MARKET STRUCTURE, PROFITABILITY, AND RISK IN THE COMMERCIAL BANKING INDUSTRY

Thesis for the Degree of Ph. D.
MICHIGAN STATE UNIVERSITY
ARNOLD ANDERSEN HEGGESTAD
1973

[illegible]

[illegible]

ABSTRACT

MARKET STRUCTURE, PROFITABILITY, AND RISK
IN THE COMMERCIAL BANKING INDUSTRY

By

Arnold A. Heggestad

This study examines the relationship between market structure and profitability in the commercial banking industry. The major hypothesis is that bank profitability increases with market power; all other determinants of profitability held constant.

Many studies have been undertaken to test the impact of market structure on performance in the banking industry. Those studies that analyzed bank prices have generally concluded that market structure has a small, statistically significant influence on bank prices. No similar effect has been found, however, on bank profitability. Since profitability may be interpreted as a summary index of performance, an obvious conclusion is that market structure has little influence on bank behavior and performance in this highly regulated industry. The higher profitability to be expected from higher prices is lost because of other factors such as nonprice competition.

There may be still another systematic effect of market power that causes statistical studies of the market power-profitability relationship to understate the influence of market power. Banks with monopoly power may well choose to accept the easy life rather than high profits. They may choose to trade some of their high profits for lower risk. Therefore, accounting profits may not be much higher for banks in monopolistic markets, but they are far more secure. To accurately compare profits between banks in different markets, the amount of risk inherent in the profit levels must be held constant.

Two different techniques are used to control differences in risk between banks. The first is to include the amount of risk as a separate explanatory variable in the regression analysis. Therefore, the statistical tests of the market structure-profitability relationship is made with the amount of risk held constant. The second technique used is to adjust accounting profit rates for their relative degrees of riskiness. Risk constant profit rates are defined as $\bar{P} = P - bV$ and as $\bar{P} = P/V^b$ where P is average profits, V is the standard deviation of profits and b is a coefficient representing the degree of risk aversion in the industry. The greater is b, the more important is risk minimization to bank managers. Several alternative values are specified for b, each making different assumptions about the amount of risk aversion in the industry. Risk constant profit rates are then used in a statistical model to test the influence of market structure on profitability.

The general model tests bank profitability as a function of bank size; the bank's cost structure; and the growth, level of demand and concentration ratio of total deposits in the bank's market. Risk, as measured by the standard deviation of the bank's profit rate over time, is either incorporated as an additional explanatory variable or as an adjustment to the average profit rate for each bank.

The basic sample consists of 360 banks--the six largest banks in 60 medium size SMSA's. Complete data throughout the period 1960-1970, however, exists for only 238 banks. These 238 banks constitute the main sample. Profit rates are measured as the eleven year average of net income after taxes to total assets. Market structure is approximated by the three bank concentration ratio of total deposits in the bank's SMSA. Market growth and demand are measured respectively by the change in retail sales between 1960 and 1970 in the bank's SMSA and by per

capita income in the SMSA. The bank's size is measured by its average total deposits. It's cost structure is approximated by the proportion of time and savings deposits in its total deposits.

The statistical tests substantiate the hypothesis that market structure influences bank profitability. Even without accounting for risk, the more concentrated is the bank's market, the greater is its profitability. By adding risk to the model either as an additional explanatory variable or as an adjustment to accounting profit rates, the measured influence of concentration on profitability increases. Therefore, it seems likely that banks with monopoly power are giving up some of their potential profits for the easy life. The effect of monopoly power on bank performance as measured by profitability will be understated unless this additional influence of market studies is also measured.

MARKET STRUCTURE, PROFITABILITY, AND RISK IN THE COMMERCIAL BANKING INDUSTRY

By

Arnold Andersen Heggestad

A THESIS

Submitted to
Michigan State University
in partial fulfillment of the requirements
for the degree of

DOCTOR OF PHILOSOPHY

Department of Economics

1973

ACKNOWLEDGMENTS

I would like to thank Professors Walter Adams, Bruce Allen, and Mark Ladenson for their help. I would especially like to thank my wife Bonnie for her help and patience.

