ESSAYS ON THE COMMERCIAL BANKING INDUSTRY

by

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B.A., Economics
University of California, Berkeley
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Abstract

This dissertation is a collection of essays on the commercial banking industry. These essays include an overview of the regulatory structure surrounding commercial banking mergers and commercial bankholding company acquisitions, a review of the commercial banking structure-conduct-performance (SCP) literature, two empirical tests of the SCP paradigm as applied to commercial banking,and an investigation into the motives behind commercial banking mergers and acquisitions which reduce shareholder wealth.

The first empirical chapter involves estimation of reduced form equations representing bank rate setting for different types of retail loans. The types of loans investigated include first and second mortgages, new and used car loans, and personal loans. Published rates charged by Northeastern banks in different banking markets were regressed against the HHI as well as bank specific and market specific control variables. The data are from the period April 1986 through March 1987. Alternate tests were performed constructing the HHI numbers based upon both commercial bank deposits only and commercial bank and thrift deposits. The empirical results do not substantiate the SCP.

The second empirical chapter tests for a specific non-linear SCP relationship. A reduced form equation is estimated in which concentration is represented by a binary critical concentration variable. As in the linear SCP chapter, concentration measures are constructed using both commercial bank deposits only and commercial bank and thrift deposits. The critical level is chosen using White's switching regimes technique. A separate set of equations in which the critical concentration level is set at HHI=1800 is also estimated. This last set of equations is estimated because HHI=1800 is the critical level implicit in current antitrust enforcement by the Department of Justice and the bank regulatory authorities. The results do not support the SCP. Moreover, the results indicate the "true" critical level, if there is one, is at a higher concentration level than the regulators' implicit critical level.

The final empirical chapter tests the hypothesis that managerial self-interest motivates commercial banking M&A activity which is inconsistent with shareholder wealth maximization. An event study is performed and the relationship between abnormal returns at the time of acquisition announcements and management shareholding is investigated. The event study is based upon 87 commercial banking acquisitions announced between 1987 and 1989. The event study results substantiate prior research indicating bidders lose in commercial banking acquisitions. The event study also yields estimates of abnormal returns to bidders surrounding acquisition announcements. Various statistical tests are performed to detect a relationship between CEO shareholding or shareholding by all officers and directors of the bidding firm and the probability of engaging in an acquisition which generates negative abnormal returns. The tests include logit and probit regressions, nonparametric tests, and univariate OLS regressions. None of the tests indicate management shareholding and the probability of engaging in wealth reducing acquisitions are related. These results are consistent with the hypothesis that managers typically overestimate the value of acquisition candidates, Roll's hubris hypothesis.

Thesis Supervisors: Dr. Paul Joskow and Dr. Jeffrey Harris, Professors of Economics, Massachusetts Institute of Technology.

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Chapter 1: Introduction

This dissertation addresses three related questions concerning commercial banking mergers and acquisitions. First, are commercial banking mergers and acquisitions bad for society? That is, do they lead to supra-competitive pricing of bank services? Second, are commercial banking mergers and acquisitions bad for bank owners? That is, do they generally reduce shareholder wealth? Finally, how can we explain the incidence of commercial banking mergers and acquisitions if they do generally reduce shareholder wealth? Specifically, are managers sacrificing shareholder wealth in return for some personal benefit derived from M&A activity?

The first question -- "do mergers and acquisitions lead to supra-competitive pricing?" -- may be rephrased "does the traditional structure-conduct-performance (SCP) paradigm apply to the commercial banking industry?" The SCP paradigm suggests that firms in more concentrated markets charge higher prices than firms in less concentrated but otherwise identical markets do. Such is the case either because market concentration facilitates collusion or because, as concentration increases, firms' awareness of the interrelatedness of their own behavior with that of other firms in the market increases. Although the SCP paradigm is the basis for much antitrust law, many economists question its validity. In this dissertation I

test the paradigm as an explanation for variation in bank loan rates across local banking markets.

Previous researchers attempting to document a structure performance connection often tested the relationship between concentration and profitability rather than concentration and price.[1] They did so because profit data were more accessible and the hypothesized greater prices should manifest themselves as greater profits. The results of these studies testing the relationship between concentration and profitability have been criticized because the studies failed to differentiate between profits due to exercise of monopoly power and profits due to more efficient production. Critics contended that efficient firms' profit maximizing output was greater than that of their rivals. Markets with some small number of particularly efficient firms would be more concentrated because these firms would have greater market share. Researchers who detected a concentration profit relationship were merely documenting the effects of superior production techniques on profitability. They were not documenting the exercise of monopoly power. Concentration was correlated with greater profitability

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[1] This type of research began with J.S.Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936 - 1940", Quarterly Journal of Economics 65 (August 1951): 293 - 324.

because it was correlated with lower costs not because it was correlated with higher prices.[1]

There are two major ways to test the validity of the competing hypotheses, i.e.the traditional paradigm and the efficient firms hypothesis. One is to include firm's market share as another explanatory variable when regressing firm profitability on concentration. Proponents of the efficient firms hypothesis state that the market share coefficient will be significant while the concentration coefficient will not.[2] The second manner is to investigate the effect of concentration on price rather than on profit. The efficient firms model suggests that concentration will not be associated with higher prices.

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[1] The seminal works in this area are H.Demsetz, "Industry Structure, Market Rivalry, and Public Policy", Journal of Law and Economics 16 (April 1973): 1 -10, and H.Demsetz, "Two Systems of Belief About Monopoly", in: H.J.-Goldschmid, H.M.Mann, and J.F.Weston, eds., Industrial Concentration: The New Learning(Boston: Little-Brown). See F.M.Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand-McNally) or Y.Brozen, Concentration Mergers and Public Policy (New York: Macmillan, 1982), or R.-Schmalensee, Inter-Industry Studies of Structure and Performance, Working Paper #1874-87 Alfred P.Sloan School of Management for more extensive discussion of inter industry structure performance studies.M.Smirlock, "Evidence on the (Non) Relationship Between Concentration and Profitability in Banking", Journal of Money Credit and Banking 17 (February 1975): 69 - 83, tests the efficient firms hypothesis as it applies to the banking industry.

Critics of the structure-profit studies also pointed out the difficulties of properly measuring economic profit. See for example F.M.-Fisher and J.J.McGowan, "On the Use and Misuse of Accounting Rates of Return to Infer Monopoly Profits," American Economic Review 73.

[2]See Demsetz, "Industry Structure, Market Rivalry and Public Policy," and "Two Systems of Belief About Monopoly," Brozen, Concentration Mergers and Public Policy andSmirlock, "Evidence on the (Non) Relationship Between Concentration and Profitability in Banking," Journal of Money Credit and Banking 17 (1985) for discussions and applications of this technique.

The traditional model suggests that concentration will be positively related to higher prices. In this thesis, I apply the second technique. I examine the effects of bank market concentration and banks' market shares on the rates banks charge for new and used car loans, first and second mortgages, and personal loans.

This dissertation is not the first work which addresses this issue. However, this dissertation does improve upon previous research regarding the effect of bank market structure on banking performance. This dissertation addresses two major shortcomings of previous studies relating rates on bank loans to bank market structure -- inadequate data and failure to account for the simultaneity of bank portfolio and pricing decisions.

Most previous studies have used proxies for loan rates rather than using actual loan rate data.[1] A typical proxy was interest and fees from loans (obtained from bank income statements) divided by total loans outstanding (obtained from bank balance sheets). This was often used as a proxy for the interest rates charged for loans. Unfortunately, this ratio reveals very little about the actual rates a bank may be charging and how these rates differ from similar banks' in less concentrated markets.

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[1] See R.A.Gilbert, "Bank Market Structure and Competition: A Survey", Journal of Money Credit and Banking 16 (November 1984): 617 - 645, for a review of the literature.Also see Chapter 2 of this dissertation.

There are two reasons to expect very low correlation between these proxies and true interest rates charged.

First, this ratio is a function of a multitude of variables besides the actual interest rates charged for loans. For example, this ratio is very sensitive to the timing and composition of a bank's loan originations. Total revenues from interest and fees will be much higher for a bank which originated a large percentage of its loans during a period of high interest rates such as the early 1980s than they will be for a bank which is identical in all respects except for having booked most of its loans during a period of relatively low interest rates.

Second, proxies lump many bank outputs together into broad categories and attempt to measure price differences for these fictional products. The level of disaggregation of bank products has varied from study to study, but, as an example, consider new versus used car loans. None of the price proxy studies would have disaggregated to such a fine extent as to differentiate between these two types of loans. However, a bank which has a higher ratio of used car loans to new car loans would be expected to have a higher ratio of interest and fee revenue to total loans than an otherwise identical bank because used car loans carry higher interest rates than new car loans. The ratio is neither a measure of the price of new car loans, the price of used car loans nor the price of anything else. Because of the low correlation between the

price proxies and true loan rates, parameter estimates from the price proxy studies were imprecise.[1]

Parameter estimates in previous studies may have been biased due to analysts' failure to incorporate the simultaneity of bank decision making into their methodology. Researchers often included portfolio composition variables (e.g.the loan to deposit ratio and the ratio of time deposits to total deposits) among the explanatory variables in OLS regressions with some interest rate or interest rate proxy as the dependent variable.[2] However, if the bank is a multiproduct firm, it simultaneously determines its portfolio composition and interest rates.(Determination of interest rates charged for loans and paid for deposits is equivalent to determination of quantity of loans to supply and quantity of deposits to purchase if one assumes invertible loan demand and deposit supply functions.) The quantities of the various types of loans to supply and deposits to purchase may be made simultaneously because of joint production technologies, i.e.the sharing of inputs (for example, information about individuals' credit worthiness or bank office space or

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[1] See J.Haslem and W.Longbrake, "A Note on Average Interest Charges on Bank Loans, the Loan Mix, and Measures of Competition", Journal of Finance 26 (March 1971): 1207-16, for a discussion of the shortcomings of balance sheet variables as proxies for prices in commercial banking structure-price studies.

[2] See R. A. Gilbert, "Bank Market Structure and Competition: A Survey" for further references and a discussion of such studies. Also see Chapter 2 of this dissertation.

simply tellers) among separate outputs; therefore, banks may set rates and determine asset composition simultaneously.[1] The portfolio composition variables which many previous researchers included among the regressors in OLS estimations, may themselves have been endogenous variables in a system of equations.[2]

I have avoided both of these problems in this dissertation. First, I use data on actual rates charged by banks rather than proxies for these rates. Second, I have not used bank balance sheet variables as explanatory variables. In this dissertation, I also test for critical concentration ratios affecting bank loan rate setting. That is, I test for a binary effect of concentration on rates -- rates being higher in markets greater than some critical level but not necessarily increasing continuously with concentration. I estimate critical concentration levels using maximum likelihood analysis and evaluate the effect of concentration above the critical levels on loan rate setting. I also evaluate the likelihood of a critical concentration level at HHI=1800, the implicit critical concentration level adopted by bank regulators.

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[1] See A. Adar, T. Agmon and Y. Orgler, "Output Mix and Jointness in Production in the Banking Firm," Journal of Money Credit and Banking 7 (May 1975): 235-243.

[2] See H.Theil, Principles of Econometrics (New York: John Wiley and Sons, 1971) for a discussion of bias in coefficient estimates due to endogeneity of the regressors.

Although the use of prices marks an improvement over many previous banking SCP studies, the reader should note the power of reduced form rate regressions as tests of the traditional paradigm is rather low. That is, there is a high probability of type two error -- mistakenly failing to reject the null hypothesis that concentration does not facilitate collusion. The power is low because banks may exercise their monopoly power through pricing of services which this study does not consider. For example, banks may exercise monopoly power not by raising loan rates, but rather by paying lower deposit rates. Additionally, the concentration coefficient may be insignificant because banks exercise monopoly power by choosing a safer portfolio rather than by raising rates.

Another caveat, the rates used in this analysis are themselves proxies for banks' expected price net of default. Some people do not pay back their debts in full. Presumably, the expected price net of default is the price of interest to bankers and the price colluding bankers would attempt to manipulate. I assume the expected price net of default equals the price I observe plus a stochastic (negative mean) error. $[E(p)=p_{observed} + e.\ E(e)<0]$. The existence of this error diminishes the efficiency of the estimation procedure and may introduce bias if e is correlated with the explanatory variables in the regression model. This error will be correlated with the explanatory variables in the regression model if banks exercise

monopoly power derived from concentrated markets by choosing a safer portfolio rather than by raising rates.

Finally, reduced form regressions' likelihood of yielding insignificant concentration coefficients increases as the market definitions implicit in the analysis stray from the true market definitions. The analysis contained herein accepts the local geographic markets supplied by the Federal Reserve System. This follows previous studies. This research also assumes that a mortgage loan, unsecured personal loan, or car loan originated by a commercial bank differs from such a loan originated by a mortgage company, finance company or automobile financing company. I discuss the question of whether commercial bank loans differ from thrift loans from the consumer's perspective in greater detail in later chapters. I have assumed that commercial bank output of the services being considered defines economically relevant product markets in order to be consistent with previous research and because this assumption underlies federal regulation of commercial bank mergers. I realize this assumption may be especially unrealistic for new car loans given that the acceptance corporations associated with the automobile manufacturers are major competitors in providing new car loans. (Surprisingly, the strongest evidence in this dissertation supporting the SCP concerns the effect of commercial banking concentration on new car loan rate setting.)

The reader should also be aware that the results of SCP tests like that presented within this dissertation may be misinterpreted. The SCP test contained within this dissertation is basically reduced form estimation of Equation 1 below.

Eq.1: $p_{i,t} = p_{i,t}(X_{i,t}, Con_{i,t}, e_{i,t})$

Here $p_{i,t}$ represents the ith firm's price in period t. $X_{i,t}$ represents a vector of control variables, and $e_{i,t}$ is an error term. Of course, $Con_{i,t}$ represents concentration in the ith firm's market in period t. A positive, statistically significant, concentration coefficient is interpreted as supportive of the hypothesis that monopolistic conduct increases with market concentration.

Bresnahan voices concerns about such an interpretation of a significant concentration coefficient[1]. The crux of his objection is that such an interpretation assumes concentration enters the reduced form only through monopolistic conduct and not elsewhere. Although Bresnahan does not suggest demand is a function of concentration, he does argue that cost may be correlated with concentration. For example, factor prices may be

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[1] T. F.Bresnahan, "Empirical Studies of Industries with Market Power", forthcoming in Handbook of Industrial Organization, R. Schmalensee and R.D. Willig eds. (Amsterdam: North Holland Press 1989).

higher in concentrated markets. Alternatively, the applicable technology may be less efficient in concentrated markets.

The possibility of undetected positive correlation between cost and concentration hinders proper interpretation of regressions of equations like Eq.1. If costs are positively correlated with concentration, then a statistically significant concentration coefficient should be expected from the regression even if monopolistic conduct were invariant with respect to concentration. Prices will be higher in concentrated markets because costs are higher in such markets and not necessarily because monopolistic conduct is more prevalent in such markets. Alternatively, if costs are negatively correlated with concentration then, the power of our test is substantially reduced. That is, the probability of failing to reject the null hypothesis in cases in which the null hypothesis is false increases. Concentration's effect on cost and its effect on pricing behavior are at odds. Although greater concentration implies greater deviation of price from marginal cost, concentration's impact on prices may be obscured because costs are lower in concentrated markets.

Failure to address Bresnahan's criticism weakens the concentration coefficient's value as an indicator of the validity of the SCP paradigm. Most researchers are cognizant of at least some variants of this criticism and design their models to mitigate the force of Bresnahan's

argument. Some researchers have tested for failures by firms in concentrated markets to minimize costs.[1] Typically, researchers who accept cost minimization include in their regressions those factor prices and other cost shifting variables which they believe may be correlated with concentration.[2] I do the same in this dissertation. I assume cost minimization by all banks in all markets, and I include in the regressions cost shifting variables which may be correlated with concentration.

Thus far I have discussed how this dissertation addresses the question of whether commercial banking mergers and acquisitions harm society. Now I will discuss how this dissertation addresses the question of whether commercial banking mergers and acquisitions harm bidders' shareholders. I will also discuss how it tests one explanation for mergers and acquisitions which do harm bidders' shareholders.

Much inter-industry research has suggested that mergers and acquisitions are zero net present value investments for bidding firms. The most recent commercial banking evidence suggests that M&A is actually a losing proposition on average for acquiring firms. There is little, if any, evidence that acquisitions are a good thing

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[1] I refer here to the expense preference literature. For example, C. Glassman and S.Rhoades, "Owner vs.Manager Control Effects on Bank Performance," Review of Economics and Statistics 62, (May 1980): 263-70.

[2] See Chapter 2 of this dissertation for a review of the literature.

for acquiring firms' shareholders. These results lead naturally to the question of why managers undertake acquisitions in the first place.

In Chapter 7, I perform an event study to see whether commercial banks' shareholders generally gained or lost in 87 bank acquisition in the late 1980s. I then use the results from the event study to test a specific explanation for acquisitions which reduced shareholder wealth. I test the hypothesis that managers undertake acquisitions for their own benefit despite expected losses for shareholders. If this hypothesis is true, there should be a positive relationship between management shareholding and abnormal returns from acquisition announcements. As management shareholding increases, management's share of the losses associated with "bad" acquisitions increases. One would expect fewer cases of shareholder wealth reducing acquisitions among firms with high management shareholding than among firms with less management shareholding.

To test this theory, I collected data on management shareholding for the 87 firms involved in the event study. I performed nonparametric tests of independence between management shareholding and abnormal returns. I also performed logit and probit analyses to see whether management share of outstanding stock affected a bank's probability of engaging in shareholder wealth reducing acquisitions.

To summarize, this dissertation contributes to our understanding of the consequences commercial banking mergers and acquisitions. First, this dissertation tests the applicability of the SCP model to the commercial banking industry. I extend previous work which has asked whether commercial banking mergers and acquisitions harm society. I use a structure/price rather than a structure/profit model. This allows a test of the traditional SCP model while retaining immunity to the efficient firms criticisms. I use actual price data as opposed to price proxies. Use of prices rather than proxies increases the efficiency of the estimation by eliminating much measurement error in the dependent variable. This work does not include endogenous variables among the regressors in OLS equations. Many previous tests of the applicability of the SCP to commercial banking included endogenous balance sheet variables among the regressors thereby biasing their results. This dissertation also extends previous work investigating the winners and losers in commercial bank mergers and acquisitions. This dissertation contains the first test of the hypothesis that many commercial banking mergers and acquisitions are instances of self-serving managers' sacrificing shareholder wealth for their own gain.

As a guide to the remainder of this work, Chapter 2 summarizes the history and current status of federal regulation of commercial bank mergers and bankholding

company acquisitions. In addition to its obvious relevance to a study of the consequences of commercial banking M&A, the regulations are also important because they influenced my decision to examine the impact of commercial banking concentration alone on rate setting (as opposed to constructing concentration measures which included output by other financial services firms). Chapter 3 is a review of the bank market structure/bank performance literature. Chapter 4 describes the data and variables used in this dissertation's SCP empirical analysis. Chapter 5 is an empirical analysis of the applicability of the linear SCP model to commercial bank loan rate setting. Chapter 6 explores the variant of the SCP paradigm in which concentration affects prices discontinuously. Chapter 7 contains an event study of commercial banking acquisition announcements and analysis of the relationship between abnormal returns surrounding acquisition announcements and management shareholding. Chapter 2 summarizes the history and current status of federal bank merger regulation. In the final chapter of this dissertation, I offer some concluding remarks.

Chapter 2: Federal Bank Merger Regulation

A. Current Bank Merger Regulation and Its Historical Development

Federal regulation of commercial banking mergers and acquisitions is directly related to all of the empirical work reported in this dissertation. In this chapter, I synopsize federal bank merger regulation, sketch its historical development and discuss current patterns of enforcement.

The primary laws affecting bank mergers and bank market concentration are the Sherman Act[1], the Clayton Act[2], the Bank Merger Act[3], and the Bank Holding Company Act[4]. Section 2 of the Sherman Act makes monopolization and attempted monopolization of any line of commerce, including commercial banking, a felony. All commercial banks are subject to Section 2 of the Sherman Act. Section 7 of the Clayton Act bars any acquisitions or mergers the effect of which may be "substantially to lessen competition, or to tend to create a monopoly." State chartered commercial banks which are not insured by the

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[1] 26 Stat. 209 (1890), as amended, 15 U.S.C.A. Sections 1-7 (1980).

[2] 38 Stat. 730 (1914), as amended, 15 U.S.C.A. Sections 12-27 (1980).

[3] 12 U.S.C.A. Section 1828 (1966).

[4] 12 U.S.C.A. Sections 1842 and 1849 (1966).

Federal Deposit Insurance Corporation are subject to Section 7 of the Clayton Act. All other commercial banks are federally regulated. The Bank Merger Act and the Bank Holding Company Act subject mergers and acquisitions involving federally regulated banks to restrictions similar to those in Section 7 of the Clayton Act.

The Bank Merger Act and the Bank Holding Company Act vest the banking agency which would be the primary regulator of the resulting institution[1] with authority to approve or deny bank merger applications or proposed Bank Holding Company acquisitions. The Acts direct the banking agencies to deny merger applications and Bank Holding Company acquisition proposals which would "result in a monopoly" or further a monopoly. The Acts also direct the agencies to deny proposals, the effect of which "may be substantially to lessen competition, or to tend to create a monopoly...unless it finds that the anticompetitive effects of the proposed transaction are clearly outweighed in the public interest by the probable effect of the transaction...In every case, the responsible agency shall take into consideration the financial and managerial resources and future prospects of the existing and proposed

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[1] The Comptroller of the Currency is the primary federal regulator for nationally chartered banks. The Federal Reserve Board of Governors is the primary regulator for state chartered, Federal Reserve member banks. The Federal Deposit Insurance Corporation is the primary regulator for state chartered, insured, non-member banks.

institutions, and the convenience and needs of the community to be served."

Federal regulators may approve commercial bank mergers and acquisitions which may tend to lessen competition if those mergers or acquisitions serve the public interest by contributing to the safety and soundness of the banking system or the convenience and needs of the community served. The Bank Merger Act and the Bank Holding Company Act also state that "in any judicial proceeding attacking a merger transaction approved (by the appropriate federal regulatory agency)... on the ground that the merger transaction alone and of itself constituted a violation of any antitrust laws other than Section 2 of Title 15 (the Sherman Act), the standards applied by the court shall be identical with those that the banking agencies are directed to apply under paragraph (5)." In other words, the courts must also consider the convenience and needs of the community when judging commercial banking antitrust disputes involving federally regulated commercial banking organizations. The Acts may shield the commercial banking industry from government sanctions against monopolies and monopolization in cases where the monopoly or monopolization better serves the banking needs of the community than the relevant alternative.

The Bank Merger Act of 1960 begins the discussion of the historical development of bank merger regulation. Congress passed the Bank Merger Act of 1960 against a

backdrop of growing public concern about increasing concentration within the commercial banking industry and uncertainty within the legal community regarding the applicability of Section 7 of the Clayton Act to commercial bank mergers. The Bank Merger Act directed the bank regulatory agency handling a merger to "...take into consideration the effect of the transaction on competition (including any tendency toward monopoly), and not approve the transaction unless, after considering all of such factors, it finds the transaction to be in the public interest." The Bank Merger Act directed the regulators to assess the effects of bank mergers and bank holding company acquisitions on the public interest and approve or deny transaction applications based upon this assessment. The regulators were to consider the convenience and needs of the communities served and the safety and soundness of the banks involved in the transaction when assessing the public interest. This differs from the circumstances which would pertain if Section 7 had applied to bank mergers. Neither "safety and soundness" nor "convenience and needs" would have mitigated a tendency toward monopoly in the eyes of the courts. The Bank Merger Act of 1960 also kept banking merger regulation within the purview of the federal banking agencies, assigning the Department of Justice a mere advisory role. This Justice Department role may be contrasted against the primary role it would have played if banks were subject to Section 7 of the Clayton Act. In that

case, the Department could file suit to block mergers it felt were anticompetitive.

The Supreme Court decision in U.S.v.Philadelphia National Bank [1] effectively nullified the Bank Merger Act of 1960. Among other things, the Court ruled that Section 7 of the Clayton Act applied to commercial bank mergers. Although banking regulatory agencies would weigh "safety and soundness" of the banking system and "convenience and needs" of the community served against a tendency toward monopoly under the Bank Merger Act of 1960, the Justice Department and the courts would focus solely on competitive issues under Section 7 of the Clayton Act.

Philadelphia National Bank and Girard Corn Exchange Bank, the potential merger partners in the Philadelphia National Bank case, were the second and third largest of the 42 commercial banks with head offices in the Philadelphia metropolitan area in 1961. They agreed to merge, sought and received approval from the Comptroller of the Currency, and subsequently faced suit brought by the Justice Department charging violation of the Sherman Act and Section 7 of the Clayton Act. The merger was upheld in District Court, but the Supreme Court reversed the District Court decision. The Supreme Court determined the merger was forbidden under Section 7 of the Clayton Act.

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[1] U.S. v. Philadelphia National Bank, 374 U.S.321 (1963)

The Philadelphia National Bank decision is a watershed in federal bank merger regulation, not only because the Court subjected commercial bank mergers to the Clayton Act's restrictions, but also because it defined commercial banking as the relevant line of commerce under the Act and the local area (meaning town, county, SMSA, or city as opposed to state, region or nation) as the relevant area of the country. The decision is also important as an expression of the Supreme Court's view that concentration is bad unless proven otherwise, i.e.the Supreme Court's subscription to the SCP paradigm.

I quote Mr.Justice Brennan for the Court's opinion regarding the relevant line of commerce in the Philadelphia National Bank case: "We agree with the District Court that the cluster of products (various kinds of credit) and services (such as checking accounts and trust administration) denoted by the term 'commercial banking' composes a distinct line of commerce. Some commercial banking products or services are so distinctive that they are entirely free of effective competition from products or services of other financial institutions; the checking account is in this category. Others enjoy such a cost advantage as to be insulated within a broad range from substitutes furnished by other institutions. For example, commercial banks compete with small loan companies in the personal-loan market; but the small-loan companies' rates are invariably much higher than the banks', in part, it

seems, because the companies' working capital consists in substantial part of bank loans. Finally, there are banking facilities which, although in terms of cost and price they are freely competitive with the facilities provided by other financial institutions, nevertheless enjoy a settled consumer preference, insulating them, to a marked degree, from competition; this seems to be the case with savings deposits. In sum, it is clear that commercial banking is a market 'sufficiently inclusive to be meaningful in terms of trade realities.'"

Congress responded to the Philadelphia National Bank decision by amending the Bank Holding Company Act and the Bank Merger Act in 1966. The amended Bank Merger and Bank Holding Company Acts expand the Justice Department's role in merger regulation relative to the advisory position explicitly defined in the Bank Merger Act of 1960. However, they reduce the Department's role relative to the primary role implicitly defined by the Philadelphia National Bank decision. The amended Acts require the banking agencies to notify the Justice Department of approved proposals. The Act then allows the Department 30 days to initiate a challenge to the proposal pursuant to Section 7 of the Clayton Act or forever forfeit the right to challenge the proposal under Section 7. [Of course, the Department may subsequently challenge for violation of Section 2 of the Sherman Act.] Furthermore, the Acts direct the courts to

consider the convenience and needs of the community when judging commercial banking antitrust disputes.

Thus, the Sherman Act, the Clayton Act, the Bank Holding Company Act, the Bank Merger Act and the Philadelphia National Bank decision are the core of current bank merger regulation. The Sherman Act bars monopolies. Philadelphia National Bank brought banks under the purview of Section 7 of the Clayton Act, defined commercial banking as the relevant line of commerce and defined markets as local. The two banking acts vested the banking agencies and the Department of Justice with authority to enforce antitrust statutes applicable to federally regulated commercial banking. The acts also directed the courts and the enforcement agencies to consider the safety and soundness of the banking institutions involved as well as the convenience and needs of the communities served when making antitrust decisions.

Of lesser note, so far as commercial bank merger regulation is concerned, are the Supreme Court cases U.S.-v.Phillipsburg NationalBank and Trust Company[1] and U.S.v.-Connecticut National Bank[2]. Also noteworthy, but not as overreaching as the "core" decisions and acts, are the Depository Institutions Deregulation and Monetary Control

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[1] 399 U.S.350 (1970).

