. Contrasts permit custom hypothesis testing of group differences which are suggested by the treatment structure. Model adequacy tests such as residual analysis and the test for heterogeneity of slopes testified to the appropriateness of the models used. Further, nonparametric tests confirmed the significance of the main effects.

Implications of the Study

The branching, intrastate holding company, and interstate banking laws significantly affect bank acquisition premiums. These laws define the pool of potential bidders for a state's banking firms and thereby control entry into the acquisition markets. The larger the population of potential acquirers, the larger the premiums. Therefore, the regulation of geographic expansion impacts

the market for corporate control. These statutes affect the competitiveness of the market, as evidenced in the significant relationship of the laws to purchase prices. Deregulation of geographic location is likely to improve the price and allocational efficiency of bank merger markets by inducing a healthy measure of competition.

Moreover, branching, intrastate holding company, and interstate banking statutes are important barriers to entry. Because these laws affect the efficacy of the takeover market, the effects of geographic regulation may extend to many forms of bank behavior, including cost and price behavior. Geographic deregulation may have effects which range beyond the impact on premiums.

The study has private, as well as social implications. Because geographic expansion regulations affect the number of potential bidders, the regulations may also affect the division of the gains to merger between target and bidder shareholders. There is no analogous regulatory environment in the nonfinancial corporate sector.Therefore, a special need exists in the banking industry to explore the determinants of acquisition premiums and the impact of regulation on premiums.

Other factors in addition to the regulatory environment affect premiums. The results of this study imply that the relationship between premiums, capital ratios, and the terms of the transaction may be complex, as evidenced by the significant interaction between the

target's capital ratio and the terms of the transaction. For example, there may be a relationship between the bidder's acquisition scheme and the terms offered. Some stock transactions may result in unacceptable earnings dilution. In addition, tax effects may influence the structure of the merger, since pure stock transactions generally escape taxation.

The results indicate that low capital targets are worth a premium, especially when the premium takes the form of common stock. It is possible that targets with low capital ratios may be using their resources more effectively than high capital targets. The benefits of greater leverage, may in turn, be reflected in higher returns on investment. These targets may provide the opportunity to gain control over a large block of assets through the purchase of a relatively small equity position. These are possibilities which are open to further research in order to more completely explore the bank acquisition process.

To summarize, the study of the effects of statutory restrictions concerning geographic expansion on bank acquisition premiums has importance for the market for corporate control. A healthy takeover market is especially desirable in the banking industry because of the socioeconomic importance of safeguarding the soundness of the system. Further, to the extent that branching, intrastate holding company, and interstate banking laws

constitute effective barriers to entry, deregulation of geographic expansion is likely to have implications for other types of bank behavior as well.

From a private perspective, this research helps to further identify the factors which affect the magnitude of price/book ratios. This knowledge should guide bidders in their search for profitable acquisitions. Since many banking firms are not publicly traded, market determined valuation information is not readily available. This makes the process of arriving at realistic target bank values more difficult.

Scope of the Study

The greatest limitation to this study is the lack of a fully developed microeconomic theory of how premiums are determined. To date, there is no established model. Therefore, we began with the empirical data and developed a model to fit it, rather beginning with a model. While this approach may not be ideal, it was consistent with the research objective.

This study attempts to determine the effects of geographic regulation on acquisition premiums. For this purpose, it was desirable to control for other factors - target financial characteristics, economic environment, and the merger structure - that are believed to affect price/book premiums. The variables used in the model, however, are not intended to be an exhaustive list of the

determinants of acquisition premiums. The analysis of covariance requires that the concomitant variables, themselves, be relatively unaffected by the treatments. There may be target financial and target market characteristics which influence premiums that do not meet this requirement. Therefore, it was not the intention of this study to develop a definitive model of the determinants of bank acquisition premiums. Nonetheless, it is hoped that empirical evidence such as that presented in this study will aid the development of the theory.

The selection criteria imposed on the sample also affect the scope of the study. Because of the timing of the Northeast Bancorp ruling, the test period spans only two years. As time goes by, the analysis given in this study can be repeated on a larger sample. Of course, it would be useful to examine the effects of branching and intrastate holding company expansion laws before the advent of interstate banking, and this design would also permit a larger sample. As more becomes known about the determinants of bank acquisition premiums, the selection criteria could be further relaxed to admit more observations to the sample. For example, only 174 of the 412 mergers which met the initial criteria for incorporation in the study were actually included in the final sample.

Finally, there are aspects of the acquisition that may affect premiums and which are consistent with the covariate requirements that simply were not considered in

this study. These are questions which are left to further research. For example, Beatty, Santomero, and Smirlock (1987) hypothesize that the tax implications of the merger structure affect the premium. In other words, tax effects may drive both the composition of transaction and the total amount of compensation offered the target shareholders. The tax implications of the structure of the merger are not fully explored here. Instead, the cash composition of the transaction serves as a rough proxy. (Pure cash transactions are generally taxable, while pure stock terms are not.) The relationship between the premium, the terms of the transaction, and the tax effects which result is certainly worthy of further research.

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