TABLE OF CONTENTS

I. Introduction

A. Market Structure and Performance
B. The Banking Industry
C. Market Structure and Uncertainty Avoidance

II. Market Structure, Profitability, and Risk

A. Market Structure and Profitability
B. Market Structure and Uncertainty Avoidance
C. Uncertainty Avoidance in the Banking Industry

III. The Banking Industry

A. Structure of the Banking Industry
B. Regulation of the Banking Industry
C. Empirical Studies of Market Structure and Performance in Banking

IV. The Sample and Measurement of Variables

A. Characteristics of the Sample
B. Measurement of Variables
C. Risk Adjusted Profits

V. The Model and Empirical Results

A. The Market Structure-Profitability Model
B. Direct Tests of the Market Structure-Risk-Profitability Hypothesis
C. Indirect Tests of the Market Structure-Risk-Profitability Hypothesis

VI. Conclusion

A. Results of Study
B. Implications of Results

VII. List of References

LIST OF TABLES

Table 1. Size Distribution of Commercial Banks, December 31, 1970. 28

Table 2. Number and Size Distribution of Banking Organizations in Metropolitan Areas, June, 1968. 35

Table 3. Mean and Standard Deviation of Independent Variables . . 53

Table 4. Effect of Introducing Risk as an Independent Explanatory Variable in the Profitability Equation 65

Table 5. Simple Regressions 69

Table 6. Regression Results--Full Model--Linear Equations 71

Table 7. Regression Results--Full Model--Multiplicative Equations. 72

Table 8. Effect of a 10 Percentage Point Increase in Concentration on Bank Performance in Selected Studies 73

LIST OF FIGURES

Figure 1. Risk-Return Determination. 19

CHAPTER I: INTRODUCTION

In the past few years, several studies have analyzed the impact of market structure on profitability in the banking industry.[1/] With only a few exceptions, they have concluded that market structure, as measured by concentration, does not have a statistically significant influence on profitability. In contrast, most studies of bank pricing behavior have found that the prices of bank services do increase, but only slightly, with the degree of monopoly in banking markets.[2/] This apparent contradiction between the effect of market structure on prices and profitability may result from an additional impact of monopoly power on performance. In search of the quiet life, banks with monopoly power may choose to forego some of the profits they could earn with their higher prices by maintaining safer portfolios than banks in competitive markets. Therefore, their profit rates may be no higher than profit rates of banks in competitive markets but, on the other hand, their profits are far more secure. None of the previous studies have considered this additional effect of market power on performance.

This study will test the interaction of market structure, profitability, and risk in banking. Its primary hypothesis is that market structure has a significant influence on profitability after all other

---

1/ See, for example, William R. Bryan, "The Determinants of Bank Profits," Research Report Number 8. The American Bankers Association, 1972; Robert F. Ware, "Banking Structure and Performance: Some Evidence From Ohio," Federal Reserve Bank of Cleveland Economic Review, March, 1972, pp. 3-12; and, Donald R. Fraser and Peter S. Rose, "More on Banking Structure and Performance: The Evidence From Texas," Journal of Financial and Quantitative Analysis, VI (January, 1971), pp. 601-611.

2/ For a recent comprehensive study of loan rate determination, for example, see Donald Jacobs, Business Loan Costs and Bank Market Structure (New York: National Bureau of Economic Research, 1971).

determinants of profitability, including risk, are held constant. Knowledge of the relationship between market structure and profitability is especially important because of the great reliance on nonprice competition in banking. Observed prices may not be indicative of the degree or competition since bankers compete through other dimensions (such as compensating balances). Profitability is a better indicator of the degree of competition in banking markets.

Market Structure and Performance

Price theory predicts that market structure will influence the prices and profits of firms operating in the market. The greater the concentration of power in the hands of a few firms, the more likely it is that there will be a reduction in the competitive fervor of firms in that industry. High concentration of power provides an environment for either overt or tacit cooperation between firms and, the closer the cooperation, the closer will the market price and, therefore, profits be to the monopoly price and profit level.

This relationship has been subjected to several tests since Bain's first attempt in 1951.[1/] Using cross-section data at varying levels of industry aggregation, these studies have looked at the effect of structure on profit or on gross margins.[2/] With the exception of Stigler, all major studies have concluded that there is a significant relationship between market structure and either profitability or price-cost margins.

1/ Joe S. Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing 1936-1940," Quarterly Journal of Economics, LXV (August, 1951), pp. 293-324.

2/ See, for example, N. H. Collins, and L. E. Preston, Concentration and Price Cost Margins in Manufacturing Industries, (Berkeley: University of California Press, 1968); H. M. Mann, "Seller Concentration, Barriers to Entry, and Rates of Return in Thirty Industries, 1950-1960," Review of Economics and Statistics, XLVIII (August, 1966), pp. 296-307; and, George R. Stigler, Capital and Rates of Return in Manufacturing Industries (Princeton: Princeton University Press, 1963).

An accurate test of this hypothesis across industries is extremely difficult. Price elasticity of demand, income elasticity of demand, and the financial and cost structure of firms may all differ between industries. Factors such as these make it extremely difficult to isolate the exact impact of market structure on profitability. In addition, the conglomerate structure of most manufacturing firms means that average performance characteristics derived from several industries, each with different market structures and economic characteristics, must be attributed to only one industry. Again, this may distort or hide the relationship between concentration and performance in any single industry.