[2] 418 U.S.656 (1974).

Act of 1980[1] and the Garn-St.Germain Depository Institutions Act of 1982[2]. The two court cases are reaffirmations of the cluster of services as the relevant line of commerce. The two acts blurred the regulatory (and consequently the economic) distinctions between commercial banks and thrifts thereby diminishing the plausibility of the commercial banking cluster of services as an economically relevant line of commerce.

In U.S.v.Phillipsburg National Bank and Trust Company, the Supreme Court overturned a District Court decision that the appropriate line of commerce consisted of checking accounts, savings accounts, certificates of deposit, personal loans, consumer installment loans, and commercial and industrial loans; but excluded home mortgage loans. The Court stated the cluster of services was the line of commerce and explicitly rejected subgroups within the cluster as relevant lines of commerce.

In U.S.v.Connecticut National Bank, the Court again overturned a District Court and emphasized the cluster of services as the relevant line of commerce. The District Court had found that the "cold, hard, realities are that savings and commercial banks are fierce competitors in this state."[3] The District Court cited comparable portfolio

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[1] Pub.L. 96-221.

[2] Pub.L.97-320.

[3] U.S. v. Connecticut National Bank, 362 F.Supp.240 (D.Ct.1973).

compositions and earnings between savings banks and commercial banks and allowed savings bank competition to be included in the analysis of the competitive effects of the proposed consolidation. The Supreme Court disallowed this inclusion stating that commercial banks continued to provide a cluster of services savings banks could not, particularly with regard to commercial customers.

The Depository Institutions Deregulation and Monetary Control Act eliminated deposit rate ceilings for commercial banks and thrifts, thereby eliminating the statutorily imposed higher interest rates for savings accounts at thrifts versus commercial banks. The Act also empowered thrifts to offer NOW accounts and expanded the power of federally chartered savings and loan associations. The Garn-St.Germain Act of 1982 further eased thrifts' lending restrictions. These Acts narrowed the differences among commercial banks, thrifts and other financial service providers. This further diminished the economic relevance of commercial banking as a line of commerce.

B. Enforcement Behavior

The banking agencies and the Department of Justice in recent years have tended to allow mergers and acquisitions which would raise any market's HHI number, constructed from commercial bank deposits, by less than 200

points or to a level below 1800. If a proposal raises a market's HHI number by more than 200 points to a level above 1800, the agency will apply some thrift inclusion method to construct the HHI and reapply the 1800/200 test. For example, the Federal Reserve Board of Governors will include 50% of thrift deposits.[1]

If the proposal fails the second test also, the regulator is likely to deny the proposal. If the proposal passes either test, no regulator is likely to deny the proposal for competitive reasons. Even if the proposal fails both tests, the applicants may rewrite the proposal to include divestiture of branches to eliminate the competitive concerns. By divesting branches as part of the merger process, the applicants can often insure the proposal would not raise any market HHI numbers by more than 200 points to a level in excess of 1800.

The Department of Justice reviews all proposals approved by the banking agencies. Like the banking agencies, the Department performs the 200/1800 test for each relevant market. If the proposal fails using commercial bank deposits only, the Department repeats the

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[1] The Federal Reserve Bank of Boston, in its analysis supporting its recommendations to the Federal Reserve Board of Governors of approval or denial of proposals, analyzes each thrift in markets for which a proposal raises competitive concerns. The Federal Reserve Bank determines how well each thrift competes with banks for commercial and industrial business and accordingly discounts that thrifts deposits to construct the market HHI numbers. This method could theoretically lead to 100% thrift inclusion for a market. See Warren Tam, Christopher Arnold and Beth Lewis, Banking Structure in New England, 1987, Federal Reserve Bank of Boston, Research Report 70.

procedure constructing the HHI numbers from both commercial bank deposits and thrift deposits counted at 20% of their dollar value. If the proposal passes the 200/1800 test in all markets, using either commercial bank deposits only or including 20% of thrift deposits, the Department is unlikely to challenge the merger on competitive grounds.

Appendix to Chapter 2

Excerpts From Antitrust Regulations Affecting Banks

Clayton Act[1] Section 7:

"No person engaged in commerce or in any activity affecting commerce shall acquire, directly or indirectly, the whole or any part of the stock or other share capital and no person subject to the jurisdiction of the Federal Trade Commission shall acquire the whole or any part of the assets of another person engaged also in commerce or in any activity affecting commerce, where in any line of commerce in any section of the country, the effect of such acquisition may be substantially to lessen competition, or to tend to create monopoly.

No person shall acquire . . . the stock or other share capital and no person subject to the jurisdiction of the Federal Trade Commission shall acquire the whole or any part of the assets of one or more persons . . . where . . . the effect of such acquisition . . . may be substantially to lessen competition, or to tend to create a monopoly."

Sherman Act[2] Section 2:

"Every person who shall monopolize, or attempt to monopolize, or combine or conspire with any other person or

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[1] 15 U.S.C.A. Sections 12-27 (1980).

[2] 15 U.S.C.A. Sections 1-7 (1980).

persons, to monopolize any part of the trade or commerce among the several States, or with foreign nations, shall be punished by fine not exceeding one million dollars if a corporation, or, if any other person, one hundred thousand dollars or by imprisonment not exceeding three years, or by both said punishments, in the discretion of the court."

Bank Merger Act[1]:

"The responsible agency shall not approve - (A) any proposed merger transaction which would result in a monopoly, or which would be in furtherance of any combination or conspiracy to monopolize or to attempt to monopolize the business of banking in any part of the United States or (B) any other proposed merger transaction whose effects in any section of the country may be substantially to lessen competition, or to tend to create a monopoly, or which in any other manner would be in restraint of trade, unless it finds that the anticompetitive effects of the proposed transaction are clearly outweighed in the public interest by the probable effect of the transaction in meeting the convenience and needs of the community to be served.

In every case, the responsible agency shall take into consideration the financial and managerial resources and future prospects of the existing and proposed

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[1] 12 U.S.C.A. Section 1828(c)

institutions, and the convenience and needs of the community to be served."

Chapter 3: The Commercial Banking SCP Literature

That concentration should lead to increases in prices was a direct conclusion of the predominant beliefs in the 1960's regarding oligopolistic behavior. A large number of studies, mostly inter-industry, attempted to identify this concentration-performance relationship empirically.[1] Much work has also been done to document an SCP relationship in commercial banking. Before reporting the results of the SCP test conducted for this dissertation, it is useful to review the existing commercial banking SCP literature.

Schweiger's work[2] heralded a wave of studies attempting to identify a positive relationship between market structure and performance in the commercial banking industry. Review of each study in detail here would be unnecessary. Certain general criticisms apply to many of these studies. The following exposition relies heavily on reviews of the literature by Gilbert[3] and Heggestad[4].

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[1] See L. Weiss, "The Concentration-Profits Relationship and Antitrust," in Industrial Concentration: The New Learning (Boston: Little, Brown and Company, 1974) for a review of much of the early literature.See R. Schmalensee, "Inter-Industry Studies of Structure and Performance," in Handbook of Industrial Organization, R. Schmalensee and R.D. Willig eds. (Amsterdam: North Holland Press 1989) for a more recent literature survey.

[2] See I. Schweiger and J. McGee, "Chicago Banking," Journal of Business 34 (July 1961): 203-366.

[3] R. A. Gilbert, "Bank Market Structure and Competition: A Survey,".

Many previous banking structure performance studies were OLS estimates of the following:

Eq.1: $p=a + b*Cr + c' [D\ C\ dummies] + e$

Where:

p = price of a banking service

Cr = some measure of market concentration

D = vector of variables included to capture variations in demand

C = vector of variables included to capture variations in costs

dummies = vector of binary variables included to account for variations in regulatory environment

One problem with this approach is data availability. Although balance sheet and income statement data are available from the Report of Condition which each bank covered by the FDIC must report to that agency, explicit price data for different types of accounts offered by banks is much harder to come by. Many researchers have responded by constructing price proxies from information available from the Report of Condition. Such proxies are of the form (total interest and fees on loans)/(total loans) for interest charged for loans, or (total service charges

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[4] A. Heggestad, "A Survey of Studies on Banking Competition and Performance," in Issues in Financial Regulation, ed. F. Edwards (New York: McGraw Hill 1979).

on demand deposits)/(number of demand deposit accounts) for service charges on demand deposit accounts, or (total interest paid on time deposits)/(total time deposits) for interest rate paid for demand deposit.

Haslem and Longbrake wrote of some of the problems with use of performance variables of this kind in 1971,[1] yet use of these proxies continues. Use of average service charges ignores the fact that banks typically offer a schedule of charges dependent upon account activity, minimum and daily balances. Banks do not typically offer one price for all demand deposit accounts.

Osborne and Wendel[2] tested the accuracy of three demand deposit service charge proxies as predictors of actual demand deposit service charges of a sample of 154 Texas banks. Osborne and Wendel defined price as a function of number of transactions per period under the assumption that for any number of transactions the customer chose an average balance to minimize the sum of explicit service charges and the implicit foregone interest on the average balances. (At the time of the study, payment of interest on demand deposits was prohibited.) The typical number of transactions for accounts within the sample was 20, so Osborne and Wendel chose the price for an account with 20

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[1] J. Haslem and W. Longbrake, "A Note on Average Interest Charges on Bank Loans, The Loan Mix, and Measures of Competition".

[2] D. Osborne and J. Wendel, "A Note on Concentration and Checking Account Prices," Journal of Finance 36 (March 1981): 181-6.

transactions per period to compare with the price proxies. Proxy 1 was (total service charges)/(total demand deposits). Proxy 2 was (total service charges)/(number of demand deposit accounts). Proxy 3 was actual service charge under the assumption of 20 transactions per month and average balances of $100 per month. Clearly Proxy 3 is the best of the group, however $100 per month may not be the price minimizing balances for 20 checks per month.

Osborne and Wendel found the correlation coefficient between their actual prices and the first two proxies to be not statistically different from zero. The correlation coefficient for the third proxy was 0.42 with a 99% confidence interval [0.22, 0.57]. Proxy 3 explained at most 1/3 of the variations in actual prices.

Use of average interest and fees from loans as a proxy for true loan rates is also problematical. Average figures are dependent upon the banks' asset composition. Different rates will be charged for different types of loans depending upon the associated risks and monitoring costs. Banks offering identical prices may have different average interest and fee levels merely because of difference in their loan portfolios. Moreover, the same bank offering the same range of services at the same prices from year to year would be likely to have a different ratio of interest and fees from loans to total loans from year to year. The use of this proxy is especially worrisome in studies attempting to determine the effect of concentration

on bank pricing because of results from Mingo[1] suggesting the riskiness of a bank's loan portfolio increases with the degree of concentration in the market in which it operates. Since a riskier loan usually requires a greater interest payment, concentration will appear to affect price even without differences in pricing among firms in more or less concentrated markets. (As previously mentioned, correlation between concentration and default risk may also bias the parameter estimates in Chapters 5 and 6 of this dissertation.)

Another problem with those studies which regressed demand deposit service charge proxies on concentration, was inclusion of the ratio of demand deposits to total deposits among the regressors. Presumably this ratio is endogenous. Higher service charges, all else constant, imply lower demand deposits to total deposits ratios. This is a violation of the OLS assumptions. Similarly, many researchers improperly included loan to deposit ratios among the explanatory variables when some proxy for rate charged on loans was used as the independent variable. Higher loan rates imply lower loan to deposit ratios.

Another concern regarding the "proxy price" studies are the samples. The researchers had to apply a single concentration ratio to each bank. Therefore, they had to

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[1] J. Mingo, "Managerial Motives, Market Structure, and the Performance of Holding Company Banks," Economic Inquiry 14 (September 1976): 411-24.

restrict their samples to banks which operated in only one local geographic market. Single market banks are not representative of the universe of banks.

Criticisms notwithstanding, do the "proxy price studies" support the traditional structure performance view? No these studies do not consistently support the SCP. Nineteen such studies were surveyed by Gilbert. Of those nineteen, only four showed a significant effect (Significant is defined throughout as having a t-statistic greater than 1.96 in absolute value unless noted otherwise.) of concentration on all price variables considered in the study (Edwards[1], Kaufman[2], Savage and Rhoades[3], Rhoades and Rutz[4]). Of these four, Savage and Rhoades found a significant negative effect of concentration on average service charge for demand deposits, the opposite effect of that expected. Whitehead[5], who was not among the four finding a

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[1] F. Edwards, "The Banking Competition Controversy," National Bank Research 3 (September 1965): 1-34.

[2] G. Kaufman, "Bank Market Structure and Performance," Southern Economic Journal 32 (April 1966): 429-39.

[3] D. Savage and S. Rhoades, "The Effect of Branch Banking on Pricing, Profits, and Efficiency of Unit Banks," in Bank Structure and Competition (Chicago: Federal Reserve Bank of Chicago, 1979), 187-96.

[4] S. Rhoades and R. Rutz, "Impact of Bankholding Companies on Competition and Performance in Banking Markets," Staff Economic Studies No. 107, Board of Governors of the Federal Reserve System (1979).

[5] D. Whitehead, "Holding Company Power and Market Performance: A New Index of Market Concentration," Working Paper Series, Federal Reserve Bank of Atlanta (December 1977).

significant effect for all prices, also found a significant negative effect of concentration on the ratio of interest and fees on loans to total loans. This too contradicts expectations.

Fifteen of the "proxy price studies" did not find concentration significantly affected all price variables tested. Seven of these fifteen (Klein and Murphy[1], Fraser and Rose[2], Ware[3], Fraser and Alvis[4], Fraser and Rose[5], Graddy and Kyle[6], Osborne and Wendel[7]) found an insignificant effect of concentration on all price variables tested. The remaining eight studies found a significant effect for some price proxies and an insignificant effect for others.

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[1] M. Klein and N. Murphy, "The Pricing of Bank Deposits: A Theoretical and Empirical Analysis," Journal of Financial and Quantitative Analysis 6 (March 1971): 747-61.

[2] F. Fraser and P. Rose, "Banking Structure and Performance in Isolated Markets: The Implications for Public Policy," Antitrust Bulletin 17 (Fall 1972): 927-47.

[3] R. Ware, "Banking Structure and Performance: Some Evidence from Ohio," Federal Reserve Bank of Cleveland Economic Review (March 1972): 3-14.

[4] D. Fraser and J. Alvis, "The Structure Performance Relationship in Banking: A Dichotomous Analysis," Review of Economic and Business Research 11 (Fall 1975): 35-57.

[5] D. Fraser and P. Rose, "Static and Dynamic Measures of Market Structure and the Performance of Commercial Banks," Journal of Economics and Business 28 (Winter 1976): 79-87.

[6] D. Graddy and R. Kyle, "The Simultaneity of Bank Decision Making, Market Structure and Bank Performance," Journal of Finance 34 (March 1979): 1-18.

[7] D. Osborne and J. Wendel, "A Note on Concentration and Checking Account Prices,".

Not all structure price studies used proxies for prices. I have identified nine studies using actual price data from surveys of banks. These studies are free of the defects previously discussed.

Edwards[1] and Meyer[2] both used data from 1955 and 1957 surveys of banks. Edwards found concentration to be significant in the determination of business loan rates according to the 1955 sample but not the 1957 sample. Meyer classified the loans by the asset size of the borrower. Concentration was significant in determining the business loan rate for three of the four borrower categories when he used the 1955 sample. Conversely, concentration was insignificant in determining business loan rates in three of the four borrower categories when he used the 1957 sample.

Fleischig[3] used data from 1955 and 1960 samples. He found the effect of market concentration on business loan rates to be insignificant for both samples.

Phillips[4] and Jacobs[5] also checked for the effect of concentration on business loan rates in 1967 and 1971

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[1] F. Edwards, "Concentration in Banking and Its Effects on Business Loan Rates," Review of Economics and Statistics 46 (August 1964): 294-300.

[2] P. Meyer, "Price Discrimination, Regional Loan Rates and the Structure of the Banking Industry," Journal of Finance 22 (March 1967): 37-48.

[3] T. Fleischig, "The Effects of Concentration on Bank Loan Rates," Journal of Finance 20 (May 1965):298-311.

[4] A. Phillips, "Evidence on Concentration in Banking Markets and Interest Rates," Federal Reserve Bulletin 6 (June 1967): 916-26.

studies respectively. Both studies concluded concentration significantly affected business loan rates. Both Aspinwall[1] in 1970 and Marlow[2] in 1982 used interest rates on residential mortgages as the price variable and both determined concentration to be a significant explanatory variable. Marlow included foreclosure rates on the right hand side of the regression to control for variations in risk. However one would expect the banking firm is trading off less risk for less return. The decision of how much risk to accept may be made simultaneously with the decision of what rate to charge. The greater the risk in the banking firm's portfolio, the greater the foreclosure rate. Hence, foreclosure rates may be endogenous. Inclusion of endogenous variables among the regressors in an OLS regression results in biased and inconsistent coefficient estimates.

The last two studies using actual price data are the studies by Heggestad and Mingo[3] in 1976 and 1977. Both

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[5] D. Jacobs, "Business Loan Costs and Bank Market Structure," National Bureau of Economic Research Occasional Paper No. 115 (1971).

[1] R. Aspinwall, "Market Structure and Commercial Bank Mortgage Interest Rates," Southern Economic Journal 36 (April 1970): 376-84.

[2] M. Marlow, "Bank Structure and Mortgage Rates," Journal of Economics and Business 34 (Spring 1982): 135-42.

[3] A. Heggestad and J. Mingo, "Prices, Non-Prices, and Concentration in Commercial Banking," Journal of Money, Credit and Banking 8 (February 1976): 107-117; A. Heggestad and J. Mingo, "The Competitive Condition of U.S. Banking Markets and the Impact of Structural Reform," Journal of Finance 32 (June 1977): 649-61.

studies used interest on new car loans as one dependent variable. Both studies found concentration significantly affected interest rates on new car loans. The 1976 study also used interest rate paid on a one year $1000 CD as a price variable and found no significant effect of concentration on price. Although the results using actual price data have been more informative than those using price proxies, doubts remain regarding the true SCP relationship.

First, such studies are scarce and their results inconsistent. I have identified only nine studies using real prices as opposed to proxies: two covered residential mortgages, one covered new car loans, one covered new car loans and CD rates, and a handful covered business loans. Taken as a whole, this set of studies reaches no conclusions. Some found a significant effect of concentration, and some did not.

Another concern is the age of the data. Of the studies mentioned, the most recent data comes from the Marlow study. The Marlow data are for 1975. None of the data cover periods after the Depository Institutions Deregulation and Monetary Control Act of 1980 (DIDMCA). The DIDMCA relaxed controls on commercial banks and thrifts, allowing thrifts to issue demand deposits and eliminating Regulation Q (Regulation Q limited the interest rates intermediaries could pay for deposits.). With a broader range of permissible bank activities and with greater

competition from thrifts, one might expect a different post DIDMCA structure-conduct-performance regime.

Also, banks offer a wider range of services than CDs, mortgages, new car loans and business loans. Not only may past research have failed to identify existing concentration conduct relationships in the product lines they examined, but they have also failed to explore all product lines for such a relationship. Granted data are not readily available for examination of each separate product banks offer, however there is room for evidence from other product lines where data are available.

Many researchers attempted to avoid these problems by investigating the effect of structure on profits rather than prices. If concentration leads to higher price cost margins, then concentration should also lead to higher profits. Many researchers attempted to verify such an effect by running the following OLS regression with a linear form:

Eq.2: rate of return = f (concentration, demand vars., cost vars., regulatory vars.,)

The concentration variable was most often a three firm concentration ratio of total deposits, although some studies used a Herfindahl Index of deposits, a one firm concentration ratio, or the number of firms in the market as the concentration measure. Deposits were used for the concentration measures for two reasons. One, deposits reflected capacity to operate in the various loan markets.

Two, deposit data are readily available. The demand variables typically included some subset of the following: average family income in the geographic bank market, change in family income in the local market over a recent sample period (to capture the effects of demand growth), per capita income in the geographic bank market, change in per capita income in the local market over a recent sample period, local market population, change in local market population, (local non-agricultural)/(total local employment), etc.,. The cost variables typically included some subset of the following: local wage index, total commercial bank deposits in the local market, and individual bank deposits. Total bank deposits and individual bank deposits were included to capture the effects of scale economies. Many studies include no variables to capture differences in wages across markets. Some studies include some liability mix variables such as (time deposits)/(total deposits) to account for differences in the cost of funds. The market is almost always defined as local SMSA or county (the lone exception is Rhoades and Savage[1]).

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[1] S. Rhoades and D. Savage, "The Relative Performance of Bankholding Companies and Branch Banking Systems," Journal of Economics and Business 33 (Winter 1981):132-141.

The samples were almost always single market banks. Once again, Rhoades and Savage[1] were the exception. Researchers had to assign a single concentration value to each bank in the sample so they had to restrict the sample to banks conducting the vast majority of their transactions in a single market. Single market banks are not necessarily representative of the universe of banks.

As with the structure-price literature, the results have been inconsistent. Of the twenty studies I have reviewed, only nine have supported the traditional SCP paradigm. That is, nine yielded a significant positive concentration coefficient in their OLS regression and eleven did not. In addition to these twenty, Gilbert surveys six more. These additional six include three which support the traditional SCP model and three which do not. Although a mere summing of the studies supports rejection of the traditional view, supporters of the SCP may highlight flaws in many of the nonsupportive studies.

Fraser and Rose[2] used data from 78 small Texas cities in 1966 and 1967. They used a one firm concentration ratio as the concentration measure. The traditional hypothesis holds that if a reasonably small group of firms

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[1] S. Rhoades and D. Savage, "The Relative Performance of Bankholding Companies and Branch Banking Systems,".

[2] D. Fraser and P. Rose, "More on Banking Structure and Performance: Evidence from Texas," Journal of Financial and Quantitative Analysis 6 (January 1971): 601-11.

taken together so dominate the market in size that they are capable of exerting market power, they will do so. Fraser and Rose defined "reasonably small" as one. Supporters of the structure-performance paradigm may argue "reasonably small" can be two, three or more. Although the one firm concentration ratio is appropriate if the underlying oligopoly model being tested is a dominant firm model, the measure is inappropriate as a concentration measure if most other collusive oligopoly models underlie the traditional hypothesis. Also, Fraser and Rose include various portfolio composition variables among their regressors. I argue below that the firm determines its portfolio composition simultaneously with its expected profit. Inclusion of endogenous portfolio composition variables among the regressors in an OLS regression results in biased and inconsistent coefficient estimates.

Vernon[1] limited his sample to large banks. His sample included 85 of the 200 largest Federal Reserve member banks. His concentration measure was a three firm concentration ratio for the SMSA of the bank's home office. Banks of this size are likely to do much of their business outside of their SMSA. Apart from the question of the general accuracy of the SMSA as the bank market is the question of its application to large banks. As the

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[1] J. Vernon, "Separation of Ownership and Control and Profit Rates: The Evidence From Banking, Comment," Journal of Financial and Quantitative Analysis 6 (January 1971): 615-25.

proportion of a bank's profits derived in product markets outside of the SMSA of its home office increases, the effect of any concentration measure which is based on this SMSA will decrease. "Local" (SMSA) concentration may enable a bank to earn economic profit on those services for which the market is local. However, as the share of these services addition to total profits decreases, the concentration coefficient in the OLS regression, with total profits as the independent variable, diminishes. Local concentration affects "local" profits which may be small relative to total profits. Vernon's results may be due to the mix of services offered by large banks rather than the nonexistence of a relationship between concentration and monopoly behavior.

Fraser and Rose[1] studied the effects of structure in small banking markets in their 1972 article. Their sample was restricted to markets with three or fewer banks, and their concentration measure was a one firm concentration measure. As argued above, many collusive oligopoly models imply collusion increases as the combined share of some number of firms greater than one increases. Fraser and Rose could not test the validity of oligopoly models in which price cost margins increase as the three firm concentration ratio (or a four firm or higher concentration

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[1] D. Fraser and P. Rose, "Banking Structure and Performance in Isolated Markets: The Implications for Public Policy," Antitrust Bulletin 17 (Fall 1972): 927-47.

ratio) increases. The three firm concentration ratio was 100% in all of their markets.

Edwards[1] was actually testing a relationship between advertising and competition in banking. In the process he regressed the advertising to sales ratio, the three firm concentration ratio, a market growth variable, the inverse of market size, and a constant on profits. The high degree of correlation between concentration and the advertising to sales ratio may explain the insignificant concentration coefficient estimate (as well as the insignificant advertising / sales ratio coefficient).

Fraser and Alvis[2] used a different approach. They used a dummy variable to signify whether a bank was in a highly concentrated market. They used a variety of dependent variables but only reported the results for some. Fraser and Alvis did not report the results with profit rate as the dependent variable except to say the concentration coefficient was insignificant with profit rate as the dependent variable. Supporters of the SCP may discount Fraser and Rose for not completely reporting their results. They may also discount their results because they arbitrarily decided the point at which a market is concentrated.

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[1] F. Edwards, "Advertising and Competition in Banking," Antitrust Bulletin 18 (Spring 1973): 23-32.

[2] D. Fraser and J. Alvis, "The Structure Performance Relationship in Banking: A Dichotomous Analysis,".

Rhoades[1] used both rate of return on equity capital and rate of return on assets as his profit measures. His dataset covered 1968, 1970, 1972, 1973, 1974, and 1975. Using a three firm concentration ratio as his concentration measure, the concentration coefficient was only significant for rate of return on equity capital and then only for 1972 and 1975. Moreover, when Rhoades added new discontinuous concentration variables, his results were even less supportive of the structure-conduct-performance paradigm. Rhoades estimated Equation 3 below.

Eq. 3: $p = a + bX + dC + fDC' + gD + e$

where

p = performance measure (ROA,ROE, price proxies)

C = Three firm concentration ratio

C'= C-75%

X = control variable matrix

D = binary variable equal to 1 if C>75%, 0 otherwise

a,b,d,f,g = parameters to be estimated

e = error term

The parameter estimates for d and g were negative with ROA and ROE as the performance measures. The parameter estimates for g were significant at the 5% level in a two tailed test, but the parameter estimates for d were not. The parameter estimates for f were significant

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[1] S. Rhoades, "Does Market Structure Matter in Commercial Banking?" Antitrust Bulletin 26 (Spring 1981): 155-81.

and positive. The cumulative estimated effect of an increase in concentration to a level above 75% was negative.

Rhoades results must be discounted because he included endogenous variables among the regressors in OLS equations. He included a variable to account for the riskiness of the bank's portfolio as one of the independent variables. The firm determines the riskiness of its portfolio and its desired profit rate simultaneously. Inclusion of a risk measure among the independent variables in an OLS regression explaining banks' rate of profit may lead to biased and inconsistent coefficient estimates.

In a 1981 study, Rhoades and Savage[1] investigated the relative performance of branching versus bank holding company expansion. They included dummy variables to distinguish between banks affiliated with bank holding companies (BHCs) and those not, as well as to distinguish between banks which operated in states allowing statewide branching, limited branching or only unit banks. Because their analysis was dependent upon statewide legal characteristics, Rhoades and Savage used the statewide three firm concentration ratio. There is no reason to believe <u>a priori</u> that state boundaries and bank product market boundaries coincide. Banks in concentrated local

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[1] S. Rhoades and D. Savage, "The Relative Performance of Bankholding Companies and Branch Banking Systems,".

markets may have made monopoly profits although the state concentration ratio was low.

Kwast and Rose[1] limited their analysis to large banks, those with deposits in excess of $500 million (their sample ranges from 1970 to 1977). The same warnings given above regarding results garnered from an exclusive sampling of large firms apply here. Kwast and Rose also included variables reflecting banks' portfolio mixes among their explanatory variables. Again, inclusion of such endogenous variables among the independent variables in an OLS regression yields biased and inconsistent coefficient estimates.

Numerical superiority is not sufficient to tilt the scales toward rejection of the traditional SCP hypothesis. However, the studies supporting the SCP hypothesis are not above reproach themselves. The following caveats and shortcomings apply to most of the literature both supporting and rejecting the traditional model.