If it is possible to segment the industry into a series of local markets, many of these problems can be avoided. Performance of firms in the same industry but in different markets can be analyzed. The production process is likely to be similar and demand characteristics should only differ in specific ways that can be quantified. Therefore, differences in profit levels may be more accurately attributed to differences in market structure.

The Banking Industry

The banking industry has several characteristics that are conducive to a meaningful study of the effect of market structure on firm performance. First, banks tend to operate in local markets that are relatively easy to delineate. With the exception of very large borrowers and depositors, standard metropolitan statistical areas appear to be meaningful approximations of banking markets. Second, the condition of entry into markets is relatively constant or differs in ways that are fairly easy to quantify. Entry barriers in SMSA's are primarily determined by state and federal regulations--both in the

granting of new charters and in the amount of statewide branching that will be permitted. Third, average costs are constant over a wide range of bank sizes.[1/] Therefore, it is unlikely that differences in profit rates result from differences in costs. Finally, very good data are available for the banking industry.

Even though these favorable characteristics allow a fairly accurate test of the impact of market structure, studies of the banking industry have found that the magnitude of the effect is small. In fact, many studies have found no effect whatsoever. This may be due to the fact that the performance variables that have typically been analyzed are the prices of bank output: interest rates charged on loans, interest rates paid on time deposits, and service charges on demand deposits. These measures of performance, although directly related to the theoretical model, are somewhat distorted by the myriad of regulations imposed on the industry. Banks can pay no interest on demand deposits and are limited by Regulation Q on the rate they can pay for time and savings deposits. In addition, many banks are constrained to maximum loan rates by state usury laws. In periods of tight money all rates will be near their ceilings and there will be little variation between banks.

1/ A recent study indicates scale economies are exhausted by $40 million deposit banks. Although there are many banks considerably smaller than this, they are primarily located in rural areas and are held to an inefficient size by restrictive branching laws and the size of their markets. For a discussion of scale economies in banking, see F. Bell and Neil B. Murphy, Costs in Commercial Banking: A Quantitative Analysis of Bank Behavior and Its Relation to Bank Regulation. (Federal Reserve Bank of Boston Research Report No. 41, April, 1968.)

In addition to the legal ceilings on bank prices, the custom in the industry is, in general, not to compete on the basis of price, especially for loans. Competition between banks takes place in the services provided by the bank for loan customers or in differences in the indirect prices charged for loans, such as compensating balances. Therefore, there may be a tremendous competitive difference between two banking markets, although customers are nominally charged the same loan rates. Banks in the competitive market may require smaller compensating balances and may offer additional services such as inventory or capital planning, market surveys or free demand deposit services to commercial borrowers. Since a large percentage of the competition in a banking market will be nonprice, a better measure of the degree of competition in a market is total profitability. Profit rates will be affected by nonprice competition as well as by price competition.

The relationship between concentration and profitability will be tested in a more complete model than has previously been used in the banking industry. The model includes all major exogenous determinants of profitability: concentration, demand conditions, differences in costs, differences in the internal organization of banks, and difference in risk.

Market Structure and Uncertainty Avoidance

A recent study has shown that an additional consequence of market power is that some of the potential profits inherent from higher prices are given up for reduced risk.[1/] Large managerial-controlled banks with monopoly power take less risk than banks in more

1/ Franklin R. Edwards and Arnold A. Heggestad, "Uncertainty, Market Structure, and Performance: The Galbraith-Caves Hypothesis and Managerial Motives in Banking," Quarterly Journal of Economics, (forthcoming).

competitive markets. Reduced risk can only be obtained at the expense of higher profits. Therefore, monopoly profits are not as high as they would be if all banks took the same amount of risk.

There are two possible explanations for this behavior: managers of bank with monopoly power may be more risk averse than managers in competitive markets and therefore have a different trade-off between risk and return, or they may have a different set of opportunities that allows them to reduce their risk without sacrificing as much profitability as their counterparts in competitive markets. It seems likely that both forces interact. Banks with monopoly power can better afford to reduce risk, and because of this, attract more risk averse managers than banks that operate in more competitive markets.

In either case, these results have implications for the structure-performance relationship. If managers of risk averse firms are deliberately opting for the "easy life," their monetary profits understate the monopoly power they have, and are using. Their monetary profits should be adjusted to compensate for this. Alternatively, if firms with monopoly power have a wider range of options, or the same range of options but with a higher return for each corresponding level of risk, their maximization of expected profits under conditions of uncertainty will understate their monopoly power. Again, to compare the profits inherent in monopolistic markets to profits in competitive markets, the amount of risk should be held constant.

In summary, it is not possible to directly compare accounting profits in competitive markets with profits in monopolistic markets. The profits in monopolistic markets may be the same or slightly higher than in competitive markets but they are also far more secure than those obtained in competitive markets. Either the options open to

banks with monopoly power or their own choices have made profits lower in their market, but far safer. If the firms with monopoly power had taken the same risk as competitive firms, their accounting profits would likely be considerably larger than they are.

This has two major consequences for economic policy. First, it disguises the monopoly power inherent in a highly concentrated market so that regulators are less concerned with market structure than they would be if they were aware of the total impact of monopoly power. Second, it disguises potential profits in these markets and tends to deter entry by new firms to the extent that expected profitability of new investment is determined by past profitability of the market.

Furthermore, lower profits do not have the same meaning as they would under the traditional profit maximization model. Under profit maximization, lower profits are caused by lower prices and higher outputs. However, once uncertainty is included in the model, the lower profits are likely to have resulted from other portfolio choices--for example, a bank with monopoly power charges the same or higher prices for loans but keeps a larger proportion of its portfolio in very liquid assets that are much safer but offer a very low return. Therefore, the public welfare is not necessarily increased by lower profits.

The basic hypothesis of the study is that market structure has an important effect on profitability in the banking industry. The more concentrated is the structure of a banking market, the greater will be profits of firms in that market, holding constant the degree of risk encountered by each firm as well as other determinants of profitability.

In Chapter II, the model and a theoretical and empirical justification for adjusting accounting profits for the degree of risk are presented. Chapter III contains a description of institutional

characteristics of the banking industry as well as a review of previous studies that have attempted to isolate the impact of market structure on performance in the industry. Chapter IV consists of a description of the sample and discussion of measurement of variables. The empirical results are presented in Chapter V, and the conclusions are presented in Chapter VI.

CHAPTER II: MARKET STRUCTURE, PROFITABILITY, AND RISK

A. Market Structure and Profitability

Economic theory predicts that market structure will be a significant determinant of the competitive conduct and, therefore, the performance of firms operating in a market. The closer the structure approximates a perfectly competitive market structure, the closer will the performance approximate the optimal performance as defined by economic theory.

The theory essentially presumes that market conduct links the structure of the market to individual firm's performance. Assuming profit maximization, perfect knowledge of costs, and certainty regarding current and future levels of demand; a given market structure will produce a certain pattern of market conduct. Market conduct, the reaction of the firm to market conditions and to action of its rivals, in turn, is associated with the performance of the market. The closer the structure approximates a competitive structure, the greater is the independence of firms in their market decisions. The result of many firms independently maximizing profits is to force performance toward the perfectly competitive norm, where price is equal to the average and marginal cost of production; there are no excess profits; every firm operates at its most efficient level of output; and there is no excess capacity.

Market structure encompasses the major factors that constitute the environment in which firms operate. In banking, these factors include: (1) the number and size distribution of bank competitors in the market; (2) the number and relative size of specialized nonbank financial intermediaries that compete with banks in their respective activities; (3) barriers to entry in the market; and, (4) the type of banking

organizations in the market (unit, branch bank systems, or holding companies); (5) the growth and price elasticity of the market demand for credit and for other bank services.

Theory suggests that the most important determinant of conduct and, therefore, performance is the number and size distribution of firms. The smaller the number of firms, the more likely that they will recognize their mutual interdependence. All realize any action taken by one firm will directly influence its rivals. Price will be set at the industry profit maximizing level--the price a monopolist would set.[1/] Similarly, the greater are the sizes of the largest firms relative to the rest of the market, the greater will be the interdependence among these large firms and the more likely will be higher prices.

The degree of competition in the market will also be influenced by the height of entry barriers--the ease with which either new or established firms currently operating in other markets may enter. Since capital flows into investments with the highest return, high profitability in a banking market would induce pressure for new firms to enter. In potentially profitable markets where entry is easy, therefore, either firms in the market will hold down prices and profits to deter possible new entry or new entry will occur and the excess profits will be competed away.[2/] High entry barriers are therefore necessary for excess profits to persist in a market.

1/ Alternatively, the greater the number of firms, the greater the probability of cheating, or of a communications breakdown, so that collusion is broken and the price moves away from the collusive profit maximizing price. For an excellent summary of these theories, see Frederick Scherer, Industrial Market Structure and Economic Performance (Chicago: Rand McNally & Co., 1970), pp. 183-184 and 208.

2/ Joe S. Bain, "A Note on Pricing in Monopoly and Oligopoly," American Economic Review, XXXIX (1949), pp. 448-464.