Most of the studies have exclusively estimated linear concentration variables. However, a non-linear SCP relationship is implicit in the current commercial banking antitrust enforcement behavior.[2] As mentioned above,

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[1] M. Kwast and J. Rose, "Pricing, Operating Efficiency and Profitability Among Large Commercial Banks," Journal of Banking and Finance 6 (June 1982): 233-54.

[2] See Chapter 6 of this dissertation for more discussion of current commercial banking antitrust enforcement behavior.

Rhoades[1] tested for a discontinuous effect of concentration on loan rate setting. He hypothesized that three firm concentration greater than 75% was a critical concentration level. Heggestad and Mingo[2] also proposed the existence of a critical concentration level. They hypothesized that at this critical level and above a bank market is effectively monopolized. The banks in such markets collude so effectively as to duplicate the monopoly result. Presumably, as concentration approaches the critical level, fewer and fewer deviations from the monopoly price go unnoticed by fellow oligopolists and beyond the critical level no deviations go unnoticed. Increases in concentration beyond this critical level have no effect on the conduct and performance of a market. If such critical levels exist(ed) in bank markets, studies which used a linear concentration measure may have underestimated the impact of bank market structure on performance. Concentration would appear to be a non-factor in the markets which were effectively monopolized although it was in those markets that concentration's effect was maximal. Heggestad and Mingo used a variant of the "switching of regimes" technique to determine the critical concentration level.

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[1] S. Rhoades, "Does Market Structure Matter in Commercial Banking?".

[2] A. Heggestad and J. Mingo, "The Competitive Condition of U.S. Banking Markets and the Impact of Structural Reform.".

Their method involved estimation of Equation 4 and systematically varying C* to isolate that C* which maximized the predictive power of the OLS regression.

Eq. 4: $p = a + bX + fDC' + e$

where

p = performance measure

C = concentration as measured by Herfindahl Index

C'= C-C*

X = control variable matrix

D = binary variable equal to 1 if C < C*, 0 otherwise

a, b, f = parameters to be estimated

e = error term

Heggestad and Mingo used two price variables for determination of C*, new car loan rates and service charges on a "typical" demand deposit account. The service charge is a proxy for true service charges and subject to the warnings above. Heggestad and Mingo determined C*=0.144 for new car loans and C*=0.099 for service charges on the "typical" checking account. Applying these figures to the distribution of firms over SMSAs and non SMSA counties they draw conclusions regarding the number of effectively monopolized markets. For new car loans, 78.5% of the nation's SMSAs and 97.2% of the nations non SMSA counties were effectively monopolized. For demand deposits, 92.3%

and 99.7% of the nations SMSAs and non SMSA counties respectively were effectively monopolized.

Smirlock[1] raised another serious objection to the vast majority of structure profit studies by directing the Demsetz efficient firms criticism toward the banking structure performance literature. Smirlock suggested that more efficient firms would expand relative to the bank market and they would also earn higher profits than their competitors. Efficiency would increase both the individual bank's profits and concentration in the bank's market as the efficient bank expanded relative to its competitors. Smirlock argued that inclusion of market share in regressions basically similar to those other researchers used would allow one to distinguish between the "efficiency effect" and the "collusion effect". Exclusion of a market share variable, the practice of most of Smirlock's predecessors, would imply that the concentration variable would capture the effects of efficiency on profits. A significant concentration coefficient would not necessarily imply bank behavior which contradicted social welfare maximization. In fact, if such a result were entirely due to the "efficiency effect", it would signify that concentrated markets should be preferred by public policy makers. Concentrated markets would signal efficiency.

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[1] M. Smirlock, "Evidence on the Non-relationship Between Concentration and Profitability in Banking.".

Smirlock tested his hypothesis by regressing profits on concentration (as measured by a three firm concentration ratio), market share, and an interaction term between concentration and market share. The interaction term is important because concentration may result in economic profit for the banks in the market and the distribution of this profit among banks may be dependent upon market share. Such a possibility would be reflected in a significant coefficient for the interaction term. He also performed the regression after using the "switching regimes" technique to isolate a critical concentration ratio and using this as a nonlinear concentration measure. He consistently found that the effect of concentration on rate of profit was statistically insignificant while that of market share was significant. He also found the coefficient on the market share/ concentration interaction term to be insignificant.

Smirlock also pointed out that Glassman's and Rhoades'[1] results were consistent with the efficient firms hypothesis. Glassman and Rhoades included market share and the three firm concentration ratio in separate regressions with profit rate as the dependent variable. Including market share yielded a higher R^2 than including the concentration ratio. Smirlock noted this may indicate that

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[1] C. Glassman and S. Rhoades, "Owner Versus Manager Control Effects on Bank Performance," Review of Economics and Statistics 62 (May 1980): 263-70.

concentration is merely a proxy for market share in equations regressing rate of return on concentration. Glassman and Rhoades did not include both market share and three firm concentration as simultaneous regressors,nor did they check for interaction between the two.

Curry[1] inadvertently tested the efficient firms hypothesis also. He was testing to see if firms acquired by multi-bank holding companies tended to have been less aggressive and more risk averse before acquisition than similar banks. In the process, Curry regressed price proxies of the type discussed above on both market share and three firm concentration simultaneously. He found concentration alone to be significant with (interest and fees from loans)/(total loans) as the dependent variable. He found a significant effect for both three firm concentration and market share with (service charge revenue from demand deposits)/(total demand deposits) as the dependent variable. Finally, Curry found market share alone to be significant in explaining variations in (interest paid on deposits)/(total time and savings deposits). These results conflict with Smirlock's efficient firms hypothesis. Under his hypothesis, neither market share nor concentration ought to affect price. However, Curry's results regarding price and market structure are subject to

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[1] T. Curry, "The Preacquisition Characteristics of Banks Acquired by Multibank Holding Companies," Journal of Bank Research 12 (Summer 1981): 82-89.

the criticisms applied above to the use of proxies for prices. (Curry also used rate of return as an independent variable. In that equation , both market share and concentration were insignificant). Smirlock noted Curry's results and attributed them to the restricted nature of his sample.

Heggestad and Mingo[1] also included both market share and a concentration measure simultaneously among the regressors in their 1976 paper. They ran separate regressions using either the Herfindahl Index or the inverse of the Herfindahl Index as the concentration measure. They chose the interest rate paid on passbook savings, interest rate paid for a $1000 CD, and the new car loan rate as dependent variables. As mentioned above, concentration was significant in the case of new car loans. Market share was not a significant explanatory variable for any of the dependent variables. Heggestad and Mingo[2] also used market share as an explanatory variable in their 1977 paper which searched for a critical concentration ratio. In that paper new car loan rates and service charges on a "typical" demand deposit account were statistically significantly affected by the critical concentration measure but not by market share.The efficient

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[1] A. Heggestad and J. Mingo, "Prices, Non-prices and Concentration in Commercial Banking.".

[2] A. Heggestad and J. Mingo, "The Competitive Condition of U.S. Banking Markets and the Impact of Structural Reform.".

firms criticism is consistent with an insignificant effect of market share on rates. However, the hypothesis' proponents would generally deny a significant effect of concentration on rates. Finally, in his review of the literature, Gilbert refers to a study by Donald Brown[1] which also tested the efficient firms hypothesis and supported it over the traditional model.

Another concern regarding the results of past studies is their treatment of risk. Most studies have ignored the interrelatedness of the riskiness of a bank's portfolio and its expected profit rate. If banks in concentrated markets exercise market power by choosing less risky portfolios, the concentration coefficient in an OLS regression of equations like Equation 2 will underestimate the effects of concentration on bank behavior. The effects of concentration on risk are important in their own right also. Many of the regulations facing banks are purportedly intended to affect the risk exposure of banks. Four studies have specifically dealt with market structure and bank risk.

Edwards and Heggestad[2] found that increases in concentration led to risk avoidance. They defined two risk

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[1] D. Brown, "The Relationship Between Concentration and Profitability in the Banking Industry," Unpublished Manuscript, Federal Reserve Bank of St. Louis, (1982).

[2] F. Edwards and A. Heggestad, "Uncertainty, Market Structure, and Performance: The Galbraith-Caves Hypothesis and Managerial Motives in Banking," Quarterly Journal of Economics 87 (August 1973): 455-73.

measures R_1 = (variance of rate of return on assets over sample period)/(expected rate of return on assets) and R_2 = (sum of squared deviations of return about its trend line)/(expected return on assets). They then regressed their risk measures on the three firm concentration ratio and on some control variables and determined concentration implied less risk.

Mingo also measures the effects of concentration on risk in his 1976 paper[1]. His risk measures were various portfolio composition variables [(such as real estate loans)/(total loans), (government securities)/(total assets), etc.]. Mingo found that concentration coupled with bank holding company affiliation led to a riskier portfolio selection.

Heggestad[2] used an alternative approach in his 1977 paper. He defined risk adjusted profits to be linear function of actual profits and risk:

Equation 4: $P^* = P - bV$

where,

P^* = risk adjusted rate of return of return on assets

P = actual rate of return on assets

b = constant

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[1] J. Mingo, "Managerial Motives, Market Structure, and the Performance of Holding Company Banks."

[2] A. Heggestad, "Market Structure, Risk and Profitability in Commercial Banking," Journal of Finance 32 (September 1977): 1207-1216.

V = variance in rate of return on assets

The constant term b is a measure of the risk preference of the bank. The greater is b, the greater the degree of risk aversion by the bank.

Heggestad used two values of b to define P* and regressed P* on the standard regressors including the three firm concentration ratio as a measure of concentration. Heggestad found the concentration coefficient to be significant. He also found a higher concentration coefficient when he used a higher value for b. This study suffers in that the relationship between desired profits and risk need not be of the linear form specified. Also, the hypothesis proposed in the previous paper by Edwards and Heggestad and in the paper by Mingo was that firms in concentrated markets had a different appetite for risk, a different b. Heggestad has constrained b at an assumed level for all banks in all markets. Finally, the capital asset pricing model suggests that variance of profit should not matter to the market value of the firm. Covariance with the market portfolio should matter.

Rhoades and Rutz[1] performed a study similar to the Mingo[2] paper. Various risk measures were regressed on concentration as measured by a three firm concentration

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[1] S. Rhoades and R. Rutz, "Market Power and Firm Risk: A Test of the 'Quiet Life' Hypothesis," Journal of Monetary Economics 9 (January 1982): 73-85.

[2] J. Mingo, "Managerial Motives, Market Structure, and the Performance of Holding Company Banks.".

ratio, and a matrix of control variables. The risk measures were (variance of rate of return)/(expected rate of return), (equity capital)/(total assets), (total loans)/(total assets), and (net loan losses)/(total loans). They found concentration reduced the risk a bank faced.

Substantial uncertainty remains regarding the effect of concentration on bank risk taking. The few studies which have been performed suggest that concentration leads to less bank risk, however Mingo[1] found the opposite effect. Also, all of these studies are restricted to single market banks. The authors could not assign a single concentration value to a multi-market bank, but single market banks are not representative of the universe of banks.

The question of appropriate geographic market is unchallenged in most of these studies. The market is generally defined as the SMSA or non SMSA county. Two studies by Eisenbas[2] are the major empirical foundation for this approach. Both studies used samples from seven cities in 1955 (Boston, Baltimore, Chicago, New York, Kansas City, St.Louis, and Minneapolis/St.Paul). The first study dealt

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[1] ibid.

[2] R. Eisenbas, "Local Banking Markets for Business Loans," Journal of Bank Research 2 (Summer 1971): 30-9; R. Eisenbas, "Non-local Markets for Business Loans," Journal of Bank Research 2 (Winter 1972): 41-7.

with small business loans. The second dealt with loans to larger businesses.

Eisenbas used the same approach in both studies. He used cluster analysis to group loans by size of borrower and by location of borrower. The first study dealt with small business borrowers. The second paper dealt with larger borrowers. After categorizing borrowers, Eisenbas determined what percentage of the loan accounts were transacted with banks located within the borrower's SMSA, what percentage within the borrower's county, what percentage within 100 miles of the borrower, etc. Eisenbas then applied a standard of 70% of the number of transactions to define a market in the first of his two papers. That is, a market is the smallest region such that 70% of the suppliers of loans to that region are themselves located within that same region. Application of the 70% standard ensured that the regional market was no greater than the SMSA for each of the seven sample cities. He concluded that the SMSA was a reasonable approximation of the small loan market.

The second of his two papers addressed the premise that some borrowers may be regionally constrained in their search for banking services. These borrowers may be willing to incur the distance related costs of dealing with banks outside of their SMSA, yet either too small to incur the costs of a national search or too small for a money center bank to service. As I mentioned, Eisenbas used the same

basic technique in this second paper to determine market size for larger transactions as he used in the previous paper to determine market size for smaller transactions.

However, in this paper he also applied the technique to a subsample of borrowers whose size indicated a likelihood to be regional as opposed to national or local banking customers. Here Eisenbas applied a 90% standard. He determined that the New York regional market would stretch 750 miles. Such a market would include Chicago, Boston, Philadelphia, and Baltimore. Similarly, the Chicago regional market would stretch all the way to the East Coast. Regional markets would be of such magnitude as to be in effect national markets.

Clearly the standard applied in the second paper is much stricter than that applied in determining the geographic bounds of small loan markets. Since Eisenbas did not give reasons to apply a stricter standard for small borrowers than for larger borrowers, he should have applied the same standard in both papers. If Eisenbas had applied the 90% criterion in determining loan market size for small borrowers, the Chicago market would extend 300 miles, the St. Louis market would extend 200 miles, and the Kansas City and Minneapolis/St.Paul markets would each extend 400 miles. This is clearly implausible. Eisenbas would have been forced to reject the 90% standard as too strict. On the other hand, if Eisenbas had applied the 70% standard to determine market size for larger business borrowers, he

would not have netted regional markets which were so large as to be effectively national. He would not have been able to dismiss regional markets. In addition to applying inconsistent standards across papers, Eisenbas begs the underlying issue of determining the appropriate standard.

Even if one accepts Eisenbas' technique, his results may not apply to modern banking markets. Eisenbas only considered seven cities, excluding western and southern cities entirely. Eisenbas was also working with 1955 data. The financial behavior of middle market businesses has undoubtedly changed since then.

Dunham[1] examined regional banking in New England. Middle market businesses, potential regional banking customers, were defined as those firms with assets between $5 million and $250 million. Such firms account for 30% of private employment in the U.S. Dunham asserted the middle market businesses are especially important to banks because they maintain large excess deposit balances at insignificant rates of interest. They also tend to buy an entire bundle of bank services from one source.

Dunham argued that large money center banks are at a disadvantage in competing for middle market business. Middle market firms require financial planning services from their primary banks as well as general business

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[1] C. Dunham, "The Regional Banking Competition," New England Economic Review (July/August 1986): 3-19.

advice. The quality of such services to the customer decreases as distance between provider and recipient increases. The greater the distance the poorer the bank's information regarding the local business environment and the greater the cost to the customer of being serviced. Also, the greater the distance, the greater the costs to the bank of monitoring the performance of the customer. Finally, geographic legal barriers still exist for money center banks wishing to service regional markets.

Dunham surveyed middle market businesses in New England and used their responses regarding location of primary bank to derive the boundaries of three regional banking markets. These regional markets are centered in Boston, Hartford, CT and Providence, RI.

If the true market for middle market business is actually regional rather than local, past research has failed to identify a significant aspect of bank market structure. High regional concentration may exist in the absence of high local concentration. High regional concentration may explain variations in banks' conduct and performance. Specifically, profit may be more accurately modeled as a function of regional structure than of local structure.

The most serious objection to previous studies is inclusion of endogenous variables among the regressors in ordinary least squares regressions. Only two of the studies I have reviewed have specified a structural form and

applied simultaneous equations methods (Clark[1] and Graddy and Kyle[2]). Most proceed directly with estimation of some performance variable as a function of concentration and other presumably exogenous variables. Edwards and Heggestad[3] made a tremendous step in recognizing the endogeneity of bank risk and its importance in understanding the effects of structure on banking performance and conduct. Upon further reflection though, not only is risk endogenous but also asset composition and liability composition.

Consider the bank as a multiproduct firm in which the various outputs are produced jointly. Profit is determined simultaneously with portfolio composition and risk. [Explicit incorporation of risk may be obtained by assuming the firm is maximizing V=V(profit) and assuming concavity of V. Santonero[4] reviewed different models of the banking firm which offered explanations for concavity of V. An alternative method of incorporating risk would be to assume banks maximize market value and that bankers believe

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[1] J. Clark, "Single Equation, Multiple Regression Methodology: Is It An Appropriate Methodology for the Estimation of the Structure Performance Relationship in Banking?" Journal of Monetary Economics 18 (1986): 295-312.

[2] D. Graddy and R. Kyle, "The Simultaneity of Bank Decision Making, Market Structure and Bank Performance.".

[3] F. Edwards and A. Heggestad, "Uncertainty, Market Structure, and Performance: The Galbraith-Caves Hypothesis and Managerial Motives in Banking.".

[4] A. Santonero, "Modeling the Banking Firm, A Survey," Journal of Money Credit and Banking 16 (November 1984): 1267-82.

stock prices reflect risk. For example, bankers may believe stock prices are determined by the capital asset pricing model or the arbitrage pricing model.] Reasons for joint production include sharing of overhead, reuse of information regarding customers, risk reduction through asset diversification, and joint demand for services by customers.

Many of the structure-price studies have included some measure of risk or portfolio composition among their explanatory variables and performed an OLS regression with rate of return or price as the dependent variable. The resulting coefficients are biased and inconsistent.

Clark[1] performed the only simultaneous equations estimation of the structure-performance relationship in banking in which profit was the performance measure. Clark's sample covered 1973 through 1982. He used a four equation model in which the dependent variables were average return on equity, standard deviation of return on equity, (total loans)/(total assets), and (time and savings deposits)/(total liabilities). Clark also included both market share and Herfindahl Index numbers as exogenous variables so that he could test Smirlock's efficient firms hypothesis. The coefficient for the Herfindahl Index number was significant in the equation with average rate of

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[1] J. Clark, "Single Equation, Multiple Regression Methodology: Is It An Appropriate Methodology for the Estimation of the Structure Performance Relationship in Banking?".

return as the dependent variable and in the equation with standard deviation of profits as the dependent variable. Concentration increased rate of return and decreased risk (as measured by standard deviation of rate of return over the sample period). Market share had no significant effect. Clark did not attempt to identify a critical concentration level.

Graddy and Kyle[1] also used a simultaneous equations approach. Theirs was a much more complicated model including 16 endogenous variables. However, they found no significant effect of concentration on their price variables. This may have been due to their use of proxies for prices rather than true prices. They used average deposit rate, (service charges on demand deposits)/(demand deposit volume), and (total fees and interest on loans)/(total volume of loans) as proxies for interest paid on deposits, price of demand deposit services, and rates charged for loans.

Despite the volume of work which has already been done concerning the relation between bank market structure and performance, there is still room for improvement.Much analysis is vulnerable to the efficient firms criticism.- Researchers have often employed poor price proxies as dependent variables in their regressions.Most studies have

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[1] D. Graddy and R. Kyle, "The Simultaneity of Bank Decision Making, Market Structure and Bank Performance,".

used the single equation approach described above although simultaneous equations may have been more appropriate.

Chapter 4: Variables and Data Used in the SCP Analysis

Chapters Five and Six report the results from estimating the following reduced form equation:

$$r_{i,j,t} = r_{i,j,t}(X_{i,j,t}, Con_{i,t}, e_{i,j,t})$$

Here $r_{i,j,t}$ represents the ith bank's rates for product j in period t. $X_{i,j,t}$ represents a vector of control variables. $Con_{i,t}$ represents concentration in the ith firm's market, and $e_{i,j,t}$ is an error term. This chapter describes the variables and data used in that analysis. The first section of this chapter explains why variables were included in the regressions and the following section describes the data and lists the data sources.

A: Variables Used In The Regressions

The dependent variables are new car loan rates, used car loan rates, first mortgages, second mortgages, and unsecured personal loan rates. The aim of this study is to analyze the effect of bank market structure on these five rates. There was some controversy about whether to investigate the effect of bank market structure on new car loan rate setting. The market shares are not constructed to reflect competition from non-depository institutions. This may be especially troublesome theoretically when

considering new car loan rate setting. The acceptance corporations affiliated with the automobile manufacturers are major providers of new car loans. Ignoring them when constructing market structure variables may lead to overestimates of the true degree of concentration and may bias the analysis against finding an effect of concentration on new car loan rates.[1]

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[1] The HHI is the structural measure used in the tests of the SCP paradigm. Ignoring some competitors' output when calculating HHI numbers may lead to either overestimates or underestimates of the true HHI numbers. Consider the following algebraic exposition. Let:

a = sales by the first through jth firms.(Banks' originations.)
b = sales by the remaining firms. (Acceptance corps.' originations.)
s_i = sales by the ith firm
$H_T = 1/(a+b)^2 \sum_1^n s^2_i$ = The market's true HHI number.
$H_a = 1/a^2 \sum_1^j s^2_i$ = False HHI number derived from including only first j firms' sales.
$H_b = 1/b^2 \sum_{j+1}^n s^2_i$ = False HHI number derived by including only last j+1 through n firms' shares.
Then,
$H_T = (a^2 H_a + b^2 H_b)/(a+b)^2$ and
$H_T/H_a = [a^2 + b^2(H_b/H_a)]/(a+b)^2$
$H_T < H_a$, if and only if, $H_b/H_a < 1+2a/b$.

The relative size of the measured HHI number H_a to the true HHI number H_T depends upon the distribution of sales between the "included" and "excluded" suppliers (a/b) and the relative degree of concentration between the included and excluded groups (H_b/H_a). It seems likely that the HHI numbers including the acceptance companies shares would be less than the reported HHI numbers for the new car loan rate regressions. Assuming the acceptance corporations' share of loans in each market is 33% (Ford Motor Credit financed 1/3 of all domestic Ford sales in 1989. I am assuming similar performance by all acceptance corporations during the sample period. See "Captive Finance Firms Reap Gains as Some Banks Drop Auto Loans," Automotive News, December 3, 1990, p2) and assuming that for each market H_b equals the nationwide HHI number for auto sales (HHI number for U.S. auto sales was 2033 for 1988 based on market shares published in the 1989 Automotive News, Market Data Book, p33) all but three of the markets represented in this dissertation would have lower HHI numbers including the acceptance corporations than excluding them. Boston, Albany, and Springfield would have higher HHI numbers including banks, thrifts, and acceptance corporations than including only banks and thrifts. If it is true that the acceptance corporations' market shares ought to have been included in the new car loan rate regressions, and if the true HHI numbers were lower than the HHI numbers which I calculated excluding the acceptance

Despite this concern, there are a number of compelling reasons to perform the analysis with new car loan rates as the dependent variable. First, the courts have defined commercial banking as the relevant line of commerce and have argued that commercial banking concentration will increase prices. One way to test this is to look at the effects of commercial banking concentration on banks' rates for whatever services for which there are available data.

Second, it is plausible that the acceptance corporations and the depository institutions are actually participating in different product markets. Arguably, the acceptance companies compete in the high-default-risk auto loan market while the commercial banks compete in the-low-default-risk auto loan market. Automobile finance companies may exist to encourage sales of affiliated manufacturers' automobiles and thereby increase the manufacturers' profit. The acceptance companies may achieve this goal by extending credit to less creditworthy customers -- those who would not qualify for bank financing. An automobile company may earn positive net expected profit from the joint product of a new car loan and a new car where a commercial bank would have earned a negative expected net profit from providing the loan alone. If it is true that banks compete among themselves for low-

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companies' shares, then the HHI coefficients are biased downwards. Under these circumstances, my methodology is biased against the SCP.

default-risk new car loan originations and acceptance corporations originate high-default-risk loans, structural measures in the new car loan rate regressions should properly exclude the acceptance companies' market shares.[1]

Third, several previous studies have investigated the effects of commercial banking concentration on new car loan rates.[2] These studies found commercial banking concentration did indeed affect new car loan rates despite the a priori intuitive arguments to the contrary. I should report the new car loan rate regression results if only for a comparison of results with those previous studies.

Finally, as mentioned above and as reported below, the empirical results from this dissertation do not generally support the SCP paradigm. The strongest support for the SCP relates to new car loan rate setting. I must report the new car loan rate results to be fair to the SCP paradigm and its proponents.

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[1] See M. E. Staten, O. W. Gilley and J. Umbeck, "Information Costs and the Organization of Credit Markets: A Theory of Indirect Lending," Economic Inquiry 28 (July 1990): 509-529. The authors note that banks offer auto financing both directly and indirectly through dealers. They argue this is to encourage self selection by borrowers into low risk and high risk groups. The low risk groups apply directly to banks for financing and undergo a thorough credit check. The high risk borrowers obtain financing from banks through auto dealers and undergo a less thorough credit check. The authors present empirical evidence that direct borrowers obtain lower rates and represent lower credit risks than indirect borrowers. This is consistent with the idea that banks alone compete for loans to low risk borrowers and both banks and auto acceptance companies compete for loans to high risk borrowers. Presumably, dealers investigate both bank and acceptance corporation financing for prospective purchasers. This suggests that the acceptance corporations rates are comparable to the banks' rate to high risk borrowers. Acceptance corporations compete with banks for high risk auto loan originations. The rates used in the analysis in this dissertation are published rates for direct, i.e. low risk, borrowers.

[2] See Chapter 3 of this dissertation.

Assets were included as an independent variable to capture the effects of scale economies on rates charged. Costs, and therefore rates, may be a diminishing function of bank size. Although bank size is endogenous, it may be treated as fixed over relatively long periods of time; I treat it as fixed here. Growth in total assets certainly takes longer than changes in portfolio composition. The latter can be, and are, effected on a daily basis. Recent empirical investigation of bank cost functions indicates negligible scale economies beyond an asset size of $20 million.[1] Despite this previous research I include assets among the regressors because the results indicating no scale economies may be misleading. The results may have been due to the peculiarities of the sample, or the cost function for commercial banks may have changed since that research was performed (Advances in computer technology and the development of secondary markets for secured assets such as mortgages exemplify environmental changes which may have altered banks' cost functions). If such scale economies exist, the regressions ought account for them.

To see why, assume scale economies exist and consider the following hypothetical situation. Market size and market concentration are related. Small markets are concentrated. Market size and firm size are also related.

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[1] See R. Gilbert, "Bank Market Structure and Competition: A Survey," for a review of studies which estimate bank cost functions.

Firms in small markets are themselves small. Market size is related to both firm size and market concentration; therefore, concentration and firm size are correlated. In this example, the concentration coefficient may reflect the effects of scale economies in regressions which do not explicitly allow for diminishing costs.

The HH index, the sum of squared market shares, is the concentration measure. I discuss market definition and the construction of the market structure variables in more detail below in the section concerning the data used in this dissertation. The traditional structure performance paradigm predicts a positive concentration coefficient. The efficient firms hypothesis predicts the concentration coefficient is zero. A major goal of this research is to unearth evidence regarding the sign of the concentration coefficient.

The efficient firms hypothesis also suggests that market share does not have a positive effect on rates charged for homogenous products. A positive significant market share coefficient may indicate market share is itself a source of monopoly power rather than a sign of efficiency.[1] A positive significant coefficient does not necessarily contradict the efficient firms premise though. Larger firms may be offering superior products and

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[1] W. Shepherd, The Treatment of Monopoly Power (New York: Columbia University Press 1975), pp. 45-50, suggests market share is a source of market power.

therefore charging higher prices. However, a body of literature linking market share to higher prices may shift the burden of proof to the efficient firms theorists to show the price differentials are quality premia rather than evidence of monopoly power. Similarly, a body of literature linking market share to lower prices would tend to validate the efficient firms premise. Market share is therefore included among the regressors in each of the rate regressions.