Entry conditions in banking markets are primarily determined by the restrictiveness of the regulatory authorities' chartering and branching policies. In addition, the ease of entry for new firms to the market is also influenced by other factors such as the availability of desirable bank locations and the size and expected growth of the market relative to the minimum efficient size of banks. A new entrant can carve out a minimal market share more easily in a large, rapidly growing market.

The potential for banks already established in other markets to enter the market through branching or through a holding company will influence conduct and performance probably even more than the potential for entry by new banks. Entry would be easier for a large organization with an established reputation and the ability to offer a wide range of services than for a new independent bank. Similarly, within a market, any spatial advantage held by one bank could be easily taken away by the establishment of a branch of another bank. Therefore, a market in a state that permits branch banking or holding companies is likely to be more competitive than a similar market in a state with more restrictive branching and holding company regulations.

Finally, market demand conditions will influence the degree of rivalry between firms. Firms in rapidly growing markets will have an incentive to compete aggressively and attempt to increase their market share, since foregone profits this year can be more than compensated for by a larger share of the larger market profits next year.[1/] In addition,

1/ Richard Caves, American Industry: Structure, Conduct, Performance (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967), p. 31.

rapidly growing markets are the most likely areas for new entry. New entrants, scrambling for a market share, may well compete away profits of established firms. In markets where demand is not growing, there will be less of an incentive for existing banks to attempt to increase their market shares, and for new entry to take place. However, the net impact of market growth on profitability is ambiguous. While rivalry is likely to increase, profits may still increase depending on the speed of adjustment in supply to the increasing demand.[1/]

The level of demand in a market will influence profitability. All other things equal, the greater the quantity that will be demanded at any price, the greater will be profitability.

B. Market Structure and Uncertainty Avoidance

Market structure may have an additional influence on performance if managers of firms with monopoly power react differently to uncertainty than managers of firms in competitive markets. By avoiding uncertainty, they may well be taking some of their potential profits in the form of reduced risk.

Several studies have documented the erosion of owners' control of large firms. Firms have become so large and the owners so fragmented that management effectively controls most policies of large firms.[2/]

1/ See, for example, Marshall Hall and Leonard Weiss, "Firm Size and Profitability," Review of Economics and Statistics, XLIX (August, 1967), p. 323.

2/ See, for example, A. A. Berle and Gardiner C. Means, The Modern Corporation and Private Property (New York: Macmillan, 1962); and, Robert S. Larner, "Ownership and Control in the 200 Largest Nonfinancial Corporations," American Economic Review, LVI (September, 1966), pp. 777-787.

This fundamental change in the nature of corporations has opened up the possibility that risk aversion is an important factor in corporate decisions. The system of rewards to management is likely to induce them to be very cautious when confronted with risky decisions. If they are not successful, they face discharge. If they are successful, the increase in their salaries will not be commensurate with the risks they have taken.[1/]

This behavior has not escaped the view of economists. Almost forty years ago, Hicks wrote: "The best of all monopoly profits is a quiet life."[2/] Rothschild talked of the twin goals of maximum profits and secure profits.[3/] As he pointed out, these goals are usually, but not always contradictory. Fighting for tariff or entry protection for an industry, for example, is consistent with both high and secure profits. However, some actions taken by firms are clearly indicative of the choice for secure profits. For example, maximum profits are generated by optimum sized plants. Alternatively, intentionally building excess capacity raises entry barriers and protects firms in the industry at the same time as it raises their costs.[4/]

1/ William Fellner, Competition Among the Few. (New York: Knopf, 1949), pp. 172-173 and R. J. Monsen and Anthony Downs, "A Theory of Large Managerial Firms," Journal of Political Economy, LXXIII (June, 1965), p. 232. McGuire, Chin, and Elbing have demonstrated empirically that executive salaries are independent of profitability. See J. W. McGuire, J. S. Y. Chin, and A. O. Elbing, "Executive Income, Sales, and Profits," American Economic Review, LII (September, 1962), p. 758.

2/ J. R. Hicks, "Annual Survey of Economic Theory: The Theory of Monopoly," in American Association Readings in Price Theory, ed. by Kenneth E. Boulding and George J. Stigler (Chicago: Richard D. Irwin, 1956), p. 369.

3/ K. W. Rothschild, "Price Theory and Oligopoly," Ibid., p. 450.

4/ Ibid., p. 452.