The principal component of banks' costs is labor.[1] Average hourly earnings of manufacturing employees is included in the regressions as a proxy for labor costs. A lower local wage should imply lower labor costs and therefore lower loan rates. Local wages also affect local bank product demand. Higher wages may imply higher income per capita for an area. Given that housing and automobiles are normal goods, higher wages ought to increase demand for car loans and first mortgages resulting in higher rates for these loans. Second mortgages and personal loans may not be normal goods. These loans may be a means of coping with short term liquidity constraints caused by decreases in earnings. In that case, increases in local wages would be

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[1] According to Functional Cost Analysis, Average Banks 1985, a publication by the Board of Governors of the Federal Reserve System, salaries and fringe benefits accounted for 41.54% of total operating expenses for banks with deposits up to $50 million, 43.58% for banks with deposits from $50 to $200 million, and 47.45% for banks with deposits exceeding $200 million. Property costs are another major bank expense category. The urban/rural dummy variable explained later in the text captures some variations in land rental rates.

associated with decreases in demand for second mortgages and personal loans resulting in lower rates for these loans. The predicted sign of the wage coefficient in the reduced form first mortgage and new car loan rate regressions is positive. In these regressions, higher wages are expected to exert upward pressure on rates from both the demand side and the supply side. The predicted sign is uncertain in the second mortgage and personal loan rate regressions.

State dummies were included to capture statewide differences in pricing. Any number of state political or legal characteristics may affect pricing. For example the state banking commissions are the chartering agencies for state banks and, as such, affect the ease of entry into their respective states' banking markets. Ease of de novo entry may affect the degree to which banks can exercise monopoly power in pricing. Also, the states' branching and multi-bank holding company restrictions vary. Such restrictions affect the cost functions of the banks currently in the market and the attractiveness of a state's markets to potential entrants. Finally, the state dummies should capture rate differences due to slight variation in the terms of the loans. For example, the Vermont new car loan rates are for 36 month loans while the New York and Massachusetts new car loans are for 48 months. Failure to include state dummies exposes the analysis to bias due to

omitted variables should any of the omitted regressors vary on a statewide basis.

A dummy variable was included to capture the effects of bank holding company affiliation. The expected effect of such affiliation on bank loan rates is debatable. The bank holding company may be the most efficient organizational form for bank management. In this case, bank holding company affiliation would be expected to have a non-positive effect on rates. However, it has also been suggested that bank holding companies are a vehicle by which banks which do not exploit their market power are acquired by firms which will exploit it. In this case, bank holding company affiliation will be associated with higher rates.

A dummy variable was included to distinguish between urban and rural markets. Rural markets tend to be more concentrated than urban markets. There may be characteristics of rural markets aside from concentration which lead their banks to charge higher rates than urban markets. The dummy variable is one for urban markets and zero otherwise.(An urban market is one which is defined as a Ranally Area [RMA] in the 1985 Rand McNally Commercial Atlas. On page 4 of the Atlas, a Ranally Area is defined as the "developed areas around each important city. RMA's include satellite communities and suburbs as well as one or more central cities. RMA boundaries are not restricted to

county lines." Table 3.1 lists the markets of this study and denotes each market's urban or rural classification.)

Finally, time dummies were included to reflect overall market conditions. The distribution of observations may differ from period to period due to incomplete reporting by banks responding to the state rate surveys. If concentrated markets are more heavily represented in higher rate time periods, then the concentration coefficient will be biased upward if the intercept is not allowed to vary over different sample periods.

B: The Data

The data for this study are publicly available. The loan rates charged by banks were collected by the state banking commissions of Massachusetts, New York, and Vermont. The market structure variables (HH indices and market shares) were obtained from the Federal Reserve Banks of New York and Boston. Bank balance sheet data (assets and deposits) were obtained from Call and Income Reports submitted to the Federal Deposit Insurance Corporation by all institutions insured by that agency.Data used to specify markets' urban or rural status were obtained from the 1985 Rand McNally Commercial Atlas.

The state banking commissions of Massachusetts, New York and Vermont all perform periodic surveys of the rates banks within their states charge for various types of

loans. These surveys are all intended as consumer aids in the purchase of banking services. I have used these surveys as data sources. The empirical analysis of this dissertation uses rates from the April 1986, September 1986, December 1986, and March 1987 issues of these surveys.(The issue dates reflect the dates for which the rates are effective rather than the actual publication dates of the survey.) There are potentially four observations per bank per rate per relevant market (some banks participate in more than one market). These are only potential observations because some banks fail to report all of the information requested. "Per rate per relevant market" refers to the fact that there are some rates for which some markets have no observations. The states' rate surveys do not all ask for all of the rates of my analysis -- new and used car loan rates, first and second mortgages rates, and personal loan rates. The Massachusetts survey does not report personal loan rates, and the Vermont survey does not report used car loan rates. Table 3.2 lists the product coverage of the state surveys. Table 3.3 lists the terms of the loans for which the survey responses apply. I describe the state surveys in greater detail below.

The Massachusetts Commissioner of Banks distributes four Consumer Credit Guides each corresponding to a different geographic region of the state. The Boston Consumer Credit Guide (covering Essex, Middlesex, Norfolk, and Suffolk Counties) is compiled twice each month. The

Southeastern Massachusetts Consumer Credit Guide (Barnstable, Bristol, Dukes, and Plymouth Counties), the Western Massachusetts Consumer Credit Guide (Berkshire, Franklin, Hampden, and Hampshire Counties), and the Worcester Consumer Credit Guide (Worcester County) are all compiled once per month. Each survey contains rates currently charged by local banks for 15 year fixed rate mortgages, 25 to 30 year fixed rate mortgages, adjustable rate mortgages, home equity loans, second mortgages, new car loans, and used car loans. The mortgage rates require 20% down payments. The new car loan rates are for a $10,000 new car, require a 20-25% down payment, and are 48 month loans. The used car loans are $3,500 loans and are for 24 months.

The New York State Banking Department distributes the Consumer Guide to Bank Services which contains data for 10 New York bank markets. The markets for which the Department collects data are New York City, Albany,Poughkeepsie, Glens Falls, Binghampton, Elmira, Syracuse, Utica-Rome, Buffalo, and Rochester. This report used data for April 1986, September 1986, December 1986, and March 1987. Each Guide reports rates charged for 25 year fixed rate mortgages, 25 year adjustable rate mortgages, 10 year fixed rate second mortgages, new car loans, used car loans, unsecured personal loans, and fixed rate home improvement loans. All of the mortgage rates reported correspond to 25% down payments. The reported

rates for second mortgages, new and used car loans, and unsecured personal loans are for loans of unspecified sizes. The new and used car loan rates require 20% down and are for 48 month and 36 month loans respectively. The rates reported for unsecured personal loans are for 36 month loans.

The Vermont Department of Banking and Insurance surveys Vermont banking service rates on a monthly basis. The Department publishes the results in one monthly publication for the entire state. The Vermont survey reports rates charged for 30 year fixed rate first mortgages, 30 year variable rate first mortgages, fixed rate second mortgages, variable rate second mortgages, new car loans, and unsecured personal loans. The rates reported for first mortgages require a 25% down payment. The duration of the second mortgage loans were unspecified as were the loan sizes for the second mortgages and the new car loans. The new car loans required 25% down payments and were for 36 months. The unsecured personal loans were for $2,000 and for 24 months.

Market structure data for Massachusetts and Vermont were provided by the Federal Reserve Bank of Boston. Market structure data were provided by the Federal Reserve Bank of New York for New York State. Each Federal Reserve Bank defines the banking markets in its district and collects market structure data for those markets for use in

analyzing the competitive consequences of proposed bank mergers and bank holding company acquisitions.

The Federal Reserve System defined bank markets correspond roughly to Rand McNally Areas (RMAs or Ranally Areas). RMAs are based on commuting patterns, economic interaction and topography. They include central cities and surrounding suburbs, and they do not necessarily conform to county bounds. Bank markets are refined beyond RMAs to better approximate those regions within which banks and their customers can interact without significant transactions costs.[1] The States of Massachusetts, New York and Vermont are composed of 19, 16 and 16 banking markets respectively. The banking markets of each of the states are listed in Table 3.4. Rate data were not available for all New York markets. The New York markets to which this study applies are listed in Table 3.5.

Although the geographic markets for many banking services may be larger than the Federal Reserve System defined markets, these predefined markets are probably appropriate for the rates investigated in this paper. The originating markets for car loans, mortgages and personal loans -- unlike the markets for large commercial loans or the secondary markets for securities backed by mortgages or

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[1]See J.Wolken, Geographic Market Delineation: A Review of the Literature, Board of Governors of the Federal Reserve System, Staff Studies Paper #140 (1984), for a discussion of the derivation of geographic banking markets.

car loans -- are likely to be local as opposed to statewide, regional, or national.

The U.S.Supreme Court held in United States v.Philadelphia National Bank[1] that the relevant line of commerce pertaining to commercial banking organizations for purposes of the Clayton Act[2] was the cluster of services provided by the commercial banking organization.[3] Therefore, the Federal Reserve System constructs market structure variables based upon the entire commercial banking enterprise rather than on subsets of products commercial banks offer, and previous researchers have used market structure variables based upon the entire enterprise rather than on subsets of products. I have also used market structure variables based upon the entire commercial banking enterprise because the data are available and so that this dissertation is consistent with previous research. Market structure variables based upon subsets of products may be more appropriate. Thus, the tests in the following chapters may be interpreted as tests of the joint hypothesis that the market structure variables are properly defined and that the SCP applies.

The HH index numbers are based upon market deposits rather than share of new car loan originations, or share of

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[1] United States v. Philadelphia National Bank, 374 U.S. 321 (1963).

[2] 38 Stat. 730 (1914), as amended, 15 U.S.C.A. Sections 12-27 (1980).

[3] See Chapter 2 of this dissertation for a more thorough discussion of federal bank merger regulation.

first mortgage originations, etc. Deposits are used as the basis for determination of market share because total deposits are thought to reflect capacity to participate in all product lines traditionally offered by commercial banking organizations.

The market structure variables for Massachusetts and Vermont were all constructed using deposit data as of June 30, 1985 and reflecting mergers and bank holding company acquisitions approved by the Federal Reserve System or completed by December 31, 1986. The market structure variables for New York were constructed using deposit data as of June 30, 1984. The variables reflect mergers and acquisitions as of June 30, 1986. Although more recent market structure variables are preferable, these were the only data available at the time of this writing. These structure variables are relatively static over time except insofar as they change as the result of mergers and acquisitions.

These structural measures, market shares and HHI numbers are generally constructed based upon commercial bank deposits only.[All of the literature cited in Chapter 3 constructed the structural variables based upon commercial bank deposits only]. However, I also report regression results with structural measures constructed from both commercial banks' and thrifts' deposits. Thrifts have long had the regulatory authority to originate mortgages, make personal loans and make car loans. There is

no evidence that there are (or are not) economies of scope arising from making these loans in conjunction with commercial loans or in conjunction with other activities from which thrifts were historically restricted. Therefore, there is no reason to assume a cost advantage or disadvantage for thrifts in the provision of these services. Similarly, there is little reason to assume a customer preference for commercial banks over thrifts. Presumably, the consumer of the retail banking services studied here is indifferent to the legal status of the institution making her the loan. Why should she care whether the institution has a commercial bank charter or a thrift charter?

The argument for the HHI to not be constructed from all depository institutions' deposits rests upon the fact that commercial banks historically offered a cluster of services thrifts could not replicate. Because banks previously could offer certain services thrifts could not, and because customers preferred to purchase a bundle of financial services in one place, certain services offered by both commercial banks and thrifts were not perfect substitutes. For example, a new car loan at a commercial bank was not equivalent to an otherwise identical new car loan at a thrift because the consumer could purchase a wider array of other financial services at the bank than at the thrift. The cluster of services argument contends that although thrifts are now legally empowered to offer all of

the services banks do, thrifts are still not equal competitors with commercial banks. Consumers may still prefer banks because thrifts do not offer the full array of services even though they are legally free to do so. Alternatively, banks may retain some first mover advantages over thrifts as a result of the years of restrictions of thrifts. Banks may be better able to market the cluster of services, or customers may be slow to switch from previously determined primary depository institutions. Although I am not taken with the "cluster of services" argument, most of the regressions in this dissertation construct market shares based upon commercial bank deposits only. I discuss the issue of the appropriate deposit base throughout this dissertation.

There was another problem with the market structure data aside from age. Unfortunately, the market from which rate observations were obtained was not always determinable. Many banks operate in more than one market and the surveys from which the rates were obtained for this study do not specify which office of a given bank was contacted for rate information. This was not a problem for the New York observations because the New York Consumer Guide specifies the markets for which the rates apply. Nor was this a problem for the Boston or Worcester, Massachusetts observations. The Boston and Worcester rates are reported by the Massachusetts Commissioner of Banks in separate surveys. However, the observations for the

remainder of Massachusetts as well as those for Vermont could not be easily paired with a specific market. In cases in which a bank operates in more than one market and the specific market from which the reported rates were obtained was not apparent, I assumed the rates applied to the market from which the bank receives the most deposits. Table 3.5 lists all of the banking markets of this study as well as their respective states and HHI numbers.

Bank-specific data were obtained from bank Call Reports. Such data include assets, total bank deposits (as opposed to market bank deposits which are used to determine HHI numbers and market shares), Treasury Bill holdings, certificates of deposit in excess of $100,000, and bank holding company affiliation. Bank Call reports are submitted on a quarterly basis to the Federal Deposit Insurance Corporation. The September 1986, December 1986 and March 1987 values of these variables are taken directly from the third quarter 1986, fourth quarter 1986 and the first quarter 1987 reports respectively. The April 1986 values were interpolated from the first and second quarter 1986 reports.

Each regression includes average hourly earnings of production workers on manufacturing payrolls as a measure of the price of labor. Hourly earnings data are available for states and metropolitan areas. The hourly earnings data are available in the monthly Bureau of Labor Statistics

publication Employment and Earnings. Table 3.6 lists the average hourly earnings data used in this study.

The samples for each rate regression are different. The differences arise due to missing observations. Some missing observations arise because of differences in the rates each state surveys. Other missing observations arise due to reporting failures by banks. Tables 3.7 through 3.11 list sample statistics for the various rate regression samples.

TABLE 4.1
URBAN/RURAL STATUS OF MARKETS REPRESENTED IN REGRESSIONS

MARKET	URBAN/RURAL
Albany, NY	Urban
Barre-Montpelier, VT	Rural
Bennington, VT	Rural
Binghamton, NY	Urban
Boston, MA	Urban
Brattleboro, VT	Rural
Buffalo, NY	Urban
Burlington, VT	Urban
Cape Cod, MA	Rural
Elmira, NY	Urban
Fall River, MA	Urban
Greenfield, MA	Rural
Hanover-Lebanon, VT	Rural
Pittsfield, MA	Urban
Providence, RI*	Urban
Rochester, NY	Urban
Rutland, VT	Rural
Springfield, MA	Urban
Springfield, VT	Rural
St.Albans, VT	Rural
St.Johnsbury, VT	Rural
Stowe-Morristown, VT	Rural
Syracuse, NY	Urban
Woodstock, VT	Rural
Worcester, MA	Urban

Massachusetts banks participate in the Providence banking market. The Providence market includes portions of southern Massachusetts.

TABLE 4.2

LOAN PRODUCT COVERAGE OF STATE SURVEYS

State	Frequency of Survey	Products Covered
Massachusetts	Bi-monthly for Boston Monthly for the rest of the state	fixed rate first mort. adj. rate first mort. fixed rate second mort. new and used car loans personal loans
New York	Issued three to five times per year	adj. rate first mort. fixed rate first mort. fixed rate second mort. fixed rate home improvement loans new and used car loans
Vermont	Monthly	adj. rate first mort. fixed rate first mort. adj. rate second mort. new car loans personal loans new mobile home loans

TABLE 4.3

LOAN TERMS BY STATE

	MA	NY	VT
New Car	20-25% down 4 year term $10,000 loan	20% down 4 year term	25% down 3 year term
Used Car	2 year term	20% down 3 year term	Not surveyed
Adjustable Rate First Mortgage	20% down	25% down 25 year term	25% down 25 year term
Fixed Rate Second Mortgage	No specifics given	10 year term	No specifics given
Unsecured Personal Loan	Not Surveyed	3 year term	2 year term $2,000 loan

TABLE 4.4:
ALL MASSACHUSETTS, NEW YORK, AND VERMONT BANKING MARKETS

MASSACHUSETTS	NEW YORK	VERMONT
Amherst-Northampton	Metropolitan New York	Barre-Montpelier
Athol	Albany	Barton-Newport
Boston	Binghamton	Bennington
Cape Cod	Buffalo	Brattleboro
Clinton	Elmira-Corning	Burlington
Fall River	Ithaca	Middlebury
Fitchburg-Leominster	Jamestown	Randolph
Gardner	Mid-Hudson	Rutland
Great Barrington	Olean	Springfield
Greenfield	Oneonta	St.Albans
Martha's Vineyard	Plattsburgh	St.Johnsbury
Nantucket	Rochester	Stowe-Morristown
New Bedford	St.Lawrence	Vergennes
North Adams-Williamstown	Syracuse	Waitsfield
Pittsfield	Utica-Rome	Wilmington
Southbridge	Watertown	Woodstock
Springfield		
Taunton		
Worcester		

TABLE 4.5
MARKET HH NUMBERS
CONSTRUCTED FROM COMMERCIAL BANK DEPOSITS ONLY

MARKET	HH NUMBER
BOSTON	1275
ALBANY	1358
ELMIRA	1495
BARRE MONTPELIER	1595
PROVIDENCE	1663
SYRACUSE	1725
ROCHESTER	1748
HANOVER LEBANON	1825
RUTLAND	1846
BINGHAMPTON	2015
CAPE COD	2038
FALL RIVER	2078
BENNINGTON	2133
WORCESTER	2275
ST. JOHNSBURY	2377
SPRINGFIELD, MA	2441
BURLINGTON	2490
BUFFALO	2494
SPRINGFIELD, VT	2588
ST. ALBANS	2631
BRATTLEBORO	3208
GREENFIELD	3281
PITTSFIELD	3325
STOWE-MORRISTOWN	3386
WOODSTOCK	5351

TABLE 4.6
MARKET HH NUMBERS
CONSTRUCTED FROM ALL INSTITUTIONS' DEPOSITS

MARKET	HH NUMBER
BOSTON	400
ALBANY	687
SPRINGFIELD MA	750
CAPE COD	898
WORCESTER	953
ELMIRA	975
ROCHESTER	977
SYRACUSE	1076
FALL RIVER	1122
PITTSFIELD	1146
PROVIDENCE	1390
HANOVER LEBANON	1391
BARRE MONTPELIER	1415
RUTLAND	1495
GREENFIELD	1514
BINGHAMPTON	1700
BENNINGTON	1819
BUFFALO	1845
SPRINGFIELD VT	1914
BURLINGTON	2120
ST.ALBANS	2300
ST.JOHNSBURY	2343
BRATTLEBORO	2785
STOWE-MORRISTOWN	3386
WOODSTOCK	3944

TABLE 4.7
AVERAGE HOURLY EARNINGS
PRODUCTION WORKERS ON MANUFACTURING PAYROLLS

	4/87	12/86	9/86	3/86
Boston	10.55	10.37	10.30	9.98
Springfield	9.11	9.04	8.98	8.98
Worcester	9.54	9.57	9.40	9.35
Other MA	9.66	9.50	9.40	9.10
Albany	10.53	10.42	10.29	10.09
Binghamton	9.32	9.07	9.06	8.93
Buffalo	12.07	11.93	11.67	12.38
Elmira	9.62	9.47	NA	NA
Rochester	11.93	12.07	11.94	12.10
Syracuse	11.20	11.43	11.32	10.95
Utica-Rome	9.59	9.56	9.29	9.21
Burlington	9.94	9.69	9.66	9.75
VT	9.97	8.94	8.87	8.77
From	7/87	3/87	12/86	6/86

NA: Data not available.

From Table C-8, Employment and Earnings, U.S.Department of Labor, Bureau of Labor Statistics, June 1986, December 1986, March 1987, and July 1987 issues.

TABLE 4.8
PERSONAL LOAN REGRESSION DATA
L Denotes Logarithm

Variable	N	Mean	Min.	Max	Std. Dev.
Loan Rate (basis points)	345	1395.58	275.00	2006.00	154.31
L(Rate)	345	7.23	7.15	7.6	0.10
Assets ($1000)	345	6,744,574	10,898	45,652,000	13,045,666
Lassets	345	13.43	9.30	17.64	2.41
Sept	345	0.23	0.00	1.00	0.42
Dec.	345	0.26	0.00	1.00	0.44
March 1987	345	25	0.00	1.00	0.44
MA	345	00	0.00	0.00	0.00
VT	345	13	0.00	1.00	0.33
BHC	345	0.82	0.00	1.00	0.38
Urban	345	0.90	0.00	1.00	0.31
HHI	345	1900.62	1358	5351	535.20
L(HHI)	345	7.52	7.21	8.59	0.24
Earnings (cents/hr.)	345	1071.03	875	1207	115.75
L(Earn.)	345	6.97	6.78	7.12	0.11

TABLE 4.9
USED CAR LOAN REGRESSION DATA
L Denotes Logarithm

Variable	N	Mean	Min.	Max	Std. Dev.
Loan Rate (basis points)	477	1248.96	950.00	1650.00	118.82
L(Rate)	477	7.12	6.86	7.41	0.09
Assets ($1000)	477	5,165,504	10,898	45,652,000	11,413,429
Lassets	477	13.36	9.30	17.64	2.12
Sept	477	0.26	0.00	1.00	0.44
Dec.	477	0.26	0.00	1.00	0.44
March 1987	477	0.25	0.00	1.00	0.43
MA	477	0.00	0.00	0.00	0.00
VT	477	0.13	0.00	1.00	0.33
BHC	477	0.85	0.00	1.00	0.36
Urban	477	0.97	0.00	1.00	0.16
HHI	477	1713.45	1275	3325	439.47
L(HHI)	477	7.42	7.15	8.10	0.24
Earnings (cents/hr.)	477	1064.74	898	1207	95.10
L(Earn.)	477	6.96	6.79	7.12	0.09

TABLE 4.10
NEW CAR LOAN REGRESSION DATA
L Denotes Logarithm

Variable	N	Mean	Min.	Max	Std. Dev.
Loan Rate (basis points)	528	1101.87	900.00	1435.00	87.42
L(Rate)	528	7.00	6.80	7.27	0.05
Assets ($1000)	528	4,689,415	10,898	45,652,000	10,944,891
Lassets	528	13.21	9.30	17.64	2.10
Sept	528	0.24	0.00	1.00	0.43
Dec.	528	0.26	0.00	1.00	0.44
March 1987	528	0.26	0.00	1.00	0.44
MA	528	0.35	0.00	1.00	0.48
VT	528	0.08	0.00	1.00	0.28
BHC	528	0.84	0.00	1.00	0.37
Urban	528	0.91	0.00	1.00	0.29
HHI	528	1788.35	1275	5351	547.53
L(HHI)	528	7.45	7.15	8.59	0.27
Earnings (cts/hr)	528	1050.65	875	1207	101.82
L(Earn.)	528	6.95	6.78	7.12	0.10

TABLE 4.11
SECOND MORTGAGE RATE REGRESSION DATA

Variable	N	Mean	Min.	Max	Std.Dev.
Loan Rate (basis points)	213	1101.87	900.00	1435.00	87.42
L(Rate)	213	7.08	6.83	7.38	0.10
Assets ($1000)	213	9,662,198	18,134	45,652,000	15,404,917
Lassets	213	14.23	9.81	17.64	2.28
Sept	213	0.22	0.00	1.00	0.41
Dec.	213	0.27	0.00	1.00	0.45
March 1987	213	0.25	0.00	1.00	0.43
MA	213	0.25	0.00	1.00	0.43
VT	213	0.00	0.00	0.00	0.00
BHC	213	0.92	0.00	1.00	0.27
Urban	213	1.00	0.00	1.00	0.07
HHI	213	1741.84	1275	3325	412.41
L(HHI)	213	7.44	7.15	8.11	0.23
Earnings (cts./hr)	213	1075.45	898	1207	96.15
L(Earn.)	213	6.97	6.79	7.12	0.10

TABLE 4.12
FIRST MORTGAGE RATE REGRESSION DATA
L Denotes Logarithm

Variable	N	Mean	Min.	Max	Std.Dev.
Loan Rate (basis points)	367	912.04	734.00	1423.00	102.64
L(Rate)	367	6.80	6.60	7.26	0.14
Assets ($1000)	367	5,099,538	12,778	45,652,000	12,046,405
Lassets	367	13.48	9.46	17.64	1.92
Sept	367	0.23	0.00	1.00	0.42
Dec.	367	0.27	0.00	1.00	0.44
March 1987	367	0.25	0.00	1.00	0.43
MA	367	0.43	0.00	1.00	0.50
VT	367	0.09	0.00	0.00	0.30
BHC	367	0.92	0.00	1.00	0.27
Urban	367	0.89	0.00	1.00	0.32
HHI	367	1798.36	1275.00	5351	604.32
L(HHI)	367	7.44	7.15	8.11	0.23
Earnings (cts./hr)	367	1044.02	875	1207	99.14
L(Earn.)	367	7.45	7.15	8.59	0.29

Chapter 5: The Continuous Concentration SCP Model

A: Introduction

In this section, I present the results of regressing each of the five rates on an appropriate set of control variables and the appropriate continuous market structure variables. All of the regressions are reduced form regressions of Equation 1 below, where $r_{i,t}$ is the ith loan rate observation in period t, $e_{i,t}$ is an error term and the rest of the variables are self explanatory.

Eq.1: $r_{i,t} = r_{i,t}$(assets$_{i,t}$, hourly manufacturing earnings$_{i,t}$, urban$_{i,t}$, BHC$_{i,t}$, HHI$_{i,t}$, market share$_{i,t}$, MA$_{i,t}$, VT$_{i,t}$, Sept. '86$_{i,t}$, Dec.'86$_{i,t}$, March '87$_{i,t}$, $e_{i,t}$)

I prefer a log-log specification. The traditional paradigm suggests that as concentration increases, price diverges from the competitive level and approaches the monopoly level. The amount by which concentration may increase price depends upon the difference between the monopoly price and the competitive price. The difference between the monopoly price and the competitive price is a function of the underlying cost conditions and demand conditions facing the firm. Therefore, the absolute effect of concentration on price depends upon the underlying cost

and demand conditions facing the firm. A log-log specification, unlike a linear specification, allows the absolute value of concentration's effect on rates to vary among markets with different underlying economic conditions.

My preferences notwithstanding, the underlying demand and cost functions and behavioral equations could certainly generate a linear price equation or semi-log or some other specification. The use of a log-log specification is but one plausible course of action among many. Therefore, I also report and discuss the results of a linear specification for this chapter's regressions. Because these results do not differ much from those obtained with a log-log specification, I perform only log-log regressions in Chapter 6.

The HHI numbers and market shares are generally constructed from commercial bank deposit shares. Alternative market structure measures are plausible. It would seem reasonable to construct the structural measures from the deposits of both commercial banks and thrifts. I report the results when the structural measures are based upon both commercial bank and thrift deposits in Table 4.6. The choice of deposit base does not much alter the conclusions.

The regressions in this chapter do not allow for a dichotomous effect of concentration on bank rates, i.e.- critical concentration levels. Although critical

concentration is addressed specifically in Chapter 7, it warrants preliminary mention here. A concentration level may exist below which banks cannot or do not collude and above which banks do collude. If such a critical concentration level exists, regressions such as those of this chapter which do not address such a possibility may lead one to conclude market structure does not affect bank loan rates when in fact it does. The concentration coefficient may be insignificant because concentration is measured as a continuous variable when it is in fact binary. In Chapter 6, I consider the likelihood of critical concentration levels in banking, estimate critical concentration levels and test the significance of the estimates. For now, the reader is cautioned that the results of this chapter's analysis may lead to falsely failing to reject the null hypothesis that rates are independent of concentration. There are several reasons to estimate a linear concentration model even though the true underlying model may be non-linear.

First, some analysts may question the statistical significance of the critical concentration coefficients since the t-statistics for such coefficients overstate the significance of the results (I cover this issue in greater detail in Chapter 6). Given that some readers may have strong prior beliefs that there are no critical concentration levels in banking, the results of analysis which forgoes the disputed methodology may be valuable.

Additionally, most previous research concerning bank market structure and conduct has ignored the possibility of a critical concentration level.Performing the analysis without regard to critical concentration allows comparison between previous studies and this dissertation.

Finally, I ran this chapter's regressions to investigate the hypothesis that concentration affects bank rates continuously. This issue is separate from that of concentration affecting bank rates dichotomously. It warrants investigation on its own merits aside from consideration of a critical concentration level. The existence of alternative theories concerning market structure and rate setting does not diminish the need to analyze the hypothesis that loan rates increase continuously with concentration.