The impact of uncertainty on firm behavior has recently been raised in John Kenneth Galbraith's The New Industrial State.[1] In a recent review of Galbraith's book, Caves extends the thesis. Caves says that Galbraith "has touched upon an important and oft-ignored aspect of the large firm's behavior: that a significant portion of the potential profits latent in its position of market power is taken in the form of avoiding uncertainty, with important allocative effects on the economy."[2]

Caves suggests two possible explanations for the Galbraith effect. First, the possession of market power gives the firm the option of trading off excess profits for the "easy life." Firms with monopoly power can afford to choose between high risk investments that offer relatively high returns and safer investments with corresponding lower returns whereas firms in competitive markets are more restricted in their options because of the necessity of earning the opportunity cost of capital. Second, managers with greater risk aversion may align themselves with firms with monopoly power because of the opportunities for greater security.[3] Therefore, Caves argues that firms with monopoly power will avoid uncertainty to a greater extent than firms in a competitive environment. Management of monopolistic firms, is, on average, more risk averse and, in addition, it has the option of trading off excess profits for the "easy life."

1/ John Kenneth Galbraith, The New Industrial State (Boston: Houghton Mifflin, 1971).

2/ Richard Caves, "Uncertainty, Market Structure and Performance: Galbraith as Conventional Wisdom," in Industrial Organization and Economic Development, ed. by J. W. Markham and G. F. Papanek (New York: Houghton Mifflin, 1970), p. 284.

3/ Ibid., p. 285.

In summary, market structure clearly has a significant influence on the conduct and performance of firms in the market. Firms in concentrated markets have the ability to reap high profits from their monopoly power. If they choose, they may forego some or all of these profits in order to reduce the risk they must face. In either case, market performance will be worse than the level of performance that would have been generated by a competitive market.

C. Uncertainty Avoidance in the Banking Industry

The Galbraith-Caves hypothesis suggests that firms with monopoly power may take less risk than firms in competitive markets. This section will explore the implications of the Galbraith-Caves hypothesis to the banking industry and discuss an empirical test of the hypothesis.

Lintner has recently developed a model of the firm under conditions of uncertainty that can be used to predict the impact of risk avoidance on behavior of firms with monopoly power.[1/] This model is ideally suited to the structural characteristics of the banking industry in that it applies to firms that satisfy the following characteristics:

(1) They have substantial degrees of monopoly power and, therefore, are price-setters and price-leaders rather than price-takers.

(2) At the time prices are determined, the quantities of output which can be sold at any one of the possible prices are highly uncertain.

1/ J. Lintner, "The Impact of Uncertainty on the 'Traditional' Theory of the Firm: Price-Setting and Tax Shifting," in Industrial Organization and Economic Development, ed. by J. W. Markham and G. F. Papanek (New York: Houghton Mifflin, 1970), pp. 238-265.

(3) Marginal production costs are essentially constant with respect to output over wide ranges of possible outputs.

(4) The firms have the power to increase the quantity sold at any given price by increasing their outlays on advertising and other promotions. However, Lintner treats advertising as exogenous in his model.

(5) The firms have substantial capacity to produce any output actually demanded and do not have problems with regard to carry-over inventories to the next "model" year.

(6) Uncertainties regarding unit sales at any price are relatively much greater than uncertainties regarding actual price realizations and actual costs.

(7) Pricing decisions are made on a fully rational profit-maximizing basis subject to risk aversion with respect to the uncertain profits involved.[1/]

These assumptions are quite realistic for the banking industry. Banks clearly operate in oligopolistic markets; and, therefore, have market power. Furthermore, they are price-setters as opposed to price-followers--as is demonstrated by the prime rate "convention." Second, loan demand fluctuates in fairly wide ranges at any given interest rate as economic conditions change. Third, all studies of economies of scale in banking have found essentially constant marginal costs with respect to output, at least beyond $40 million in total deposits.[2/] Fourth, banks do have the power to influence the quantity of credit and bank services demanded at

1/ Ibid., pp. 239-241.
2/ See, for example, F. Bell and N. Murphy, Costs in Commercial Banking.

any given price through advertising campaigns and through the introduction of additional services. Fifth, banks do not have the "inventory" problems faced by many manufacturing firms. By adjusting their holdings of short-term securities, they can rather easily accommodate wide fluctuations in demand. Finally, large fluctuations in realized prices and costs seldom occur. Entry regulations minimize the possibility of a new entrant instigating a price war. Similarly, Regulation Q and the prohibition of interest on demand deposits as well as anticyclical monetary policy prevent wide fluctuations in the cost of funds for commercial banks.

Lintner assumes that each firm (or its management) is risk averse--the firm prefers options with greater return, provided returns are no lower. He adopts an exponential utility function that allows the degree of risk aversion to change for each firm but to be constant with respect to wealth.[1/] Using the exponential utility function and the assumption that the quantity sold and therefore the uncertain returns are distributed normally, Lintner derives a model in which the firm maximizes utility by maximizing the certainty equivalent of profits ($\bar{P} = P - bV$) where $\bar{P}$ is the certainty equivalent of profits, P is expected profits, b is the risk aversion coefficient,[2/] and V is the variance of profits. Uncertainty (defined as profit variance which is the difference between price and marginal costs squared times the variance of quantity) is expressed as a utility cost and is measured in terms of dollars of

---

1/ For a justification for using this form of the utility function, see Lintner, "The Impact of Uncertainty," pp. 242-244. He argues this form of the function is reasonable for "intermediate" decisions of the firm.