Before proceeding with the regressions, I had to determine whether it was appropriate to include Boston observations in the sample. Recall there are Boston data for all rates except for personal loan rates. Three circumstances led me to question whether the same reduced form equation would apply to Boston as would apply to the other markets. One, Boston is a regional banking center. As such, production of banking services within Boston may differ from that in other markets. Two, inclusion of Boston observations led to rather strange coefficients in preliminary car loan regressions. Three, Boston car insurance rates, accident rates, and auto theft rates are

famously high. The high accident and theft rates and any other factors leading to the high insurance rates may also affect car loan rates.

I performed F-tests to determine whether the same regime applied to both Boston and all other markets for the following reduced form price equation with a log-log specification:

rate = r(assets, bank holding companydummy, market share, time dummies, error term)

This is basically the same price equation used elsewhere in this dissertation. It differs in that it excludes effects of an urban dummy variable, hourly manufacturing earnings, concentration and the state dummy variables. These excluded variables all have the same value for all Boston observations, so regressions using only Boston observations could not differentiate their effects on rates. The results of these regressions are reported in Tables 5.2 through 5.4.

The results of the F-tests are reported in Table 5.1. They imply a different regime applies to Boston for new and used car loan rate setting but that the regimes for both Boston and all other markets are the same for first and second mortgage rate setting. It is possible that the test rejected the null hypothesis for car loan rate setting because of the omitted effects of concentration and wages. Boston has the lowest concentration in the sample and the highest wages. However, it seems strange that the omitted

variables would thus affect car loan rate setting and not mortgage rate setting also. Throughout this dissertation, car loan rate regressions exclude Boston observations. Mortgage rate regressions include Boston observations.

B: Results

The results do not support the traditional structure performance paradigm. This finding is consistent across specifications (log-log results in Tables 5.5 and 5.7, linear results in Table 5.6) and across deposit bases (Table 5.7 reports the results when the structural measures are based upon both thrift and commercial bank deposits). Five of the fifteen concentration coefficients were negative. Only one of the 15 concentration coefficients was positive and significant at the 5% level in a two tailed test. None of the concentration coefficients were large enough to lend much support to the structure-performance paradigm. The only sign of market power was a statistically significant and rather large market share coefficient in the personal loan rate regression in Table 5.7.

Let us examine those equations yielding significant concentration coefficients. The new car loan rate concentration coefficient is positive and significant at the 5% level in the commercial bank deposit based, log-log regression (Table 5.5) and at the 10% level in the

regression with a linear specification (Table 5.7). These new car loan concentration coefficient estimates are small, 0.034 and 0.014 respectively. (In a log-log regression, coefficient estimates represent elasticities. The 0.034 coefficient estimate implies that as concentration doubles new car loan rates increase by 3.4% [not 3.4 percentage points]. The coefficient estimate from the linear specification implies that as the HHI increases 1000 points new car loan rates increase by 14 basis points.) The used car loan rate concentration coefficient is positive and significant at the 10% level in the log-log, thrift and commercial bank deposit based regression (Table 5.6). The coefficient estimate is 0.025. (This coefficient estimate implies that as concentration doubles used car loan rates increase by 2.5% [not 2.5 percentage points].) These coefficients, as well as all other concentration coefficients are very small. The absolute value of these concentration coefficients range from 0.009 to 0.048 in the log-log specified regressions. (As concentration doubles the concentration coefficient estimates imply rates increase from 0.9% to 4.8%) They range from 0.001 to 0.020 in the linearly specified regressions (The coefficient estimates imply that the absolute impact of a 1000 point increase in the HHI on rates varies from 0.1 to 20 basis points.)

The results do not substantiate the efficient firms premise that market share is a proxy for efficiency.

Although market share is often significant, it is generally significant and positive. The market share coefficients are usually small. The market share coefficient in the personal loan rate regression with the linear specification (Table 5.7) is a glaring exception. This coefficient is significant and very large, 251. (Market share is measured from 0 to 100. Therefore, this coefficient estimate implies that a ten point increase in market share, say from 20 to 30, increases rates 2510 basis points.)

Although this positive significant market share coefficient is consistent with market share being a source of market power, the result does not lend strong support to the structure-performance paradigm. First, the result is not consistent across alternate specifications. Second, the coefficient may represent the impact of product differentiation rather than market power. Banks with high market share may offer superior products. High market share banks may produce these superior, and more costly services, more efficiently than low market share banks. Finally, most supporters of the structure-performance paradigm do not view market share as a source of market power.

Although significant negative market share coefficients would have substantiated the efficient firms premise, significant positive coefficients (as in the linear personal loan rate regression) are not inconsistent with the efficient firms idea. As noted above, high share

firms may be offering differentiated products at higher cost and thus at higher prices. Also, the small and generally insignificant concentration coefficient estimates do support the efficient firms theorists' basic contention that concentration does not lead to collusion.

None of the other results are especially surprising or noteworthy. The urban dummy coefficient estimate is often significant. New and used car loans and first mortgages tended to be less expensive in urban areas. Second mortgages and personal loans tended to be more expensive in urban areas. Bank holding company affiliation was associated with lower rates. The time dummy variables showed a general decline in rates over the sample period. The sole exception was an increase in personal loan rates between December 1986 and March 1987. This general trend is consistent with the movement of interest rates over the sample period.[1]

In sum, the analysis presented in this chapter does not support the SCP model. I have found no evidence of a linear relationship between local bank market concentration and bank loan rates. Proponents of the SCP paradigm may argue that concentration does affect bank loan rate setting but that concentration's impact on rates is non-linear. This chapter's results may have been due to mismeasurement

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[1] See Federal Reserve Bulletin, February 1988, p.A23 for the prime rate over the period.

of concentration. If concentration had been properly measured, I would have uncovered a relationship between concentration and bank loan rates. In the next chapter, I investigate the possibility that concentration does indeed affect bank loan rates in a particular non-linear fashion. I address the question of whether there are critical concentration levels affecting bank loan rate setting. I uncover some limited support for the critical concentration variant of the SCP model.

TABLE 5.1

F-TESTS OF H0:
THE SAME STRUCTURAL REGIME APPLIES TO BOSTON AND ALL OTHER OBSERVATIONS

Loan Rate	F-stat	Degrees of Freedom
New Car[1]	2.6361	7/525
First Mortgage	0.170	7/358
Used Car[2]	3.7812	7/466
Second Mortgage	0.001	7/202

1.significant at the 5% level
2.significant at the 1% level

TABLE 5.2
OBSERVATIONS FROM ALL MARKETS
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Independent Vars.	new car	used car	first mort	sec.mort.
Intercept	7.058**	7.255**	7.227**	7.165**
	(395.00)	(203.96)	(209.78)	(120.95)
Assets	0.001	-0.003	-0.021**	0.002
	(0.41)	(1.25)	(8.94)	(0.42)
Holding Co.	-0.006	-0.047**	-0.070**	-0.027
	(0.59)	(3.62)	(4.12)	(0.89)
Market Share	0.001	0.001	-0.003	0.002
	(0.47)	(0.38)	(1.48)	(0.38)
9/86	-0.054**	-0.035**	-0.090**	-0.053**
	(6.09)	(3.02)	(7.10)	(2.41)
12/86	-0.084**	-0.069**	-0.108**	-0.072**
	(9.91)	(6.06)	(8.90)	(3.51)
3/87	-0.090**	-0.082**	-0.113**	-0.137**
	(10.59)	(7.13)	(9.15)	(6.52)
Adjusted R^2	0.199	0.146	0.405	0.153
R^2	0.208	0.157	0.415	0.176
F	23.33##	15.94##	43.10##	7.45
Sum of Squares	3.302	4.278	4.438	3.082
Obs.	539	480	372	216

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 5.3
OBSERVATIONS FROM ALL MARKETS EXCEPT BOSTON
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Independent Vars.	new car	used car	first mort.	sec.mort.
Intercept	7.059**	7.251**	7.252**	7.160**
	(309.52)	(223.72)	(185.45)	(120.83)
Assets	0.002	0.001	-0.023**	0.003
	(1.08)	(0.51)	(8.28)	(0.66)
Holding Co.	-0.011	-0.081**	-0.073**	-0.033
	(1.06)	(5.80)	(3.28)	(1.01)
Market Share	0.008**	0.012**	-0.007	0.005
	(3.87)	(4.30)	(2.06)	(0.90)
9/86	-0.053**	-0.041**	-0.100**	-0.047**
	(5.53)	(3.44)	(6.22)	(2.04)
12/86	-0.082**	-0.066**	-0.114**	-0.078**
	(8.98)	(5.53)	(7.52)	(3.50)
3/87	-0.087**	-0.075**	-0.119**	-0.134**
	(9.42)	(6.26)	(7.43)	(5.82)
Adjusted R^2	0.231	0.198	0.418	0.151
R^2	0.242	0.212	0.431	0.179
F	21.18##	15.29##	32.58##	6.26##
Sum of Squares	2.271	2.677	3.753	2.491
Obs.	405	349	265	179

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 5.4
BOSTON OBSERVATIONS ONLY
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Independent Vars.	new car	used car	first. mort	sec.mort.
Intercept	6.624**	8.042**	6.841**	5.673**
	(16.19)	(15.62)	(17.87)	(4.92)
Assets	0.028	-0.048	0.003	0.091
	(1.19)	(1.64)	(0.12)	(1.36)
Holding Co.	-0.038*	-0.047*	-0.075**	-0.085
	(1.95)	(1.79)	(3.18)	(0.66)
Market Share	-0.032	0.033	-0.017	-0.088
	(1.35)	(1.09)	(0.76)	(1.37)
9/86	-0.065**	-0.025	-0.066**	-0.097
	(3.57)	(1.06)	(3.55)	(1.33)
12/86	-0.108**	-0.086**	-0.092**	-0.091
	(5.82)	(3.66)	(4.83)	(1.35)
3/87	-0.119**	-0.109**	-0.095**	-0.187**
	(6.56)	(4.71)	(5.29)	(2.81)
Adjusted R^2	0.273	0.253	0.343	0.133
R^2	0.305	0.288	0.380	0.278
F	9.31##	8.34##	10.22##	1.92
Sum of Squares	0.918	1.371	0.670	0.591
Obs.	134	131	107	37

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 5.5
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK DEPOSITS BASED STRUCTURAL VARIABLES
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
Intercept	6.984**	6.910**	7.126**	7.948**	5.555**
	(25.66)	(21.07)	(15.41)	(12.18)	(11.45)
Assets	0.002	0.004*	-0.016**	0.002	0.003
	(0.76)	(1.66)	(5.59)	(0.52)	(0.87)
Hourly Man. Earnings	-0.022	0.013	-0.027	-0.111	0.189**
	(0.56)	(0.28)	(0.43)	(1.21)	(2.62)
Urban	-0.025**	-0.050*	-0.003	0.212*	0.065
	(1.56)	(1.93)	(0.14)	(1.91)	(1.40)
Holding Co.	-0.006	-0.082**	-0.073**	-0.023	-0.062**
	(0.60)	(5.85)	(4.31)	(0.75)	(3.04)
HHI	0.034**	0.031	0.024	-0.031	0.048
	(1.93)	(1.32)	(1.17)	(0.79)	(1.48)
Market Share	0.007**	0.006*	-0.011**	0.002	0.010*
	(2.53)	(1.77)	(3.14)	(0.28)	(1.84)
MA	-0.015	0.029	0.015	0.011	
	(1.03)	(1.57)	(1.32)	(0.54)	
VT	-0.045**	0.055**	0.192**		
	(2.21)	(2.30)	(4.21)		

TABLE 5.5 (cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK DEPOSIT BASED STRUCTURAL MEASURES
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
9/86	-0.054** (5.53)	-0.041** (3.55)	-0.083** (6.54)	-0.052** (2.39)	-0.052** (2.79)
12/86	-0.083** (8.84)	-0.066** (5.63)	-0.109** (8.95)	-0.075** (3.66)	-0.057** (3.23)
3/87	-0.087** (9.20)	-0.076** (6.39)	-0.116** (9.25)	-0.142** (6.76)	-0.049** (2.75)
Adjusted R^2	0.228	0.224	0.420	0.164	0.211
R^2	0.249	0.246	0.438	0.204	0.234
F	11.53##	10.94##	25.11##	5.16##	10.18##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 5.6
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK AND THRIFT DEPOSITS BASED STRUCTURAL VARIABLES
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
Intercept	7.003**	6.853**	7.408**	8.053**	5.521**
	(25.52)	(20.82)	(16.12)	(12.40)	(11.29)
Assets	0.002	0.004*	-0.016**	0.002	0.003
	(0.77)	(1.75)	(5.64)	(0.61)	(0.82)
Hourly Man. Earnings	-0.001	0.029	-0.010	-0.124	0.224**
	(0.02)	(0.62)	(0.50)	(1.38)	(3.21)
Urban	-0.025	-0.045*	-0.073	0.202*	0.062
	(1.50)	(1.76)	(0.45)	(1.82)	(1.35)
Holding Co.	-0.006	-0.080**	-0.009**	-0.031	-0.064**
	(0.62)	(5.68)	(4.30)	(0.97)	(3.11)
HHI	0.013	0.025*	-0.009	-0.033	0.024
	(1.22)	(1.93)	(0.60)	(1.42)	(1.24)
Market Share	0.007**	0.005	0.005**	0.002	0.011**
	(2.60)	(1.51)	(2.60)	(0.38)	(2.08)
MA	0.001	0.048**	0.065	0.010	
	(0.07)	(2.92)	(0.34)	(0.39)	
VT	-0.041**	-0.083**	0.188**		
	(2.03)	(2.66)	(4.08)		

TABLE 5.6 (cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK AND THRIFT DEPOSIT BASED STRUCTURAL MEASURES
LOG-LOG SPECIFICATION
('t-statistic' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
9/86	-0.054**	-0.042**	-0.083**	-0.052**	-0.051**
	(5.49)	(3.56)	(6.52)	(2.39)	(2.77)
12/86	-0.082**	-0.066**	-0.108**	-0.075**	-0.056**
	(8.76)	(5.63)	(8.93)	(3.69)	(3.17)
3/87	-0.086**	-0.076**	-0.115**	-0.142**	-0.048**
	(9.12)	(6.40)	(9.23)	(6.81)	(2.70)
Adjusted R^2	0.223	0.227	0.420	0.170	0.211
R^2	0.245	0.249	0.438	0.209	0.234
F	11.26##	11.12##	25.14##	5.34##	10.20##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 5.7
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK DEPOSIT BASED STRUCTURAL VARIABLES
LINEAR SPECIFICATION
('t-statistic' in parentheses)

	new car	used car	first mort.	sec. mort.	personal
Ind Vars.					
Intercept in Basis Points	1125.01** (29.54)	1256.45** (24.64)	1085.68** (14.62)	1155.22** (11.98)	1029.06** (11.22)
Assets coef.x 10^7	3.054 (0.96)	0.843 (0.23)	-10.665** (2.63)	2.944 (0.46)	3.777 (0.67)
Hourly Man. Earnings	0.009 (0.27)	0.061 (1.17)	-0.010 (0.16)	-0.138 (1.58)	0.292** (3.82)
Urban	-14.881 (0.85)	-24.414** (2.42)	-11.165 (0.51)	318.552** (3.27)	103.407** (2.06)
Holding Co.	3.487 (0.34)	-71.649** (5.39)	-95.346** (5.62)	-11.858 (0.34)	-66.559** (3.42)
HHI	0.014* (1.67)	0.020 (1.59)	-0.001 (0.10)	-0.015 (0.63)	0.003 (0.16)
Market Share	0.249 (0.56)	-1.207** (4.70)	-0.010 (0.02)	-0.119 (0.10)	250.849** (3.06)
MA	9.018 (0.62)	66.095 (0.52)	18.395 (1.54)	17.973 (0.74)	
VT	-12.010 (0.59)	66.629** (2.63)	319.931** (6.50)		

TABLE 5.7
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
COMMERCIAL BANK DEPOSIT BASED STRUCTURAL VARIABLES
LINEAR SPECIFICATION
('t-statistic' in parentheses)

	new car	used car	first mort.	sec. mort.	personal
Ind Vars.					
9/86	-60.242** (5.63)	-78.304** (3.69)	-69.412** (5.95)	-60.176** (2.63)	-51.950** (2.99)
12/86	-90.045** (8.87)	-107.214** (5.67)	-96.752** (8.67)	-77.778** (3.87)	-79.657** (4.11)
3/87	-95.070** (9.27)	-107.792** (6.50)	-170.366** (8.48)	-70.214** (6.65)	-91.908** (3.68)
Adjusted R^2	0.205	0.212	0.329	0.181	0.345
R^2	0.226	0.235	0.349	0.220	0.364
F	10.46##	10.35##	17.55##	5.76##	19.53##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

Chapter 6: The Critical Concentration SCP Model

A: Introduction

The idea of a critical concentration ratio rests upon the notion that some minimal level of concentration must obtain before the firms in a market may collude. At concentration levels below this critical level, the costs of maintaining a cartel are insurmountable. That is, the costs of meeting, determining mutually beneficial collusive behavior, and monitoring and enforcing the collusive agreement are so high as to make collusion impracticable. The costs of reaching and maintaining a collusive agreement are sufficiently low at concentration levels in excess of this critical level to allow for collusion to occur.

This hypothesis implies that the true concentration price relationship is nonlinear. Price does not increase continuously with concentration but rather it jumps as concentration surpasses a threshold. If this hypothesis is true, models in which price varies continuously with concentration are subject to specification error. The correct model includes a binary variable representing concentration. This variable is either zero or one depending upon whether concentration is or is not above the threshold, i.e.the critical level. In this chapter I test for the effects of critical concentration on five retail banking rates.

Many previous researchers have also tested for the effects of critical concentration. Bain began the search for evidence of critical concentration when he noted significantly higher rates of return in American manufacturing industries in which the eight firm concentration ratio exceeded 0.70 than in less concentrated American manufacturing industries.[1] Since then, a number of researchers have performed inter-industry studies relating critical concentration to some performance measure, e.g.profitability or price cost margin.[2] These researchers have reached mixed results. Considering the underlying model generating a critical concentration level, this is not surprising. Critical concentration levels are likely to be industry specific. See Bradburd and Over for a general model providing the theoretical underpinnings for the existence of a critical concentration level.[3]

Proponents of the critical concentration variant of the SCP model may argue that single industry data, such as

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[1] See J.Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936 - 1940."

[2] See L. W.Weiss, "The Concentration-Profits Relationship and Antitrust" for a review of the literature up to 1974. See R.Schmalensee, Inter-Industry Studies of Structure and Performance for more recent citations.

[3] R.M.Bradburd and A.M.Over, "Organizational Costs, 'Sticky' Equilibria and Critical Levels of Concentration", Review of Economics and Statistics 64 (February 1982): 50-58. Bradburd and Over actually describe and test a model which generates two critical concentration levels. Preexisting collusive arrangements will continue so long as concentration remains above one critical concentration level. Concentration must exceed a higher concentration level in order for collusive arrangements to come into being when there was no collusive arrangement in the preceding period.

the loan rates from this dissertation, may provide stronger evidence of a positive critical concentration price relationship.

I report the results from four separate specifications of the following reduced form equation similar to Equation 1 from page 100. The difference between this reduced form and Equation 1 is that here a binary critical concentration variable, C*, replaces HHI from Equation 1.[1]

$$r_{i,t} = r_{i,t}(\text{assets}_{i,t},\ \text{hourly manufacturing earnings}_{i,t},\ \text{urban}_{i,t},\ \text{BHC}_{i,t},\ C^*_{i,t},\ \text{market share}_{i,t},\ \text{MA}_{i,t},\ \text{VT}_{i,t},\ \text{Sept.'86}_{i,t},\ \text{Dec.'86}_{i,t},\ \text{March '87}_{i,t},\ e_{i,t})$$

In two of the regressions, I used critical concentration levels generated by the switching regimes technique

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[1] There are many alternative specifications which I may have tested, e.g. the one discussed on pages 57 and 58 of this dissertation. That specification allows for concentration to have a linear effect on rates up to the critical level and no effect thereafter. If the regulators accepted the model discussed on pages 57 and 58, you would expect vigorous enforcement below the critical level because rates increase linearly with concentration. In fact, regulatory oversight is more lax below the critical level. After considering many alternative specifications, I settled on one which seemed appropriate given observed regulatory behavior. Future readers may identify specifications which more closely approximate observed regulatory behavior. Absent a priori theoretical arguments to the contrary, I would presume the results from estimating such a specification using this dissertation's data would be similar to the results shown here.

outlined by White.[1] I explicate the method in the Appendix to this chapter. In the other two regressions I have set the critical concentration levels at HHI=1800. As I explain below, bank regulators implicitly treat HHI=1800 as a critical concentration level in the commercial banking industry. Therefore, I tested for any critical concentration effect at this level of concentration. For each method of generating critical concentration levels, I tested for effects of critical concentration using both commercial bank deposit based structural variables and commercial bank plus thrift deposit based structural variables.

The results were mixed. Some critical concentration coefficients were negative. Many were insignificant. On the other hand, the critical concentration coefficients were significant (and positive) in all four new car loan rate regression. I discuss the methods and the findings in more detail below.

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[1] See L.White, "Searching for the Critical Industry Concentration Ratio: An Application of the Switching Regimes Technique", in Studies in Nonlinear Estimation, S.Goldfeld and R. Quandt, eds. (Cambridge, Mass.: Ballinger Publishing Company, 1972).

B: Switching Regimes Method

I: Introduction

The switching regimes method is a maximum likelihood method of identifying critical concentration levels. One should exercise caution in interpreting the t-statistics associated with the critical concentration coefficient when the level was identified using the switching regimes method because the switching regimes method chooses the critical concentration level to maximize the statistic's value. Goldfeld and Quandt have performed a number of Monte Carlo studies of the switching regimes technique used here and report that 5% significance F-tests of the existence of a switch point will falsely imply rejection of the null hypothesis up to 16% of the time.[1] In other words, the method may often lead the researcher to conclude a critical concentration level exists when it does not. Keeping this caveat in mind, let us move on to my empirical results from using the switching regimes method.

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[1] See L. White, "Searching for the Critical Industry Concentration Ratio: An Application of the Switching Regimes Technique," for reference to these studies.

II: Commercial Bank Deposit Based Structure Measures

The switching regimes method failed to identify a plausible critical concentration ratio in either the personal loan rate or the used car loan rate regressions. The method identified HHI=1494 as the critical concentration level for personal loan rate setting. This "critical concentration" level merely isolates the least concentrated market for which there were personal loan rate data, Albany, from the rest of the sample. That personal loan rates were lower in Albany than in the other sampled markets for which there were data is not a ringing endorsement for the critical concentration variant of the traditional SCP paradigm. The estimated critical concentration coefficient was approximately 0.05. This would imply a 5% discrepancy between personal loan rates in Albany and rates elsewhere.[1] It seems more appropriate to say rates are 5% lower in Albany than to say they are 5% higher everywhere else. It seems more reasonable that the characteristics of the Albany market are leading to lower rates than that the characteristics of the rest of the sample are leading to higher rates.

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[1] In a log-log specification, where b represents the coefficient for a dummy variable, the dependent variable is e^b greater when the dummy variable is one than when it is zero. For the effects of critical concentration on personal loan rates, $e^{0.05} = 1.05$.

The switching regimes method yielded an insignificant critical concentration ratio in the used car loan rate regression. The t-statistic was 1.77. This was not significant at the 5% level in a two tailed test. Moreover, the coefficient estimate was negative and large absolutely. The critical concentration coefficient was -0.140. This corresponds to used car loan rates approximately 13% lower in concentrated markets. The critical concentration level was HHI=2077.

The new car loan rate critical concentration coefficient was very small, only 0.041. This implies new car loan rates approximately 4% higher in concentrated markets. Although the estimated critical concentration ratio was a plausible HHI=2132, the minuscule coefficient estimate detracts from its value as supporting evidence for the SCP hypothesis.

The first mortgage results provide weak support for the paradigm. The critical concentration ratio was HHI=3385 and the coefficient estimate was significant at the 5% level in a two tailed test. Two Vermont banking markets, Stowe-Morristown and Woodstock had HHI numbers of 3386 or more. First mortgage rates in these markets were approximately 19% higher there than elsewhere (after correcting for differences in values of the control variables). These results may not be due to a causal concentration performance relationship. Stowe-Morristown

and Woodstock may have had high first mortgage rates for other reasons.

This first mortgage rate result supporting the traditional hypothesis is offset by the finding that markets in which the HHI is 2587 or more charge second mortgage rates approximately 21% lower than elsewhere (after accounting for differences in values for the control variables). The statistical significance of this second mortgage rate is suspect though. The critical concentration coefficient's t-statistic is only 2.10. As I mentioned, the t-statistics from the switching regimes method are inflated metrics of statistical significance.

III: Commercial Bank and Thrift Deposit Based Structure Measures

The results including thrifts' deposits to construct the structural measures were quite similar to the results using only commercial bank deposit based structural measures. Only the new car loan rate regression and the first mortgage rate regressions supported the paradigm. Just like the case in which structural variables were based solely upon commercial bank deposits, the personal loan rate and used car loan rate critical levels were much too low to plausibly accept as critical concentration ratios, i.e. concentration levels above which at least tacit collusion occurs. The personal loan rate critical level was

HHI=749, and the used car loan rate critical level was HHI=1075. The critical concentration coefficients were 0.049 and a very low 0.020 respectively. These coefficients imply personal loan rates approximately 5% higher in concentrated markets and used car loan rates approximately 2% higher in concentrated markets.

Just like the case in which the structural variables were based upon commercial bank deposits only, the second mortgage rate critical concentration coefficient was negative, -0.044. This coefficient estimate translates to second mortgage rates approximately 4% lower in concentrated markets. As with the personal loan and used car loan critical levels, the second mortgage critical level was too low to accept as a critical concentration ratio in the sense meant by supporters of the SCP paradigm. The estimated critical concentration level is HHI=897.

Again, the first mortgage rate results and the new car loan rate results support the SCP paradigm. The first mortgage rate critical concentration ratio was 3385, and the corresponding critical concentration coefficient estimate was 0.174. The new car loan rate critical concentration level was 2299 and the corresponding critical concentration coefficient estimate was 0.092. The critical concentration coefficient estimate translates to first mortgage rates 19% higher in markets where the HHI was 3386 or more, i.e.in Stowe-Morristown, VT and Woodstock, VT. The

new car loan rate critical concentration coefficient translates to new car loan rates 10% higher in the five markets in which the HHI was 2300 or more. As I mentioned above, the first mortgage rate results may be due to unidentified characteristics of the Stowe-Morristown and Woodstock, VT markets rather than due to concentration.

The results generally failed to support the efficient firms hypothesis. Market share coefficients were often positive and significant. This is consistent with market share being a source of market power in its own right rather than merely a proxy for efficiency. However, this result is also consistent with superior (in terms of consumer preference) products being sold by banks with greater market share. In this case, the positive effect of market share on rates may be a quality premium rather than the result of the exercise of market power.

C: Critical Concentration Levels at HHI=1800

I: Introduction

The Federal Reserve System and the Department of Justice both use the HH index as a measure of concentration to analyze the competitive aspects of proposed mergers. Both organizations treat HHI=1800 as an effective critical level. If a proposed merger does not raise the HHI by more than 200 points to a level above 1800, neither organization

is likely to oppose it on competitive grounds.[1] Because of this regulatory behavior, it is of interest to determine whether there is actually any difference in the pricing behavior of banks in markets with HH index numbers over 1800 versus those in less concentrated markets. I have included a binary concentration variable which is zero if a bank's market's HHI number is less than 1800 and one otherwise in regressions for each of the five rates of this paper. In this section I have performed the regressions with two alternative sets of HHI numbers and market shares. The numbers and shares are derived from two alternative deposit bases. The first set employs HHI numbers and market shares based upon commercial bank deposits only. The second set employs HHI numbers and market shares based upon deposits in all depository institutions in the markets.

The Supreme Court has ruled commercial banks and thrifts are in separate lines of commerce. Also, previous empirical work has used only commercial bank deposits to

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[1] See Federal Reserve Bulletin 74 #3 (March 1988),180-181, for the following quote."Under the revised Department of Justice Merger Guidelines, 49 Federal Register 26, 823 (June 29, 1984), a market in which the post merger HHI is above 1800 is considered highly concentrated.In such markets, the Department is likely to challenge a merger that increases the HHI by more than 50 points.The Department has informed the Board that a bank merger or acquisition generally will not be challenged (in the absence of other factors indicating anticompetitive effects) unless the post merger HHI is at least 1800 and the merger increases the HHI by at least 200 points.The Justice Department has stated that the higher than normal HHI thresholds for screening bank mergers for anticompetitive effects implicitly recognizes the competitive effect of limited purpose lenders and other non-depository financial entities."

construct structural measures, hence the first set of switching regimes regressions.[1] As I argued in Chapter 2, thrifts are equal competitors with banks in providing car loans, personal loans, and mortgages, hence the second set of switching regimes regressions.

II: Results

The results using either commercial bank deposits only or both commercial bank and thrift deposits as the basis for the structural variables were substantially identical. Generally, the regressions fail to support the existence of a critical concentration level at HHI=1800. The sole exceptions to this conclusion were the new car loan rate regression results. New car loan rates were significantly higher in markets where the HHI, however defined, exceeded 1800. The new car loan rate regression results are not surprising in light of the switching regimes results. The switching regimes method identified critical concentration levels in the HHI=2050 range using either commercial bank deposits or both commercial bank deposits and thrift deposits as the basis for market structure variables. It is not surprising then to find statistically significant differences between new car loan

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[1] See Chapters 6 and 2 of this dissertation for more discussion of the Supreme Court decision and previous empirical work respectively.

rates in markets with HHI greater than 1800 and those with HHI below 1800. The set of sample markets in which the HHI is greater than 1800 and the set of sample markets in which the HHI is greater than 2050 are similar.

The new car loan rate critical concentration coefficient was 0.032 when the market structure variables were based upon commercial bank deposits only and 0.038 when the market structure variables were based upon both commercial bank and thrift deposits. This corresponds to rates approximately 3% higher in markets where the commercial bank deposit based HHI exceeds 1800 or rates approximately 4% higher where the commercial bank and thrift based HHI exceeds 1800.

None of the other concentration coefficients were statistically significant. Several of the concentration coefficient estimates were negative, but all were absolutely much smaller than the new car loan concentration coefficient. None of the other coefficients exceeded 0.02 in absolute value.

The market share coefficients failed to substantiate the efficient firms hypothesis that market share is a proxy for efficiency. The market share coefficients were significant and positive in the car loan rate regressions and the personal loan rate regressions. They were significant and negative in the first mortgage rate regressions. The market share coefficients were insignificant in the second mortgage rate regressions. The

coefficients were all rather small. They ranged from 0.001 to 0.012. A market share coefficient of 0.012 suggests a doubling of market share will be associated with rates 1.2% (not 1.2 percentage points but actually 1.2 percent) higher. None of the other coefficient estimates were particularly noteworthy or unusual.

D: Summary and Conclusion

This chapter's results generally fail to support the critical concentration variant of the traditional SCP hypothesis. I found a statistically significant critical concentration effect on new car loan rates at HHI=2133 where the HHI was based upon commercial bank deposits only and at HHI=2300 where the HHI was based upon both commercial bank and thrift deposits. I also found statistically significant critical concentration effects on first mortgage rates at HHI=3386 where the HHI was based upon either commercial bank deposits only or both commercial banks' and thrifts' deposits. However, the coefficient estimate was very small in the new car loan rate regression in which only commercial bank deposits were used to create the structural variables. Also, the first mortgage results merely indicated high first mortgage rates in Stowe-Morristown and Woodstock. These markets may have high first mortgage rates for other unidentified reasons. The switching regimes method failed to identify critical

concentration effects for the other three loan rates (used car loans, personal loans, and second mortgages).

I found little support for a critical concentration level at HHI=1800, the implicit critical concentration level adopted by the regulatory authorities. There may be a critical concentration effect in new car loan rate setting and in first mortgage rate setting, but the evidence suggests it occurs at higher concentration levels than HHI=1800. I found no evidence of critical concentration levels below, at, or above HHI=1800 for the other three loan rates.

Generally, this chapter's results failed to substantiate the efficient firms claim that market share is a proxy for efficiency. Non-positive market share coefficients are consistent with the claim. However, many of the market share coefficients were positive and statistically significant. None of the coefficients were very large, so none were especially injurious to the efficient firms premise.

TABLE 6.1
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
SWITCHING REGIMES RESULTS
COMMERCIAL BANKS' DEPOSITS
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

	new car	used car	first mort.	sec. mort	personal
Crit.-Level Ind Vars.	HHI=2132	HHI=2077	HHI=3385	HHI=2587	HHI=1494
Intercept	7.525**	6.997**	7.303**	7.808**	6.078**
	(26.98)	(21.96)	(16.90)	(12.57)	(12.47)
Assets	0.001	0.004	-0.015**	0.001	0.003
	(0.57)	(1.61)	(5.48)	(0.36)	(1.02)
Hourly Man. Earnings	-0.062	0.034	-0.027	-0.126	0.160**
	(1.53)	(0.75)	(0.43)	(1.42)	(2.23)
Urban	-0.041**	-0.046*	0.002	0.229**	0.066
	(2.53)	(1.77)	(0.09)	(2.09)	(1.44)
Holding Co.	-0.003	-0.084**	-0.076**	-0.015	-0.069**
	(0.27)	(6.04)	(4.59)	(0.50)	(3.44)
Critical Concentration	0.041**	-0.140*	0.173**	-0.231**	0.049**
	(4.32)	(1.78)	(3.47)	(2.10)	(2.94)
Market Share	0.007**	-0.007**	-0.010**	0.001	0.010*
	(4.39)	(1.97)	(3.18)	(0.18)	(1.94)
MA	-0.035**	0.043**	0.014	0.018	
	(2.34)	(2.56)	(1.20)	(0.89)	
VT	-0.080**	0.049**	0.196**		
	(3.67)	(2.08)	(4.45)		

TABLE 6.1 (cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
SWITCHING REGIMES RESULTS
COMMERCIAL BANKS' DEPOSITS
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

	new car	used car	first mort.	sec. mort.	personal
Crit.-Level Ind Vars.	HHI=2132	HHI=2077	HHI=3385	HHI=2587	HHI=1494
9/86	-0.054**	-0.042**	-0.083**	-0.056**	-0.052**
	(5.63)	(3.54)	(6.64)	(2.58)	(2.84)
12/86	-0.083**	-0.065**	-0.109**	-0.078**	-0.057**
	(9.06)	(5.47)	(9.07)	(3.84)	(3.28)
3/87	-0.087**	-0.076**	-0.117**	-0.145**	-0.050**
	(9.41)	(6.38)	(9.46)	(6.97)	(2.84)
Adjusted R^2	0.256	0.227	0.437	0.179	0.226
R^2	0.277	0.249	0.454	0.218	0.248
F	13.32##	11.13##	26.83##	5.63##	11.02##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 6.2
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
SWITCHING REGIMES RESULTS
ALL INSTITUTIONS' DEPOSITS
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

Crit.-Level Ind Vars.	new car HHI=2299	used car HHI=1075	first mort. HHI=3385	sec. mort. HHI=897	personal HHI=749
Intercept	7.123**	6.944**	7.330**	7.446**	6.034**
	(27.20)	(21.70)	(17.01)	(11.52)	(12.31)
Assets	0.002	0.004	-0.015**	0.002	0.004
	(1.07)	(1.62)	(5.44)	(0.58)	(1.01)
Hourly Man. Earnings	-0.006	0.041	-0.032	-0.061	0.168**
	(0.02)	(0.88)	(0.52)	(0.64)	(2.33)
Urban	-0.044**	-0.048*	-0.002	0.181	0.065
	(2.66)	(1.88)	(0.08)	(1.64)	(1.42)
Holding Co.	-0.019*	-0.081**	-0.076**	-0.040	-0.070**
	(1.74)	(5.75)	(4.58)	(1.25)	(3.48)
Critical Concentration	0.092**	0.020**	0.174**	-0.044**	0.049**
	(4.37)	(2.35)	(3.50)	(2.18)	(2.90)
Market Share	0.009**	0.006*	-0.011**	0.003	0.011**
	(3.44)	(1.76)	(3.39)	(0.56)	(2.08)
MA	-0.010	0.048**	0.013	-0.006	
	(0.77)	(2.95)	(1.15)	(0.28)	
VT	-0.014	0.056**	0.189**		
	(0.69)	(2.34)	(4.24)		

TABLE 6.2 (cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
SWITCHING REGIMES RESULTS
ALL INSTITUTIONS' DEPOSITS
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

	new car	used car	first mort.	sec. mort.	personal
Crit.-Level Ind Vars.	HHI=2299	HHI=2077	HHI=3385	HHI=2587	HHI=1494
9/86	-0.054**	-0.042**	-0.083**	-0.052**	-0.052**
	(5.64)	(3.56)	(6.64)	(2.40)	(2.84)
12/86	-0.082**	-0.066**	-0.109**	-0.074**	-0.057**
	(8.92)	(5.64)	(9.09)	(3.64)	(3.28)
3/87	-0.086**	-0.076**	-0.117**	-0.141**	-0.050**
	(9.36)	(6.38)	(9.48)	(6.78)	(2.84)
Adjusted R^2	0.257	0.231	0.439	0.181	0.227
R^2	0.278	0.253	0.456	0.219	0.249
F	13.36##	11.36##	27.06##	5.68##	11.09##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 6.3
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
HHI=1800 CRITICAL LEVEL
COMMERCIAL BANK DEPOSIT BASED STRUCTURE VARIABLES
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
Intercept	6.906**	6.911**	7.457**	7.948**	5.767**
	(25.86)	(21.22)	(16.12)	(12.25)	(11.92)
Assets	0.001	0.004	-0.016**	0.002	0.003
	(0.61)	(1.60)	(5.67)	(0.56)	(0.92)
Hourly Man. Earnings	0.024	0.046	-0.045	-0.144	0.212**
	(0.62)	(0.97)	(0.68)	(1.56)	(3.02)
Urban	-0.027*	-0.049*	-0.010	0.210*	0.065
	(1.70)	(1.89)	(0.45)	(1.89)	(1.40)
Holding Co.	0.000	-0.080**	-0.073**	-0.024	-0.070**
	(0.02)	(5.58)	(4.34)	(0.75)	(3.38)
Critical Concentration	0.032**	0.015	-0.014	-0.016	-0.012
	(3.79)	(1.49)	(1.08)	(0.85)	(0.77)
Market Share	0.006**	0.006*	-0.008**	0.001	0.012**
	(2.33)	(1.70)	(2.20)	(0.24)	(2.19)
MA	-0.021	0.032*	0.011	0.013	
	(1.48)	(1.84)	(0.99)	(0.64)	
VT	-0.047**	0.058**	0.217**		
	(2.42)	(2.41)	(4.82)		

TABLE 6.3 (cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
HHI=1800 CRITICAL LEVEL
COMMERCIAL BANK DEPOSIT BASED STRUCTURE VARIABLES
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
9/86	-0.053**	-0.042**	-0.083**	-0.052**	-0.051**
	(5.56)	(3.55)	(6.54)	(2.40)	(2.75)
12/86	-0.081**	-0.066**	-0.109**	-0.075**	-0.056**
	(8.84)	(5.60)	(8.96)	(3.66)	(3.18)
3/87	-0.086**	-0.076**	-0.116**	-0.142**	-0.048**
	(9.25)	(6.38)	(9.26)	(6.78)	(2.67)
Adjusted R^2	0.248	0.225	0.420	0.165	0.207
R^2	0.269	0.247	0.437	0.204	0.230
F	12.80##	11.01##	25.08##	5.17##	9.98##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

TABLE 6.4
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
HHI=1800 CRITICAL LEVEL
ALL INSTITUTIONS DEPOSIT BASED STRUCTURE VARIABLES
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
Intercept	7.475**	7.171**	7.164**	7.705**	5.571**
	(26.06)	(20.31)	(15.47)	(11.09)	(10.68)
Assets	0.001	0.004	-0.015**	0.002	0.003
	(0.44)	(1.63)	(5.40)	(0.58)	(0.89)
Hourly Man. Earnings	-0.055	0.009	-0.007	-0.113	0.242**
	(1.33)	(0.18)	(0.10)	(1.13)	(3.17)
Urban	-0.027*	-0.049*	0.007	0.218**	0.063
	(1.69)	(1.90)	(0.33)	(1.97)	(1.35)
Holding Co.	-0.001	-0.081**	-0.073**	-0.019	-0.070**
	(0.07)	(5.64)	(4.32)	(0.61)	(3.34)
Critical Concentration	0.038**	0.016	-0.019	-0.010	-0.008
	(3.53)	(1.16)	(1.06)	(0.38)	(0.41)
Market Share	0.007**	0.006*	-0.010**	-0.000	0.012**
	(2.64)	(1.68)	(3.01)	(0.09)	(2.30)
MA	-0.005	0.041**	0.012	0.014	
	(0.39)	(2.52)	(1.07)	(0.72)	
VT	-0.071**	0.081**	0.210**		
	(3.25)	(2.76)	(4.31)		

TABLE 6.4(cont.)
ORDINARY LEAST SQUARES COEFFICIENT ESTIMATES
HHI=1800 CRITICAL LEVEL
ALL INSTITUTIONS DEPOSIT BASED STRUCTURE VARIABLES
LOG-LOG SPECIFICATION
('t-statistics' in parentheses)

Ind Vars.	new car	used car	first mort.	sec. mort.	personal
9/86	-0.054**	-0.042**	-0.083**	-0.052**	-0.051**
	(5.62)	(3.53)	(6.51)	(2.40)	(2.75)
12/86	-0.083**	-0.066**	-0.108**	-0.074**	-0.056**
	(9.00)	(5.61)	(8.89)	(3.63)	(3.14)
3/87	-0.088**	-0.076**	-0.115**	-0.141**	-0.047**
	(9.39)	(6.37)	(9.16)	(6.72)	(2.64)
Adjusted R^2	0.245	0.221	0.422	0.162	0.208
R^2	0.266	0.244	0.439	0.202	0.231
F	12.57##	10.80##	25.26##	5.10##	10.03##

* significant at 5% level in one tailed test
** significant at 5% level in two tailed test
significant at the 1% level
significant at the 10% level

Appendix to Chapter 6

To aver the existence of a critical concentration level is to aver the existence of two separate regimes which determine bank loan rates. One regime applies in markets with concentration levels below the critical level; the other regime applies in markets with concentration levels equal to or greater than the critical level. Algebraically:

$r_{1,i}=f_{1,i}$(assets, local wage rate,...)

$r_{2,i}=f_{2,i}$(assets, local wage rate,...)

$f_{2,i} - f_{1,i} = c_i$

where $r_{1,i}$= rate charged for ith loan service when concentration is less than the critical level, i.e.under the first regime.

$r_{2,i}$ = rate charged for ith loan service when concentration is greater than the critical level, i.e.under the second regime.

c_i = constant.

Considering a sample ordered by concentration, determination of the critical concentration level is determination of the concentration level at which the appropriate rate setting regime switches from f_1 to f_2. Determination of the critical concentration level is equivalent to partitioning the sample. We can write the log-likelihood function conditional on any such partition:

Log L = $-N*\log[(2*pi)^{1/2}] - N/2 - (N_1/2)*\log[(SSE1)/N_1 -$

$$(N_2/2)*\log[(SSE2)/N_2$$

where

N = total number of observations in the sample

N_1 = observations such that the HH index is less than the critical level

N_2 = observations such that the HH index is greater than the critical level

SSE_1 = the sum of squared errors from performing the regression, sans the critical concentration variable, on N_1

SSE_2 = the sum of squared errors from performing the regression, sans the critical concentration variable, on N_2

Log-likelihood functions can be evaluated for all partitions of the data (N_1,N_2) where inclusion in either N_1 or N_2 is determined by market concentration. That partition, read critical concentration level, which implies the greatest log-likelihood function is the maximum likelihood estimate of the true partition and implicitly the true critical concentration level.

Assuming the regimes differ only in intercept, this simplifies to selecting that critical concentration level which yields the highest t-statistic in absolute value.[1] The hypothesis I am investigating in this dissertation is that banks in concentrated markets charge higher rates than otherwise identical banks in less concentrated markets. The

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[1] See L. White, "Searching for the Critical Industry Concentration Ratio: An Application of the Switching Regimes Technique" p.65.

assumption that the intercept value is the only difference between the regimes seemed appropriate for my purpose.

Chapter 7: Commercial Banking Acquisitions and Shareholder Wealth

A: Introduction

In this chapter, I investigate the impact of management shareholding on banks' probability of engaging in acquisitions which reduce shareholder wealth. I perform an event study to assess the abnormal stock returns associated with banks' acquisition announcements. This event study yields a subsample of banks which have made acquisitions which have diminished shareholder wealth. That is, a subsample of banks whose stock price was negatively affected by the acquisition announcement. I then compare this subsample to the subsample of banks whose acquisition announcements did not reduce shareholder wealth to determine whether management's share of outstanding common stock affects a bank's likelihood of making a shareholder wealth reducing acquisition.

This is a test of the proposition that managerial self-interest motivates merger activity which is inimical to shareholders' interests. Presumably, as management's share of a firm's equity diminishes, its propensity to take actions which enrich itself at shareholders' cost increases. This is so because as management's share of equity diminishes its share of costs imposed upon

stockholders diminishes. There are a number of actions managers may take which serve their own interests but do not serve the interests of their companies' shareholders. Many previous researchers have hypothesized that, under certain circumstances, increasing firm size may be one such action. A finding that high management shareholding diminishes the probability of a shareholder wealth reducing acquisition would support the proposition that shareholder wealth reducing acquisitions are motivated by managerial self-interest.

My empirical results do not support this proposition. None of the statistical tests indicate that bank managers with low own-company shareholding are more likely to engage in shareholder wealth reducing acquisitions than other bank managers. I conclude shareholder wealth reducing acquisitions in the banking industry are the result of management error in assessing the value of acquisition candidates. My results and conclusions are consistent with prior inter-industry research which failed to substantiate the management-self-interest hypothesis and with theoritical arguments that management self-interest is especially unlikely to explain commercial banking acquisitions.

B:Literature Review

There are four bodies of literature especially relevant to this chapter's analysis. First are the scores of event studies using inter-industry data to identify the winners and losers from mergers and acquisitions. Second are the relatively few event studies investigating the winners and losers in commercial banking mergers and acquisitions. These two groups of work are relevant because this chapter itself contains an event study examining commercial banking acquisitions. They are also relevant because they suggest that commercial bank acquisitions are on average non-positive net present value investments.

The third relevant body of literature includes those articles and books suggesting that managers may act to increase firm asset size even when this is not in stockholders' interests. These articles provide a number of theoretical justifications for management to prefer a larger firm. This work motivates the second stage of my analysis in which I investigate the relationship between management shareholding and abnormal returns from acquisition announcements.

The final relevant body of literature is the work done investigating the operating characteristics of acquired banks. These studies are relevant to this chapter because their results suggest many commercial banking mergers and

acquisitions enhance efficiency. Although acquisitions may reduce bidders' shareholders wealth, they may also increase net social welfare. The results from these analyses may be useful in interpreting the implications of a finding that managerial self-interest does in fact motivate many acquisitions.

In addition to these bodies of literature, one specific article "Merger Decisions and Executive Stock Ownership in Acquiring Firms,"[1] is especially relevant to this chapter. "Merger Decisions..." is analytically similar to this chapter. Like this chapter, "Merger Decisions..." investigates the impact of management shareholding on the probability of engaging in acquisitions which reduce shareholder wealth.

Two thorough literature reviews on the market for corporate control summarize the inter-industry, event study, corporate acquisitions literature. These are Jarrell, Brickley and Netter's, "The Market for Corporate Control: The Empirical Evidence Since 1980,"[2] and Jensen and Ruback's, "The Market for Corporate Control: The

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[1] W. Lewellen, C. Loderer and A. Rosenfeld, "Merger Decisions and Executive Stock Ownership in Acquiring Firms," Journal of Accounting and Economics 7 (1985): 209-31.

[2] G. A. Jarrell, J. A. Brickley and J. M. Netter, "The Market for Corporate Control: The Empirical Evidence Since 1980," Journal of Economic Perspectives 2 (Winter 1988): 49-68.

Scientific Evidence."[1] According to both reviews, the evidence suggests shareholders of target firms earn positive abnormal returns following acquisition announcements while shareholders of acquiring firms earn no abnormal returns. The equity markets generally view acquisitions as enhancing efficiency, however all benefits accrue to target shareholders. Although this conclusion is consistent with shareholder wealth maximization by bidders' managers, it raises the question of why managers make acquisition bids which do not benefit their own shareholders. One explanation is that the equity markets are wrong and that managers see opportunities for synergies which more than offset the cost of the acquisition to the acquirer. Current evidence refutes this explanation. Gains to bidders from mergers and acquisitions during the 1960s were typically overestimated by the equity markets, not underestimated.[2] Another hypothesis, tested in this chapter for commercial banking acquisitions, is that managers' and shareholders' interests diverge. Acquisitions may generate benefits for managers despite the fact they generate non-positive returns for shareholders. Assume a firm's manager owns some share, alpha, of the

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[1] M.C. Jensen and R.S. Ruback, "The Market for Corporate Control: The Scientific Evidence," Journal of Financial Economics 11 (1983): 5-50.

[2] See M. E. Porter, Competitive Advantage (New York: The Free Press, 1985): 317-23 for a discussion of the failure of many acquisitions from the acquirers' shareholders' point of view.

firm's equity. Each dollar reduction in the firm's market value costs the manager alpha dollars. Presumably, as alpha falls, the manager is increasingly likely to exercise options which enrich himself but cost shareholders. The manager's benefits from exercising these options are constant but his share of the cost is decreasing.[1] My empirical results do not support this explanation for commercial banking mergers and acquisitions. Proponents of the management self-interest theory may overstate the gains to acquiring managers generally, or to acquiring bank managers specifically. Alternatively, they may understate the costs. A final explanation, forwarded by Richard Roll, is that managers tend to overestimate the efficiency gains they can wrench from targets and subsequently overbid. This is known as Roll's hubris hypothesis and is consistent with this chapter's empirical results.[2] Before proceeding, we must determine whether commercial banking organizations tend to make shareholder wealth reducing acquisitions at all. Do the inter-industry event study results extend to commercial banking?

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[1] See M. C. Jensen and W. H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," Journal of Financial Economics 3 (1976): 305-60, for a more thorough discussion of the relationship between alpha, firm value and non-pecuniary benefits for managers.

[2] See R. Roll, "The Hubris Hypothesis of Corporate Takeovers," The Journal of Business 59 (April 1986): 197-216.

The commercial banking event study literature suggests shareholders in acquiring firms typically do not merely break-even in acquisitions but actually lose. This is especially surprising given that there are fewer potential bidders for banks than for typical industrial targets. The Glass-Steagall Act restricts most established companies from acquiring commercial banks, and interstate banking restrictions further limit the number of potential bidders. Given less competition, commercial banking bidders would appear better positioned than bidders in other industries to benefit their shareholders through acquisitions. Nonetheless, the most recent evidence suggests acquirers not only lose in commercial banking acquisitions but lose more than the targets' shareholders gain.

The most recent evidence regarding the effects of commercial banking acquisitions on shareholder wealth is Hannan and Wolken's, "Returns to Bidders and Targets in the Acquisition Process: Evidence from the Banking Industry,"[1] This is the only study which examines the net gains to targets' and acquirers' from commercial banking acquisition announcements. Hannan and Wolken found that bidding firms' shareholders generally suffered substantial, statistically significant losses upon announcement of planned acquisitions. Moreover, these losses outweighed the

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[1] Timothy H. Hannan and John D. Wolken, "Returns to Bidders and Targets in the Acquisition Process: Evidence from the Banking Industry," Journal of Financial Services Research 3 (1989): 5-16.

substantial, statistically significant gains to targets' shareholders which they also found. The authors also cite three other studies which found no gain for bidders and significant gains for targets.[1] These other studies did not test to see whether the net gain to all shareholders was significantly different from zero.

Sushka and Bendeck[2] also find evidence that bidders lose in commercial banking acquisition announcements. They find significant losses for bidders in "non-emergency acquisitions," i.e. acquisitions which are not acquisitions of failed banks conducted under the aegis of the commercial banking regulatory authorities. Interestingly, Sushka and Bendeck find statistically significant, positive abnormal returns accruing to bidders' shareholders in "emergency acquisitions." This result is not inconsistent with the body of work cited above finding bidders' shareholders generally lose in acquisitions involving healthy

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[1] These three studies are Francisco de Cossio, J. W. Trifts and K. P. Scanlon, "Bank Equity Returns: The Difference Between Intrastate and Interstate Bank Mergers," Working Paper, Division of Research, College of Business Administration, University of South Carolina (1987); C. M. James and P. Weir, "Determinants of the Division of Gains in Corporate Acquisitions: Evidence from the Banking Industry," University of Oregon Mimeo, (January 1987); and J. W. Trifts and K. P. Scanlon, " Interstate Bank Mergers: The Early Evidence," The Journal of Financial Research 10 (Winter 1987): 305-11. Hannan and Wolken also cite M. M. Cornett and S. De, "An Examination of Stock Market Reactions to Interstate Bank Mergers," Southern Methodist University Mimeo (1989). The Cornett and De study finds positive abnormal returns for the bidders on the announcement day but find these results are lost in the days following the announcement. The cumulative abnormal returns calculated from the day before the announcement to 15 days after the announcement are negative.

[2] M. E. Sushka and Y. Bendeck, "Bank Acquisitions and Stockholders' Wealth," Journal of Banking and Finance 12 (December 1988)" 551-62.

institutions. Takeovers of failed institutions are governmentally managed and assisted. The heavily regulated market for corporate control of failed institutions may be non-competitive (thereby allowing for positive returns to bidders) while the freer market for control of healthy institutions may be competitive (implying non-positive returns to bidders).[1]

A study by Dubovsky and Fraser[2] finds that shareholders of bidding banks are even less likely to gain from acquisition announcements now than they were in the past. The authors constructed samples of likely target banks and likely bidding banks. They then examined stock price reactions for the two types of banks to recent court decisions limiting the regulatory authorities ability to block commercial banking mergers and acquisitions on competitive grounds. The court decisions positively affected the target sample and negatively affected the bidder sample. The equity markets viewed the decisions as making it easier for bank management to succeed in acquisitions which would not be in the bidding shareholders' interests. The authors noted their results

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[1] R. H. Pettway and J. W. Trifts, "Do Banks Overbid When Acquiring Failed Banks?" Financial Management (Summer 1985): 5-15, find that the market for failed banks is also competitive. They find banks generally overbid for failed institutions.

[2] D.A. Dubovsky and D.R. Fraser, "The Differential Impact of Two Significant Court Decisions Concerning Banking Consolidation," Journal of Banking and Finance 13 (July 1989): 339-54.

were consistent with the hypothesis that many acquisitions are in management's interest but not shareholders' interest.

Many researchers agree with Dubovsky and Fraser that acquisitions may benefit management at owners' expense. As early as 1962, respected neoclassical economists asserted that growth in the size of the firm is an explicit management goal.[1] Marris[2] provided the first empirical evidence of this by showing that both pecuniary and non-pecuniary returns to management were an increasing function of the firms growth rate. Many other researchers have subsequently shown that management compensation is an increasing function of firm size and/or growth rate.[3] One of the most recent of these studies finds the elasticity of banking CEO pay to asset size to be about one third.[4]

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[1] See W. J. Baumol, "On the Theory of the Expansion of the Firm," American Economic Review 52 (1962): 1078-1087.

[2] R. Marris, The Economic Theory of Managerial Capitalism (Glencoe, IL 1964).

[3] Examples include W. J. Baumol, Business Behavior, Value and Growth (New York: Harcourt, Brace and World 1967); D. H. Ciskel and T. N. Carroll, "The Determinants of Executive Salaries: An Econometric Survey," Review of Economics and Statistics 62 (February 1980): 7-13; A. T. Coughlan and R. M. Schmidt, "Executive Compensation, Management Turnover and Firm Performance," Journal of Accounting and Economics 7 (April 1985): 43-66; and K. J. Murphy, "Corporate Performance and Managerial Remuneration: An Empirical Analysis," Journal of Accounting and Economics 7 (April 1985): 11-42.