2/ In the utility function, $U = a + ce^{-2bW}$, where U is utility, a and c are constants, W is wealth, b is the risk aversion coefficient and is obtained from the ratio $(-U''/U')$. See J. Pratt, "Risk Aversion in the Small and the Large," Econometrica, 32 (January-April, 1964), pp. 122-136.

expected profits. Under the assumptions of the model, price is the decision variable rather than quantity. By lowering price, the firm loses utility in decreased expected profits but gains utility from a fall in profit variance. Firms then maximize the certainty equivalent of profits, and therefore utility, at the price and resulting quantity where the loss in expected profits from any additional price reduction is exactly compensated by the gain in utility from reduced uncertainty. Lintner concludes:

> Prices (and gross margins) will be lower, (a) the greater the uncertainty concerning the quantities which will in fact be sold over the pricing period at any announced price, and (b) the greater the risk aversion of the company.1/

The Lintner model may be summarized in Figure 1.2/ In the diagram, a set of a particular firms' indifference curves in profit level-profit variance space are depicted by lines 1 through 4. A firm will desire to attain that indifference curve which will yield the highest possible expected profit for a given level of profit variance. In other words, in Figure 1, indifference curve 2 is preferred to 1, 3 is preferred to 2, and so forth. Furthermore, given that all firms have exponential utility functions, the slope of any firm's indifference curves will be a constant and, as depicted in Figure 1, will be equal to the reciprocal of the firm's degree of risk aversion ($\frac{1}{r}$). Different firms, of course, may have different degrees of risk aversion, so that each firm's indifference curve set may differ with respect to slope. An alternative set of indifference curves showing greater risk aversion, for example, is depicted by lines 1' through 3' in Figure 1.

1/ Lintner, "The Impact of Uncertainty," p. 247.

2/ The diagram was derived by the author and Franklin Edwards for the paper on the Galbraith-Caves hypothesis. See Franklin R. Edwards and Arnold A. Heggestad, "Uncertainty, Market Structure, and Performance," p. 12.