[4] See J. R. Barro and R. J. Barro, "Pay, Performance and Turnover of Bank CEOs," National Bureau of Economic Research Working Paper Number 3262, February 1990.

Recently, Schleiffer and Vishny summarized managers' non-value-maximizing incentives for making acquisitions. These were increasing the size of the firm, increasing the growth rate of the firm, diversification of the manager's human capital, and making the manager less replaceable.[1] They argued that "Acquisitions ... may provide managers with their greatest opportunity for expressing their non-value-maximizing preferences." They later vocalized the exact proposition tested later in this chapter, "It is not that managers make valuation mistakes, but rather that they pay for the benefits of the acquisition that they care about but shareholders do not."

The literature does not suggest managers' taste for acquisitions is constant across industries. Some theories regarding managerial motives suggest that the incentive to engage in wealth reducing acquisitions may be lower in banking than in other industries. Diversification is often cited as a management goal in the market for corporate control. Managers may seek to diversify into high growth industries, or managers may seek to diversify to reduce the variability of corporate earnings, or managers may seek to diversify to better utilize their own human capital and make themselves less replaceable to the firm.[2] Federal

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[1] A. Schleifer and R. Vishny, "Value Maximization and the Acquisition Process," Journal of Economic Perspectives 2 (Winter 1988): 7-20.

[2] See A. Schleifer and R. Vishny, "Value Maximization and the Acquisition Process," for arguments that managers seek to diversify irrespective of the effect of diversification on shareholder wealth.

bank merger regulation allows bank holding companies to diversify only into areas which are "closely related to banking and a proper incident thereto."[1] This regulation removes the diversification incentive for banking managers contemplating acquisitions. Management self-interest may be less likely to motivate shareholder wealth reducing acquisitions in banking than in other industries because bank managers have less to gain via acquisition activity.

The literature discussed thus far has addressed whether banks make acquisitions which do not benefit their own shareholders, and, if so, why? Apart from the question of whether commercial banking acquisitions benefit bidders' shareholders is the question of whether commercial banking acquisitions benefit society. Only the studies of the operating performance of acquired banks confront this issue. These operating performance studies attempt to determine whether commercial banking acquisitions are generally a mechanism to correct for poor management of target banks. They test the hypothesis that poorly managed banks attract bidders seeking to profit by improving management and enhancing the targets' performance.

The operating performance studies employ one or both of the following methodologies. The first is to employ logit and/or probit analysis to estimate the relationship between the likelihood of a bank's being acquired and that

[1] 12 U.S.C. § 1843(c)(8).

bank's market and firm characteristics. Bank profitability, bank deposit growth and/or expense to asset ratios are included among the explanatory variables. A significant negative relationship between profitability or deposit growth and likelihood of being acquired is interpreted as evidence that acquisitions are market responses to poor management at target banks. A significant positive relationship between likelihood of being acquired and any of the expense ratios is interpreted the same way.

The second type of operating performance study compares the post-acquisition performance of acquired banks to a sample of banks which were not acquired by another bank or bankholding company. The authors then test to see whether the acquired banks are better performers than the non-acquired banks. There are two articles utilizing this technique.[1] Both articles test for whether post-acquisition profit rate is higher or expense rates are lower at acquired banks than at a sample of comparable banks which were not recently acquired. Neither article finds that acquired banks outperform other banks. This result is not surprising since the relevant question is whether acquired banks do better than they would have done

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[1] S. Rhoades, "The Operating Performance of Acquired Firms in Banking," in Issues After a Century of Federal Competition Policy, eds. Wills, Caswell, and Culbertson (Massachusetts: Lexington Books, 1987) and Stephen A. Rhoades, "Billion Dollar Bank Acquisitions: A Note on the Performance Effects," Federal Reserve Board of Governors unpublished manuscript (Fall 1989).

if they had not been acquired and not whether they do better than other banks.[1] That a bank's post-acquisition performance is substantially improved over its pre-acquisition performance does not imply or require that its post-acquisition performance surpass market average performance. For example, assume there are two types of banks: high performers and low performers. Assume that performance is determined exclusively by management quality. High performers earn 20% annual rate of return. Poor performers earn 10% annual rate of return. Assume that all of the poor performers are acquired by firms seeking to profit by improving the targets' performance, that the acquirers institute better management and that this increases the poor performers annual rate of return to 20%. In this example, bad management does attract bidders, the acquisitions do increase social welfare, but the acquired banks do not outperform the average bank.

Let us now consider the logit/probit analyses of the pre-acquisition characteristics of acquired banks. Neither Rhoades (1987)[2], Hannan and Rhoades[3], nor Rhoades (1989)[4]

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[1] See P. M. Healy, K. G. Palepu and R. S. Ruback, "Does Corporate Performance Improve After Mergers?" National Bureau of Economic Research Working Paper Number 3348, May 1990 for an alternative methodology for evaluating the post-acquisition performance of acquired firms. The authors compare the acquired firm's post-acquisition performance relative to other firms in the industry, using accounting data, to their pre-acquisition performance. They find acquired firms' performance improves significantly.

[2] S. Rhoades, "The Operating Performance of Acquired Firms in Banking."

found any evidence that target banks were poor performers. However, Amel and Rhoades[1] find substantial evidence that poorly performing banks are especially likely to be acquisition targets. Amel and Rhoades report the results from 12 yearly, cross sectional, logit regressions explaining the determinants of the probability of being acquired. In three of the regression equations, the profitability coefficients were negative and significant at the 1% level (probability of being acquired increases as profitability decreases). In two of the regression equations, the profitability coefficients were negative and significant at the 5% level. In one of the regression equations, the profitability coefficient was negative and significant at the 10% level. The profitability coefficients were negative in all of the regressions equations. In two of the regression equations, the bank growth coefficients were negative and significant at the 5% level. In one of the regression equations, the bank growth coefficient was negative and significant at the 10% level.

Amel and Rhoades' results are especially convincing given that this type of analysis is a low power test of the

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[3] T. H. Hannan and S. A. Rhoades, "Acquisition Targets and Motives: The Case of The Banking Industry," Review of Economics and Statistics 69 (February 1987): 67-74.

[4] S. A. Rhoades, "Billion Dollar Bank Acquisitions: A Note on the Performance Effects."

[1] D. F. Amel and S. A. Rhoades, "Empirical Evidence on the Motives for Bank Mergers," Eastern Economic Journal 15 (January-March 1989): 17-27.

social welfare benefits of banking acquisitions. The power is low because improving management quality is just one way a merger or acquisition may be socially beneficial. Exploiting economies from joint operation of the organizations involved in the transaction may be another way an acquisition may be socially beneficial.[1] In this case, the pre-merger operating characteristics of acquired banks may not be especially bad. The power is also low because the study uses accounting rate of return. Accounting rate of return is merely a proxy for the appropriate explanatory variable, economic rate of return.

The Amel and Rhoades results that poorly managed banks are more likely to be acquired are more convincing than the other studies' results that poorly managed banks are not more likely than well managed banks to be acquired. Amel and Rhoades sample is larger than the other papers' samples and is based on all meaningful mergers and acquisitions in a relatively recent time period.[2] The other papers' samples include data from the Sixties and early Seventies, a period which was arguably fundamentally different from

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[1] M. Quint, "New York Banks See the Logic of Merging," New York Times (October 22, 1990): D1 recently made just this argument for an expected increase in merger activity among New York commercial banks.

[2] The sample includes all commercial banking mergers and acquisitions between 1978 and 1983 satisfying the following criteria: involving either two commercial banks, two bankholding companies or a commercial bank and a bankholding company; involving two organizations which were not commonly owned prior to the acquisition; involving the purchase of at least 25% of the equity of the target; and not involving the purchase of a failed institution. The resulting sample included 1724 acquired banks.

today in terms of the market for corporate control of commercial banks. Hostile takeovers were far less likely to be successful in the Sixties and early Seventies than they are today; acquisitions motivated by poor target management are more likely than other takeovers to be hostile. Lower probability of success may have discouraged takeover attempts motivated by bad management at the target. Two of the other studies' samples were also less representative of the universe of banks than the Amel and Rhoades' sample. Hannan and Rhoades'[1] sample includes only Texas banks. Rhoades (1989)[2] includes only acquisitions in which both parties had assets in excess of one billion dollars.

The Amel and Rhoades results suggest that many commercial banking acquisitions increase net social welfare.[3] Merger activity is not motivated entirely by hubris or a management yen for maximization of bank size. This result suggests a temperate public policy response even if there were evidence that commercial banking mergers and acquisitions do not benefit acquiring firms' shareholders.

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[1] T. H. Hannan and S. A. Rhoades, "Acquisition Targets and Motives: The Case of The Banking Industry."

[2] S. A. Rhoades, "Billion Dollar Bank Acquisitions: A Note on the Performance Effects."

[3] Note this does not imply these acquisitions enhance bidders' shareholders' welfare.

Lewellen, Loderer and Rosenfeld's article, "Merger Decisions and Executive Stock Ownership in Acquiring Firms,"[1] is especially relevant to this chapter. Lewellen, Loderer and Rosenfeld investigate the relationship between stock returns to bidders in completed mergers and the degree to which managements' annual compensation is tied to firm value. Despite their claims to the contrary, their study does not support the proposition that substantial amounts of own-company share ownership help align managements' and shareholders' interests.

Lewellen, Loderer and Rosenfeld analyzed 191 completed mergers effected during the period from 1963 to 1981 in a variety of industries. They performed event studies to determine the abnormal returns to bidding shareholders from the period beginning five days prior to the announcement date and ending on the completion date of the acquisition. They then investigate the relationship between abnormal returns and three variables meant to measure the degree to which management's total remuneration is tied to firm value. These three variables are alpha (the ratio of outstanding equity owned by management), the ratio of the dollar value of own-company stockholdings to compensation from employment, and the ratio of the expected annual income from own-company stockholdings to compensation.

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[1] W. Lewellen, C. Loderer, and A. Rosenfeld, "Merger Decisions and Executive Stock Ownership in Acquiring Firms."
[1] W. Lewellen, C. Loderer, and A. Rosenfeld, "Merger Decisions and Executive Stock Ownership in Acquiring Firms," 220.

Alpha is a measure of the cost to management of failing to maximize firm value. The other two ratios are measures of the positive incentives for management to maximize firm value.

Lewellen, Loderer and Rosenfeld performed a number of statistical tests concerning the relationship between own-company shareholding and abnormal returns. None of the tests applicable to the specific hypothesis, that "managers with substantial amounts of money invested in their firms' common stock will engage less frequently in activities that harm shareholders,"[1] yielded statistically significant results. The authors compared mean shareholding for firms which had made acquisitions yielding negative abnormal returns versus all other firms in the sample and firms which had made statistically significant negative abnormal returns versus all other firms in the sample. The firms with negative returns and the firms with statistically significant negative returns had lower mean management shareholding. The authors were unable to test the statistical significance of the differences in means because of the distributional properties of alpha. Therefore, the authors performed non-parametric median comparison tests. The subsample of firms with negative abnormal returns had lower median management shareholding than the rest of the firms in the sample, and the subsample

[1] W. Lewellen, C. Loderer, and A. Rosenfeld, "Merger Decisions and Executive Stock Ownership in Acquiring Firms," 220.

of firms with statistically significant, negative abnormal returns had lower median management shareholding than the rest of the firms in the sample. However, these differences in medians were not statistically significant. The authors then performed a non-parametric test of independence between management shareholding and abnormal returns. They failed to reject the null hypothesis that the two variables were independent.

Finally, the authors performed two tests which did show a statistically significant relationship between management shareholding and abnormal returns. However, these tests identified high abnormal returns by firms with very high management shareholding rather than low management shareholding by firms with negative abnormal returns. The test results neither support nor refute the authors' hypothesis. In the first test, the authors regressed abnormal returns on management shareholding. The slope coefficient was positive and significant at the 5% level in a two tailed test. The problem with this evidence is that the regression results may have been driven by particularly good acquisitions among high management shareholding firms rather than bad acquisitions by low management shareholding firms. The authors next set of tests indicated that this was the case.

The authors partitioned the sample into fractiles based upon management shareholding and compared mean abnormal returns among fractiles. They report the results

for six such comparisons of means. Of those six, two comparisons yielded statistically significant results. Abnormal returns were statistically significantly higher for the top 20% of firms (in terms of management shareholding) than for the bottom 80%, and abnormal returns were statistically significantly higher for the top 10% than for the bottom 90%. As I mentioned above, these two comparisons show that high management shareholding firms made particularly good acquisition decisions from the shareholders' perspective, but they do not show that low management shareholding firms made particularly bad acquisition decisions from the shareholders' perspective. A better test for whether low management shareholding firms made bad acquisition decisions would have been to compare abnormal returns for the bottom 10% versus the top 90% or the bottom 20% versus the top 80%. The authors do not report the results from these comparisons. They do report the results from comparing the bottom 10% versus the top 10%, the bottom 20% versus the top 20%, the bottom 50% versus the top 50%, and the bottom 70% versus the top 30%. None of these comparisons yielded statistically significant results.

Lewellen, Loderer and Rosenfeld conclude that their results indicate managerial self-interest motivates shareholder wealth reducing merger decisions. I would argue the results are inconclusive and generally fail to support the hypothesis. Most of their findings are

statistically insignificant. Those findings which are statistically significant indicate that high management shareholding is related to exceptionally high abnormal returns rather than showing low shareholding is related to negative abnormal returns.[1]

C:Methodology and Data Sources

The methodology employed in this chapter is similar to that in Lewellen, Loderer and Rosenfeld. I performed an event study based upon 87 commercial banking acquisitions announced between 1987 and 1989. I assumed stock returns followed the market model:

$$R_{it} = a_i + \beta_i R_{mt}$$

where,

R_{it} = returns to security i on day t

R_{mt} = market returns on day t

a_i, β_i = parameters to be estimated

I estimated a_i and β_i for each acquirer using a sample period beginning 90 days prior to the acquisition announcement and ending 15 days prior to the announcement. I then analyzed abnormal returns for dates surrounding the announcement date. Abnormal returns were actual returns

[1] W. H. Mikkelson and R. S. Ruback also review Lewellen, Loderer and Rosenfeld. They conclude "These mixed results do not support the proposition that investment decisions differ systematically between firms with high and firms with low management ownership of common stock." See W. H. Mikkelson and R. S. Ruback, "Takeovers and Managerial Compensation: A Discussion," Journal of Accounting and Economics 7 (1985), 234.

for a given date minus forecasted returns. Forecasted returns were based upon the market model and the estimated a_i and $ß_i$. Stock returns were obtained from the CRSP data files, and are adjusted for splits and dividends. R_{mt} is represented by the CRSP value weighted index. I made no corrections for serial correlation in the stock returns. This follows typical event study methodology and Monte Carlo evidence that correcting for serial correlation does not notably improve test statistic specification in event studies using daily stock returns.[1]

The sample of banks for the event study was derived from listings of completed acquisitions reported in Mergers and Acquisitions between March 1987 and August 1990. I excluded all transactions for which there was no announcement in the Wall Street Journal Index or for which the announcement made no mention of the financial terms of the acquisition. I excluded mergers in which the roles of "acquirer" and "target" could not be assigned with a reasonable degree of certainty. I also excluded acquirers from the sample if they did not file definitive proxy statements with the SEC during the year of the acquisition. (The proxy statements were the source of the management shareholding data.) The sample does not include acquisitions of less than a 25% equity stake, nor does it include takeovers of failed institutions. The sample

[1] See S. J. Brown and J. B. Warner, "Using Daily Stock Returns: The Case of Event Studies," Journal of Financial Economics 14 (1985), 19-20.

includes only acquisitions by commercial banks or by commercial bankholding companies.

In the second stage of the analysis, I investigated the relationship between management shareholding and abnormal returns. I performed non-parametric tests of the hypothesis that management shareholding and abnormal returns were statistically independent. These tests were the Spearman rank correlation test and Kendall's tau test. I also performed logit and probit regressions to test whether high management shareholding affected the probability of engaging in acquisitions which reduced shareholder wealth. This analysis involved partitioning the dataset based upon the results of the event study. I divided the dataset into acquirers who engaged in acquisitions which affected stockholder wealth negatively versus all others; acquirers who engaged in acquisitions which generated negative returns which were statistically significant at the 10% level versus all others; and acquirers who engaged in acquisitions which generated negative abnormal returns which were statistically significant at the 5% level versus all others.

I performed the probit and logit regressions because the hypothesis that as management share diminishes their probability of acting in ways which may reduce shareholder wealth increases suggests a qualitative choice model in which we observe instances in which managements' actions were apparently inimical to shareholder wealth versus

instances in which they were not. I performed the nonparametric tests because the underlying cumulative probability function may not be logistic (as assumed by the logit model) or normal (as assumed by the probit model). It may be useful to test for independence between management shareholding and abnormal returns in a way which does not presume a specific underlying distribution. Next I regressed abnormal returns on management shareholding using OLS. Finally, I sorted the dataset into fractiles based upon management shareholding and compared mean abnormal returns among fractiles. I perform these last two tests to be consistent with Lewellen, Loderer and Rosenfeld. They do not directly test the hypothesis that low management shareholding increases the probability of a value reducing acquisition.

Management shareholding data are from definitive proxy statements filed with the SEC. All tests are performed using two alternative measures of management shareholding -- CEO share of outstanding common stock and share of outstanding common stock held by all officers and directors of the corporation as a group. In cases where the proxy statement did not identify the CEO as such, I assumed the highest paid manager was the CEO.

D:Sample Statistics

The sample consists of 87 transactions announced between 1986 and 1989. The transactions involve banks from 30 states and the District of Columbia. Each geographic region in the conitinental U.S. is represented in the sample. Table 7.1 lists the states represented in the sample.

Table 7.2 reports data on the market value of acquiring firms, deal size, the ratio of deal size to market value of the acquiring firm, and management shareholding. For Table 7.2, market value was evaluated on the last business day of the year preceding the acquisition announcement. Acquiring firms' market value ranged from $33.5 million to $2.86 billion. The sample mean was $1.05 billion and the median was $965 million. By comparison, the 1990 Fortune 100 banking corporations' market value ranged from $214 million to $7.6 billion. The mean market value was $1.36 billion.[1] This comparison to the Fortune 100 understates the relative size of the firms in the sample because none of the market value figures have been adjusted for inflation. The banking organizations in the sample are generally rather large relative to the typical banking enterprise. This is common of commercial banking event studies since the majority of U.S. banks are small and privately held. Also, most banking event studies, including this one, restrict their samples to transactions

[1] Fortune , 4 June 1990, 312-314.

announced in the Wall Street Journal. Deals involving small acquirers are not likely to satisfy this condition.

The value of the transactions in the sample ranged from $1.8 million to $2 billion. The mean was $248 million, and the median was $61 million. The ratio of deal value to market value of the acquirer ranged from 0.001 to 2.019. The mean was 0.267 and the median was 0.144. Typically, the transactions represented significant investment decisions on the part of the acquirer.

CEOs' shares of outstanding stock ranged from 0.03% to 35.78%. Mean CEO shareholding was 0.95%, and median CEO shareholding was 0.21%. This is lower CEO sharheholding than Lewellen, Loderer and Rosenfeld observed for their sample. Their CEO shareholding varied from 0.00% to 78.7%. Mean shareholding was 4.0% and median shareholding was 0.3%.

The share of outstanding stock owned by all officers and directors as a group ranged from 0.54% to 39.17% in my sample. Mean shareholding was 5.09%, and median shareholding was 2.67%. This is also lower than the shareholding that Lewellen, Loderer and Rosenfeld observed for their sample. Their shareholding by all officers and directors varied from 0.1% to 78.8%. Mean shareholding was 8.7% and median shareholding was 3.3%.

Table 7.3 reports summary statistics for the alpha and beta estimates from the market model. The mean alpha was 0.0004 and was not significantly different from zero. This

mean alpha is consistent with the CAPM. The CAPM predicts alpha equals the risk free rate of return. Annualized, a mean alpha of 0.0004 using daily returns corresponds to approximately 10.5% ($1.0004^{250}-1$). The rate for 3 month U.S. Treasury Bills ranged between 5.18% and 8.83% over the period 1986-1989. An annual return of 5.18% translates to a daily alpha estimate of 0.0002. The difference between the estimated mean alpha of 0.0004 and 0.0002 is statistically insignificant; therefore, the estimate is consistent with the CAPM.

Although the estimated alphas from this chapter are consistent with the CAPM, it is not uncommon for empirical studies to yield alphas which are substantially different from the estimated risk free rate of return.[1] Although these results impugn the empirical validity of the CAPM, they do not invalidate event study methodology. Many event studies, including the event study reported in this chapter, are based upon the market model. The market model presumes that stock returns tend to move together. This event study and others estimate alphas and betas to correct for marketwide security price movements and to help to identify abnormal returns for specific securities. Using these estimated alphas and betas implicitly involves accepting the market model, but it does not involve

[1] See D. Harrington, Modern Portfolio Theory and the Capital Asset Pricing Model, A User's Guide (Englewood Cliffs, New Jersey: Prentice-Hall Inc., 1983), 43-48 for a review of such studies.

accepting the CAPM. Virtually any alpha estimates are consistent with the market model although the CAPM predicts alphas will approximate the risk free rate of return.

The mean beta was 0.795. This compares to a mean beta of 0.968 for 48 banks discussed in a September 1990 Value Line report.[1] This difference in mean betas is not particularly troublesome. The difference between the average betas from the Value Line report and my sample may be due to differences in underlying risk structures of the two samples. The Value Line report covered larger banks in a more recent time period. The Value Line banks' portfolios may expose them to greater systematic risk than the banks in my sample; e.g. they may hold more corporate obligations from highly leveraged transactions or more loans to developing countries. Alternatively, the difference in mean betas may have been due to differences in estimation procedures. Value Line may have estimated the betas using a different market index than the one I used, or over a different sample period, or using a different market model form.

More disquieting than the difference in mean beta between my sample and the Value Line sample was the variability of the alpha and beta estimates. Both alpha and beta varied widely across banks. The market model was a particularly poor predictor of two banking organizations

[1] The Value Line Investment Survey (New York: Value Line Publishing Inc,14 September 1990), 2001-2050.

returns, Summcorp and Deposit Guaranty Corp. Much of the variability in alpha and beta is due to the market model results from these two firms. Table 7.4 reports sample statistics for alpha and beta excluding the Summcorp and Deposit Guaranty Corp. alpha and beta estimates. We see that much variability remains, but the sample standard deviations of the two variables does fall substantially.

Although it is possible that the variation in beta estimates across the sample firms may be due to differences in risk, this seems unlikely. Considering the rather low R-squareds and t-statistics from the market model regressions, it seems more likely that the betas vary widely across the sample because many of the individual alpha and beta estimates have high variance. The high variance associated with these estimates may be due to non-normality of daily security returns.[1] Although this non-normality is not an issue in the event study portion of this chapter, it causes concern in the second stage of the analyis where individual firms' excess returns are compared to management shareholding.

Non-normality of daily returns may guaranty imprecise market model coefficient estimates and abnormal return estimates. This increases the probability of insignificant cross section test results in the second stage of the analysis. Brown and Warner note "there is evidence

[1] It is widely accepted in the finance field that daily stock returns are non-normal. See, for example, E. F. Fama, Foundations of Finance (New York: Basic Books, 1976), 21-26.

that.mean excess return in a cross section of securities converges to normality as the number of sample securities increases."[1] Hence, the effect of non-normal security returns in cross section tests may be countered by increasing the sample.size, i.e. the number of securities. Clearly, there is no concern about the effects of imprecise estimates of abnormal returns when the cross section tests are statistically significant as they are in my event study. However, insignificant cross section test results, like those I generate when comparing abnormal returns to management shareholding, may be due to an insufficiently large sample rather than the absence of an abnormal return-managment shareholding relationship.[2]

E:Empirical Results

The event study yielded negative, average abnormal returns for acquiring banks on the announcement date, the day before the announcement date, and the two day period ending with the announcement date. These negative returns were statistically significant at the 0.5% level in two tailed tests. The average abnormal returns for the announcement date, for the five days preceding the

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[1] S. J. Brown and J. B. Warner, "Using Daily Stock Returns: The Case of Event Studies," 25.

[2] Lewellen, Loderer and Rosenfeld neither reported nor discussed the variability of their market model coefficient estimates, so I can not discuss how imprecise abnormal return estimates may have affected their management shareholding-abnormal returns results.

announcement date, for the five days following the announcement date, and for the two day period ending with the announcement date are reported in Table 7.5. The test statistic used to determine the statistical significance of the average abnormal returns is described in Appendix 7.1. Table 7.6 reports data on the number of announcements leading to positive returns, number leading to statistically significant negative returns, etc. For 68% of the transactions, abnormal returns for the two day period ending on the official announcement date were negative. For 26%, abnormal returns were statistically significantly negative at the 10% level in a one tailed test. For 22%, abnormal returns were statistically significantly negative at the 5% level in a one tailed test. These results imply commercial banking acquisitions are not generally consistent with shareholder wealth maximization. They also reinforce the need to investigate the motives for commercial banking acquisitions.

The analyses of the relationship between management shareholding and abnormal returns did not suggest shareholder wealth reducing acquisitions were the result of self serving management. The tests uniformly failed to reject the null hypothesis that management shareholding and probability of engaging in a shareholder wealth reducing acquisition were independent.

My first tests of the relationship between management shareholding and abnormal returns were non-parametric tests

of the hypothesis that management shareholding and abnormal returns were independent. One non-parametric test was the Spearman rank correlation coefficient test. The Spearman rank correlation coefficient, r_S, is defined as follows:

$r_S = 1 - (6\sum_i d_i^2)/(n(n^2-1))$

$-1 \leq r_S \leq 1$

where,

$\sum_i d_i^2 = \sum_i (R(X_i)-R(Y_i))^2$

$R(X_i)$ = rank of ith observation in the dimension X, e.g. CEO share of outstanding stock

$R(Y_i)$ = rank of ith observation in the dimension Y, e.g. abnormal returns on the event day.

$r_S*(n-1)^{1/2} \sim N(0,1)$ for large samples.[1]

I tested for dependence between management shareholding and abnormal returns on the announcement date, the day before the announcement date, and cumulative abnormal returns for the two day period ending with the announcement date. For each event window, I tested for dependence using both CEO shareholding and shareholding by all officers and directors as the management shareholding variable. I also tested for dependence using an alternative measure of abnormal returns.[2] In addition to

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[1] See W. W. Daniel, Applied Nonparametric Statistics (Boston: PWS-Kent Publishing Company, 1990), 362 for a discussion of the distribution of the Spearman correlation coefficient.

[2] I used this alternative measure of abnormal returns because it is easily measured and has been used in many recent event studies, e.g., J. Pound, "Shareholder Activism and Share Values: The Causes and Consequences of

measuring abnormal return as the residual between actual return and expected return based upon the market model, I also measured abnormal return as the excess of actual return over market return. That is, for security i for day t, an alternative estimate of abnormal return is $EX_{it} = R_{it} - R_{mt}$. ($R_{it}$ and R_{mt} are defined above.)

Table 7.7 summarizes the results of the ten different specifications of the management shareholding-abnormal returns relationship for which I performed Spearman tests. The results do not support the hypothesis that shareholder wealth reducing acquisitions are motivated by management self-interest. All of the tests yielded statistically insignificant, negative Spearman correlation coefficients. If it were true that the propensity to engage in shareholder wealth reducing acquisitions decreases with greater management shareholding, one would expect a positive correlation coefficient. Not only were the correlation coefficients negative and statistically insignificant, they were also small. The correlation coefficients were all less than 0.2 in absolute value, and many were less than 0.1 in absolute value.

The second nonparametric test for independence between management shareholding and abnormal returns from announcements was Kendall's tau test. Kendall's tau is defined as follows. Sort the observations from small to

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Countersolications Against Management Antitakeover Proposals," Journal of Law and Economics 32 (October 1989): 357-380.

large in terms of one of the two relevant variables. Denote this variable X, and denote the other variable Y. In that case,

$tau = 2S/n(n-1)$

$-1 \leq tau \leq 1$

$3(tau)[n(n-1)]^{1/2}[2(2n+5)]^{-1/2} \sim N(0,1)$ for large samples.[1]

where,

$S = P - Q$

P = number of Y pairs (Y_i, Y_{i+1}) such that $Y_{i+1} > Y_i$.

Q = number of Y pairs (Y_i, Y_{i+1}) such that $Y_{i+1} < Y_i$.

Tau can be interpreted as the difference between the probability of accordance and the probability of discordance. The observation pairs (X_i, Y_i) and (X_j, Y_j) are in accordance if either ($X_i<X_j$ and $Y_i<Y_j$) or ($X_i>X_j$ and $Y_i>Y_j$). The observation pairs are discordant if either ($X_i<X_j$ and $Y_i>Y_j$) or ($X_i>X_j$ and $Y_i<Y_j$).[2]

I performed Kendall tau tests for all of the alternative specifications of the management shareholding-abnormal returns relation for which I had previously performed Spearman tests. The results of the tau tests are reported in Table 7.8. These results were equally non-supportive of the hypothesis that acquisitions which reduce

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[1] See W.W. Daniel, Applied Nonparametric Statistics, 373 for a discussion of the distribution of Kendall's tau.

[2] Ibid., 365.

shareholder wealth are motivated by management self-interest as the Spearman results were. None of the estimates of tau were statistically significantly different from zero. All of the estimates of tau were quite small. The tau estimates were never as large as 0.1 in absolute value. This indicates that the probability of accordance and discordance were approximately equal. Finally, all the estimates of tau were negative. This indicates a negative relationship between management shareholding and abnormal returns. The "divergent interests" hypothesis would imply that management shareholding and abnormal returns were *positively* related.

The logit and probit regression results also indicated that management self-interest does not motivate shareholder wealth reducing acquisitionsin commercial banking. The logit results are reported in Tables 7.9 and 7.10. The probit results are reported in Tables 7.11 and 7.12. I performed logit and probit regressions using alternative measures of management shareholding, alternative event windows, and the following partitions of the sample: announcements yielding negative abnormal returns vs. all others, announcements yielding negative abnormal returns which were statistically significant at the 10% level vs. all others, announcements yielding negative abnormal returns which were statistically significant at the 5% level vs. all others, and announcements which yielded

negative excess returns over market returns vs. all others. I estimated the following equation:

P(negative abnormal returns) = F(a + ß*management shareholding)

The regressions consistently produced statistically insignificant management shareholding coefficient estimates. Moreover, the coefficient estimates were often positive. This indicates the estimated probability of engaging in an acquisition increases with management shareholding rather than decreasing as hypothesized.

Future researchers may include the ratio of deal size to acquiring company market value as an explanatory variable in the probit and logit regressions. Table 7.13 shows that this ratio is negatively correlated with abnormal returns and that the correlation is statistically significant. Lack of access to software capable of performing multinomial logit or probit regressions.precluded me from performing the regressions. The data do not indicate these multinomial regressions would yield different results from the univariate regressions. Table 7.14 reports Spearman rank correlation coefficients between the ratio of deal size to acquirer's market value and management shareholding and the coefficients' associated z-statistics. Positive correlation between relative deal size and management shareholding might result in an insignificant or even positive shareholding coefficient in the univariate

regressions. The shareholding variable may serve as a proxy for relative deal size. The positive effect of relative deal size on probability of yielding negative abnormal returns may dominate any negative effect of high management shareholding. Table 7.14 indicates management shareholding and relative deal size are correlated. However, the correlation is slight. Rho equals 0.151 for CEO shareholding, and rho equals 0.035 for all directors and officers shareholding. Moreover, these correlation coefficients are statistically insignificant.

Next, I performed univariate OLS regressions of abnormal returns on officers' and directors' shareholding. These regressions do not really test the hypothesis that as management shareholding diminishes, the probability of engaging in an acquisition yielding negative abnormal returns increases. Significant, positive shareholding coefficients may reflect superior acquisitions by firms with high management shareholding rather than inferior acquisitions by firms with low management shareholding. I report these regression results to be consistent with Lewellen, Loderer and Rosenfeld despite this mismatch between hypothesis and test. Table 7.15 shows the management shareholding coefficients are consistently small and never significantly different from zero using different abnormal return windows and measures and different management shareholding measures.

Finally, I sorted the data by all officers' and directors' shareholding and compared average abnormal return between different fractiles. Recall Lewellen, Loderer and Rosenfeld made this comparison and found that the top 10% of acquirers in terms of management shareholding had significantly higher abnormal returns than the bottom 90%, and the top 20% had significantly higher abnormal returns than the bottom 80%. I argue above, in the literature review section of this chapter, that a comparison between the bottom 10% and the upper 90% may be more relevant for our hypothesis -- that probability of engaging in shareholder wealth reducing acquisitions increases as management shareholding decreases. Therefore, I report the results from this comparison as well as the other two comparisons in Table 7.16. The data do not support the hypothesis that management shareholding reduces the probability of shareholder wealth reducing acquisitions. In two comparisons, upper 20% versus lower 80% and upper 10% versus lower 10%, the higher shareholding group had lower mean abnormal returns. In the other comparison, upper 10% versus lower 90%, the two groups had approximately equal mean abnormal returns.

F:Summary

In this chapter, I have performed an event study based upon 87 acquisition announcements by commercial banks. I have

found that on average banks' shareholders lose when banks and bankholding companies make acquisitions. This is consistent with previous commercial banking event studies and raises the question of why commercial banking management engages in acquisition activity.

One hypothesis is that managers benefit by increasing firm size. Managers engage in M&A to benefit themselves at owners' expense. Given that managers' costs of increasing firm size to the detriment of shareholder wealth increases with managements' share of outstanding stock, *ceteris paribus*, this hypothesis is testable. I test the hypothesis that management self-interest motivates shareholder wealth reducing acquisitions by investigating the relationship between management shareholding and abnormal returns surrounding merger announcements. A negative relationship would support the hypothesis that shareholder wealth reducing acquisitions are a principal agent problem. I apply nonparametric tests of independence between management shareholding and abnormal returns, qualitative choice models explaining the probability of engaging in wealth reducing acquisitions as a function of management share, and ordinary least squares models explaining abnormal returns as a function of management shareholding. Finally, I compare mean abnormal returns among different groups of firms having different levels of management shareholding. None of the tests lead me to reject the null

hypothesis that management shareholding and abnormal returns are independent.

Prima facie, my results contradict an earlier study of managerial motives in takeovers. However, a close reading of the previous study indicates the authors' interpretations of their results are controversial. Most of their reported results are statistically insignificant, and the significant results are consistent with the null hypothesis that low management shareholding does not increase the probability of making a shareholder wealth reducing acquisition.

My results are especially convincing given that there are fewer potential gains from acquisitions to bank managers than to managers in other industries. Theorists have argued that managers may benefit from diversification even when the firm does not. Federal bank merger regulations limit the degree to which banks and bankholding companies may diversify. This eliminates some managerial motives for engaging in wealth reducing acquisitions. Theory and data suppport Roll's hubris hypothesis: bank managers systematically overestimate the value of target companies.

Table 7.1

States Represented by Sample

Arizona
California
Colorado
Connecticut
Delaware
Florida
Georgia
Illinois
Indiana
Kentucky
Maryland
Massachusetts
Michigan
Mississippi
Missouri
Nevada
New Hampshire
New Jersey
New York
North Carolina
Ohio
Oregon
Pennsylvania
Rhode Island
South Carolina
Tennessee
Vermont
Virginia
Washington
Washington, D.C.
Wisconsin

Table 7.2

Banking Organization Sample Statistics

Variable	mean	min.	max.	med.	Std. Dev.
Acq.'s Market Value ($1,000)	1053765	22540	2857812	965494	797816
Deal Value ($1,000)	248027	1800	2000000	61000	385361
Deal Value/ Market Value	0.267	0.001	2.019	0.144	0.347
CEO Shareholding (Percent)	0.953	0.03	35.78	0.21	4.002
Officers and Drs. Shareholding (Percent)	5.094	0.54	39.17	2.67	6.672

Table 7.3
Alpha and Beta Estimates
All Transactions

Variable	mean	min.	max.	median	Std. Dev.
Estimated Alpha	0.0004	-0.00342	0.00597	0.0003	0.0196
Estimated Beta	0.79493	-0.81267	1.95277	0.788	0.4469

Table 7.4
Alpha and Beta Estimates
Excluding Outlying Summcorp.and Deposit Guaranty Corp
Observations

Variable	mean	min.	max.	median	Std. Dev.
Estimated Alpha	0.00032	-0.00342	0.00446	0.00029	0.00169
Estimated Beta	0.82433	0.07561	1.95277	0.80561	0.40421

Table 7.5
Average Abnormal Returns

	MEAN	MAX	MIN	Z-STAT[1]
AAR(-5)	0.00144	0.0431	-0.09138	1.07
AAR(-4)	0.00227	0.04361	-0.02014	1.69
AAR(-3)	0.00024	0.03479	-0.05185	0.18
AAR(-2)	-0.00087	0.0373	-0.03167	-0.65
AAR(-1)	-0.00757	0.03564	-0.09869	-5.64
AAR(0)	-0.00472	0.05073	-0.09825	-3.52
AAR(1)	0.00029	0.08475	-0.06681	0.22
AAR(2)	-0.00251	0.02829	-0.07545	-1.87
AAR(3)	-0.00027	0.03293	-0.03823	-0.2
AAR(4)	0.00301	0.0435	-0.10255	2.24
AAR(5)	0.00055	0.15135	-0.05206	0.41
AAR(-1,0)	-0.01221	0.07962	-0.12155	-6.43

[1] $z \sim N(0,1)$. See Appendix 7.1 for a derivation of z.

Table 7.6

Distribution of Abnormal Returns for Selected Event Windows

	10% Significance[1]		5% Significance	
	Negative	Positive	Negative	Positive
AR(-1)	57.47%	42.53%	28.74%	10.34%
AR(0)	66.67%	33.33%	21.84%	8.05%
AR(-1,0)	68.97%	31.03%	26.44%	10.34%

	5% Significance	
	Negative	Positive
AR(-1)	19.54%	9.20%
AR(0)	9.20%	5.75%
AR(-1,0)	21.84%	5.75%

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[1] Significance of abnormal returns for a given firm for a given event window was determined as follows. $AR_i(t)/SE_i$ ~ student t where SE_i is the standard error of the regression used to estimate a_i and $ß_i$. For an n day event window, $AR_i/(SE_i*n^{1/2})$ ~ student t where n is the number of days in the event window and where daily abnormal returns are independent and identically distributed. M. Salinger, "Standard Errors in Event Studies," Unpublished manuscript, Graduate School of Business, Columbia University, July 1989 shows this i,i,d, assumption is not strictly true, However, he also shows that ignoring the intertemporal correlation only results in significant misstatement of standard errors when n is large.

Table 7.7
Spearman Correlation Coefficients
and Corresponding Z-Statistics

Event Window	CEO Share	All Officers and Directors Share
AR(-1)	-0.031	-0.114
	(-0.285)	(-1.062)
AR(0)	-0.089	-0.145
	(-0.823)	(-1.345)
AR(-1,0)	-0.056	-0.141
	(-0.517)	(-1.306)
EX(-1)	-0.053	-0.116
	(-0.488)	(-1.073)
EX(0)	-0.092	-0.163
	(-0.851)	(-1.515)

z-statistics in parentheses

$EX_i(t) = R_{it} - R_{mt}$

Table 7.8
Kendall Correlation Coefficients
and Corresponding Z-Statistics

Event Window	CEO Share	All Officers and Directors Share
AR(-1)	-0.018	-0.077
	(-0.241)	(-1.061)
AR(0)	-0.066	-0.090
	(-0.899)	(-1.230)
AR(-1,0)	-0.068	-0.090
	(-0.929)	(-1.230)
EX(-1)	-0.028	-0.077
	(-0.381)	(-1.054)
EX(0)	-0.092	-0.099
	(-0.851)	(-1.362)

z-statistics in parentheses

$EX_i(t) = R_{it} - R_{mt}$

Table 7.9

Logit Results: Independent Variable = CEO Shareholding

Partition Criteria*	Constant	Slope Coefficient
Neg. AR(-1)	0.361 (1.601)	-0.068 (-0.859)
10% Sign. Neg. AR(-1)	-0.787 (-2.912)	-0.224 (-0.704)
5% Sign. Neg. AR(-1)	-1.274 (-3.995)	-0.291 (-0.633)
Neg. AR(0)	0.591 (2.641)	0.0001 (0.129)
10% Sign. Neg. AR(0)	-1.017 (-3.009)	-0.640 (-0.921)
5% Sign. Neg. AR(0)	-1.209 (-1.883)	-4.727 (-1.481)
Neg. AR(-1,0)	0.836 (3.457)	-0.101 (-1.032)
10% Sign. Neg. AR(-1,0)	-0.879 (-3.079)	-0.290 (-0.738)
5% Sign. Neg. AR(-1,0)	-1.050 (-3.178)	-0.535 (-0.849)

*For example, 5% Sign. Neg.AR (-1,0) indicates the regression results where the dependent variable is 1 when abnormal returns for the two day period ending on the announcement date are negative and statistically significant at the 5% level in a one tailed test and 0 otherwise.

t-statistics in parentheses.

Table 7.10

Logit Results:

Independent Variable = All Officers' and Directors' Shareholding

Partition Criteria*	Constant	Slope Coefficient
Neg. AR(-1)	0.254 (0.929)	0.009 (0.276)
10% Sign. Neg. AR(-1)	-0.748 (-2.450)	-0.034 (-0.771)
5% Sign. Neg. AR(-1)	-1.389 (-4.065)	-0.005 (-0.125)
Neg. AR(0)	0.546 (1.930)	0.009 (0.258)
10% Sign. Neg. AR(0)	-1.181 (-3.573)	-0.019 (-0.436)
5% Sign. Neg. AR(0)	-2.266 (-4.834)	-0.005 (-0.081)
Neg. AR(-1,0)	0.710 (2.450)	0.007 (0.195)
10% Sign. Neg. AR(-1,0)	-1.147 (-3.733)	0.023 (0.687)
5% Sign. Neg. AR(-1,0)	-1.393 (-4.254)	0.022 (0.620)

*For example, 5% Sign. Neg.AR (-1,0) indicates the regression results where the dependent variable is 1 when abnormal returns for the two day period ending on the announcement date are negative and statistically significant at the 5% level in a one tailed test and 0 otherwise.

t-statistics in parentheses.

Table 7.11

Probit Results: Independent Variable = CEO Shareholding

Partition Criteria*	Constant	Slope Coefficient
Neg. AR(-1)	0.226 -1.61	-0.048 (-0.911)
10% Sign. Neg. AR(-1)	-0.487 (-2.981)	-0.137 (-0.734)
5% Sign. Neg. AR(-1)	-0.776 (-4.216)	-0.168 (-0.648)
Neg. AR(0)	0.403 (2.827)	-0.038 (-0.902)
10% Sign. Neg. AR(0)	-0.624 (-3.125)	-0.378 (-0.948)
5% Sign. Neg. AR(0)	-0.736 (-2.048)	-2.581 (-1.502)
Neg. AR(-1,0)	0.519 (3.537)	-0.063 (-1.106)
10% Sign. Neg. AR(-1,0)	-0.543 (-3.182)	-0.172 (-0.761)
5% Sign. Neg. AR(-1,0)	-0.646 (-3.329)	-0.309 (-0.869)

*For example, 5% Sign. Neg.AR (-1,0) indicates the regression results where the dependent variable is 1 when abnormal returns for the two day period ending on the announcement date are negative and statistically significant at the 5% level in a one tailed test and 0 otherwise.

t-statistics in parentheses.

Table 7.12

Probit Results:

Independent Variable = All Officers' and Directors' Shareholding

Partition Criteria*	Constant	Slope Coefficient
Neg. AR(-1)	0.160 (0.940)	0.006 (0.275)
10% Sign. Neg. AR(-1)	-0.461 (-2.496)	-0.021 (-0.815)
5% Sign. Neg. AR(-1)	-0.842 (-4.260)	-0.003 (-0.131)
Neg. AR(0)	0.341 (1.977)	0.005 (0.256)
10% Sign. Neg. AR(0)	-0.723 (-3.771)	-0.011 (-0.448)
5% Sign. Neg. AR(0)	-1.317 (-5.595)	-0.002 (-0.080)
Neg. AR(-1,0)	0.442 (2.522)	0.004 (0.193)
10% Sign. Neg. AR(-1,0)	-0.709 (-3.841)	0.015 (0.705)
5% Sign. Neg. AR(-1,0)	-0.851 (-4.438)	0.014 (0.633)

*For example, 5% Sign. Neg.AR (-1,0) indicates the regression results where the dependent variable is 1 when abnormal returns for the two day period ending on the announcement date are negative and statistically significant at the 5% level in a one tailed test and 0 otherwise.

t-statistics in parentheses.

Table 7.13

Spearman Correlation Coefficients and Z-Statistics

Abnormal Returns vs. Relative Deal Size*

Return Measure	Correlation Coefficient
AR(-1)	-0.273
	(-2.534)
AR(0)	-0.107
	(-0.995)
AR(-1,0)	-0.340
	(-3.151)
EX(-1)	-0.275
	(-2.55)
EX(0)	-0.073
	(-0.674)

z-statistics in parentheses

$EX_i(t) = R_{it} - R_{mt}$

*Relative Deal Size = Deal Value / Acquirer's Market Value

Table 7.14

Spearman Correlation Coefficients and Z-Statistics

Management Shareholding vs. Relative Deal Size*

Correlation Coefficient	
CEO Shareholding	All Officers and Directors Shareholding
0.151	0.035
(1.404)	(0.324)

z-statistics in parentheses

*Relative Deal Size = Deal Value / Acquirer's Market Value

Table 7.15
Univariate OLS Regression
Abnormal Returns = f(Management Shareholding)

Independent Variable = CEO Holding

Dependent Variable	Constant	Slope	Adjusted R^2
AR(-1)	-0.008	$4.087*10^{-4}$ (0.587)	-0.008
AR(0)	-0.005	$1.018*10^{-4}$ (0.180)	-0.011
AR(-1,0)	-0.013	0.001 (0.585)	-0.008
EX(-1)	-0.008	$3.072*10^{-4}$ (0.451)	-0.009
EX(0)	-0.005	$-3.018*10^{-5}$ (0.055)	-0.012

Independent Variable = Officers' and Directors' Holding

Dependent Variable	Constant	Slope	Adjusted R^2
AR(-1)	-0.007	$-9.267*10^{-5}$ (0.221)	-0.011
AR(0)	-0.004	$-9.395*10^{-5}$ (0.277)	-0.011
AR(-1,0)	-0.011	$-1.866*10^{-4}$ (0.585)	-0.010
EX(-1)	-0.007	$-6.811*10^{-5}$ (0.167)	-0.011
EX(0)	-0.004	$-1.668*10^{-4}$ (0.504)	-0.009

t-statistics in parentheses

$EX_i(t) = R_{it} - R_{mt}$

Table 7.16
Average Abnormal Returns for Firms in Different Fractiles of the Distribution Of Management Ownership Ratios*

Fractile	Number of Firms	Share of Outstanding Stock	Mean Value AR(0,-1)
Lower 80%	69	0.54% - 6.73%	-0.011
Upper 20%	17	7.98% - 39.17%	-0.017
Lower 90%	78	0.54% - 10.83%	-0.012
Upper 10%	8	13.39% - 39.17%	-0.012
Lower 10%	8	0.54% - 0.72%	0.003
Upper 10%	8	13.39% - 39.17%	-0.012

*Management ownership is defined as officers' and directors' share of stock

Appendix 7.1
Test Statistic Used to Determine Significance of Average Abnormal Returns

The test statistic used to determine the statistical significance of average abnormal returns is described in Stephen J. Brown and Jerold B. Warner's, "Using Daily Stock Returns: The Case of Event Studies."[1] The statistic is given by:

$$\sum^{n}_{1} A_t \; / \; (\sum^{n}_{1} S^2(A_t))^{1/2} \sim N(0,1)$$

where,

$$A_t = 1/n \sum^{n}_{i=1} A_{i,t}$$

$$S^2(A_t) = 1/T \sum^{T}_{t=1} (A_t - A)^2$$

$$A = 1/T \sum A_t$$

$A_{i,t}$ = abnormal returns for the ith firm on the tth day of the sample period.

n = number of firms in the sample

t=1...T is the sample period used to estimate the parameters of the market model.

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[1] S. J. Brown and J. B. Warner, "Using Daily Stock Returns: The Case of Event Studies," Journal of Financial Economics 14 (1985): 3-31.

Chapter 8: Summary and Conclusion

In this dissertation, I have enumerated a list of weaknesses of much previous banking structure-performance literature, and I have undertaken an empirical research project which accommodates some of these criticisms. My results generally fail to support the traditional SCP paradigm. I found no evidence that loan rates increase linearly as concentration increases, nor did I find evidence of critical concentration levels in used car loan, second mortgage rate or personal loan rate setting. I found weak evidence of critical concentration affecting new car loan rate setting and first mortgage rate setting. The critical concentration levels affecting new car loan rate and first mortgage rate setting were at higher critical concentration levels than the critical concentration levels implicit in bank regulators' behavior. Let me review the criticisms of previous commercial banking SCP work, the methods I employed here and my findings.

Most previous studies either used accounting rate of return or some price proxy as the performance measure. Fisher and McGowan[1] discuss many of the shortcomings of accounting rate of return as a proxy for economic rate of return. Their arguments can be summarized as an assertion

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[1] F. Fisher and J. McGowan, "On the Use and Misuse of Accounting Rates of Return to Infer Monopoly Profits," American Economic Review 73.

that accounting rate of return measures economic rate of return with error. Mismeasurement of the dependent variable in OLS regressions increases the variance of coefficient estimates. Use of accounting profit as the performance measure in banking structure performance studies increased the probability of finding an insignificant effect of concentration on banking conduct and performance.

When rate of return was the performance measure, researchers concerned with the effects of local market concentration confined themselves to banks with offices only in one market. Researchers restricted their attention in order to avoid the problem of apportioning profits and assets of banks which operate in several markets among the different markets in which they operated. Clearly, banks which operate in only one market may not be representative of the universe of banks.[1]

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[1] They are certainly unlike New England's larger banks.See W. Tam, C. Arnold and B. Lewis, 1987 Banking Structure in New England, Federal Reserve Bank of Boston Research Report 70, for information about bank sizes and lists of markets in which each bank participates.

Finally, studies which used rate of return as the performance measure were subject to the Demsetz/Smirlock efficient firms criticism. Smirlock argued that to the extent that bank market concentration was correlated with banks rates of return, such a correlation was due to the presence of efficient banks in concentrated markets rather than to collusion.

Price proxies were even more dubious performance measures. These proxies were typically the ratio of some income statement variable to some balance sheet variable. For example, the ratio of interest and fees from loans to total loans outstanding was used as a stand-in for interest rate charged for loans and the ratio of total interest paid on time deposits to total time deposits was use as a proxy for interest rate paid for time deposits. These ratios are not only a function of the pricing policies of the bank but are also a function of the bank's portfolio composition and the timing of its loan originations.

Banks charge different rates for different types of loans. Similarly, banks pay different rates for different types of deposits. For example, the interest rate a bank charges for an unsecured $1,500 personal loan is not likely to be the same rate it charges for a $1,000,000 commercial loan. Nor is the bank likely to charge the same rate for a 10 year fixed rate mortgage as it is likely to charge for a 30 year fixed rate mortgage. Similarly, a bank is not likely to pay the same interest rate (net of fees) on a

savings account with no minimum balance as it will pay for a savings account with a $1,000 minimum balance. Nor is a bank likely to pay the same rate on a 3 month CD as it pays on an 18 month CD. The ratios mentioned above are likely to vary even among banks with identical pricing policies merely because of variations in portfolio composition.

The ratios will also vary because of the timing of banks' loan originations and liability acceptances. Interest rates vary over time. Banks which made relatively many loans during high interest rate periods are likely to have higher ratios of interest and fees from loans to total loans than banks with similar pricing policies which made relatively many loans in low interest rate periods. Similarly, banks which rely heavily on certificates of deposits issued during high interest rate periods for funding are likely to have relatively high ratios of interest paid on time deposits to total deposits despite competitive pricing policies. Use of these proxies, as opposed to the true prices, increases the standard error of coefficient estimates.

This dissertation circumvented many of the criticisms above by relying on actual price data obtained from surveys of banks conducted by state banking commissions for most of the analysis. This dissertation used new and used car loan rates, first and second mortgage rates, and personal loan rates from surveys conducted by the Massachusetts, New York and Vermont state banking commissions as

conduct/performance measures. The data represent rates in effect in April 1986, September 1986, December 1986, and March 1987.

Previous research has also included endogenous variables among the regressors in ordinary least squares analysis. Researchers often included such variables among the regressors either as proxies for the riskiness of the banks portfolio or in response to criticisms related to using price proxies as performance variables. However, inclusion of endogenous variables among the regressors violates the classical ordinary least squares assumptions and implies biased and inconsistent coefficient estimates. This dissertation did not include such variables among the regressors in ordinary least squares regressions, so the parameter estimates do not suffer from this source of bias or inconsistency.

Not all previous work allowed for a discontinuous effect of concentration on rates. This dissertation tested the critical concentration variant as well as the linear version of the SCP. I used the switching regimes technique to identify critical concentration ratios affecting first mortgage rates and new car loan rates.

The regulatory authorities (the Federal Reserve System and the Department of Justice) treat HHI=1800 as an effective critical concentration level. I tested for a discontinuous effect of concentration on bank rates at

HHI=1800. I found little evidence of critical concentration levels at HHI=1800.

In addition to empirical estimation, I discussed the evolution and current status of bank merger regulation. The empirical results from Chapters 5 and 6 suggest a more lenient regulatory stance towards bank mergers than applies today.

As discussed in Chapter 4, the new car loan rate results may be biased against the SCP. The relevant product market may include loan originations by the captive acceptance corporations affiliated with the auto manufacturers. In that case, reasonable estimates of the acceptance corporations total market share and the distribution of originations among the acceptance corporations imply the concentration measures are biased upward. Upwardly biased concentration measures lead to downwardly biased concentration coefficient estimates. For a number of reasons, the new car loan rate results are reported despite this possibility. First, the acceptance corporations are not necessarily competing in the particular market for which the regression results apply. There is reason to believe that deposit institutions alone compete for low risk customers, and low risk customers apply directly to deposit institutions for automobile financing. Deposit institutions and acceptance corporations both compete for high risk customers, and these customers apply for financing through auto dealers.

The published new car loan rate data used in this dissertation applies to individuals who apply directly to depository institutions for financing. That is, the rates here apply to the market in which only deposit institutions compete. The following arguments also support reporting the new car loan rate results: they provide limited support for the SCP and suppressing them would appear duplicitous; previous researchers have performed similar analyses using new car loan rate data, and it may be useful to compare results; the courts have defined commercial banking as the relevant line of commerce, so the results are interesting for legal reasons.

My results are generally consistent with the efficient firms hypothesis. The finding that concentration did not lead to higher loan rates supports the efficient firms hypothesis' proponents ultimate premise that concentration is not correlated with monopolistic conduct. Although market share was often positively and statistically significantly related to loan rates, this result is consistent with both the efficient firms hypothesis and the SCP paradigm. High market share banks may offer superior products, e.g. faster loan approval, thereby earning a price premium.

In addition to testing the SCP as it applies to commercial banking, I also tested the hypothesis that many commercial banking mergers and acquisitions are examples of managers enriching themselves at shareholders' expense. I

performed an event study and found that bidders' shareholders generally lose wealth upon announcement of acquisition plans. I also tested to see whether the abnormal returns to bidders' shareholders surrounding acquisition announcements were related to management shareholding. A finding that abnormal returns and management shareholding were positively related would indicate that managers do not err in estimating the value of targets. Rather, they pursue acquisitions which reduce shareholder wealth to satisfy goals of their own. That managers are less likely to engage in shareholder wealth reducing acquisitions as their own share of the lost wealth increases would support this hypothesis. My findings did not support this hypothesis. I found no relationship between abnormal returns and management shareholding. My findings are consistent with the notion that managers systematically overestimate the value of acquisition candidates.

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