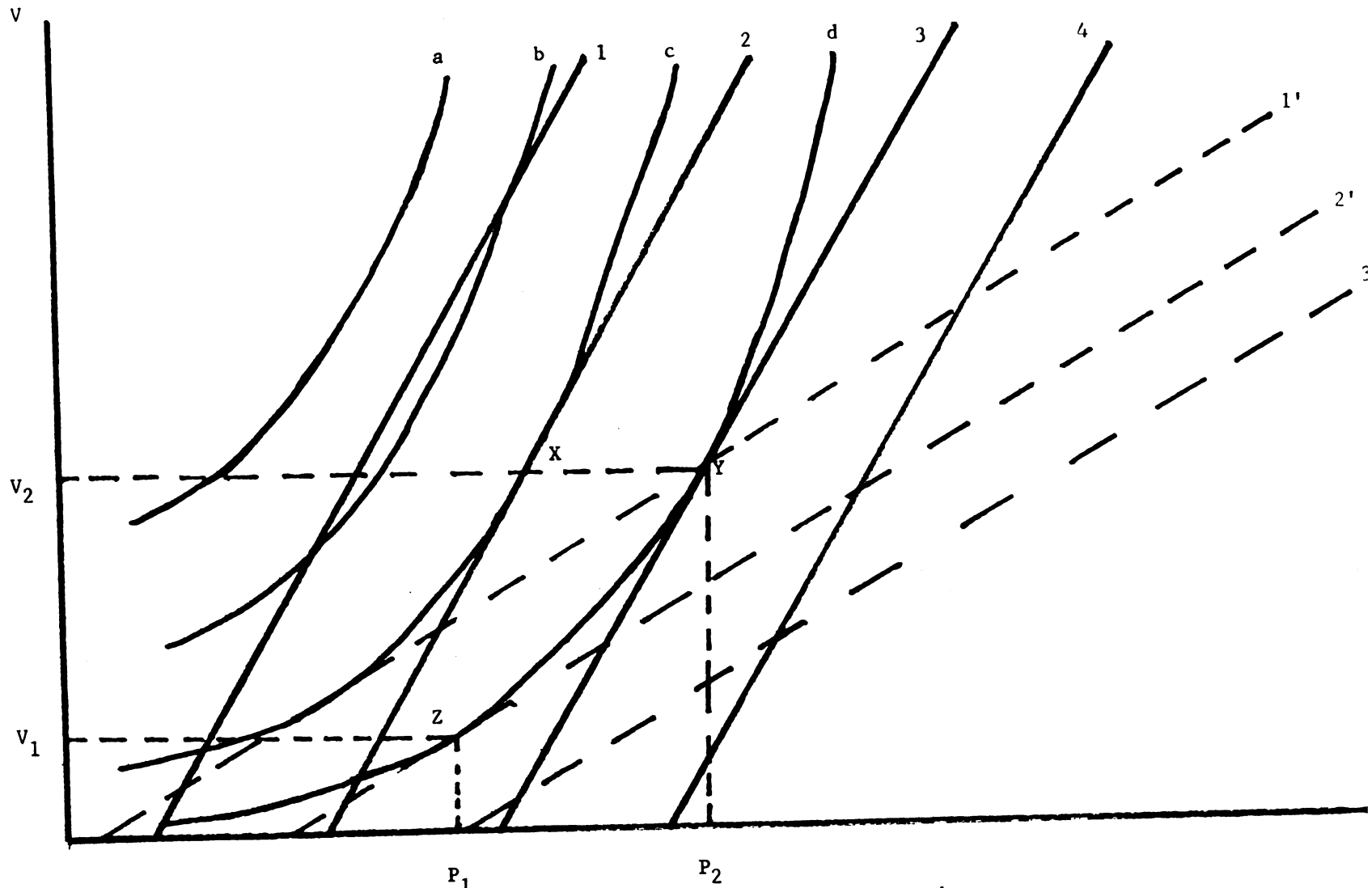

Figure 1. Risk - Return Determination

Superimposed on tnese two sets of indifference curves are the different efficient opportunity sets which may confront particular firms. Those are curves a through d in Figure 1. An opportunity set which lies to the right of another is superior, since it enables a firm to obtain a higher expected profit for every level of profit variance. Thus, in Figure 1, d is the most favorable efficient opportunity set. The convex shape of these opportunity sets is well established in the theory of portfolio choice.[1/]

The possibility that large firms with market power can afford to trade off excess profits for less risk implies that the efficient opportunity set of a firm with monopoly power lies to the right of that of a comparable firm in a more competitive market. In other words, it implies that a monopolistic firm can obtain a higher profit for every level of profit variance. In Figure 1 this argument can be depicted by assigning the efficient opportunity set "d" to the firm with greater market power, while assigning the opportunity set "c" to a more competitive firm. If both firms have identical degrees of risk aversion and therefore identical indifference maps, the firm with greater market power will maximize utility by choosing the portfolio represented by point Y, whereas the competitive firm will choose portfolio X. Second, the possibility that the management of large firms with market power have a higher degree of risk aversion implies that the indifference curve map associated with these firms will be more like those portrayed by curves 1' through 3'. Consequently, monopolistic firms will choose portfolio Z rather than portfolio Y. Potential profits of $(P_2 - P_1)$ have been foregone in order to reduce risk (profit variance) from V_2 to V_1.

1/ The convex shape results from the variance of a portfolio increasing less than linearly if returns on investments are not perfectly, positively correlated.

Franklin Edwards and I recently tested the relationship between monopoly power and uncertainty avoidance suggested by Galbraith and Caves in the banking industry.[1/] We found that the degree of uncertainty avoidance varies inversely with the concentration ratio in banking markets.

Our sample consisted of sixty-six of the largest hundred banks of 1960. (The remaining thirty-four were excluded primarily because of lack of sufficient data on the banks.) The sixty-six sample banks ranged in total, 1960, deposits from $315 million to over $10 billion. These banks are located in thirty-three of the largest Standard Metropolitan Statistical Areas (SMSA's). Thus we used a sample of very large banks, operating in a large number of widely-diversified, extensive, banking markets.

Our sample of large banks permitted us to make two important assumptions. First, we could assume the banks in the sample are manager-controlled rather than owner-controlled.[2/] Second, we could assume that all of the sample banks are located in markets which allow bank managers wide scope for choosing their desired portfolios, and therefore they face the same efficient opportunity sets, except for quantifiable differences.

Our intra-industry sample allowed us to ignore many of the problems, such as different capital structures, inherent in studies that attempt to compare risk across industries.[3/] However, we still had to account for determinants of profit variance other than market structure.

1/ Franklin R. Edwards and Arnold A. Heggestad, "Uncertainty, Market Structure, and Performance."

2/ To test this assumption, we used a classification of manager-controlled banks derived by J. R. Vernon. He classified nine of our banks as owner-controlled. Statistical tests indicated no significant difference between these banks and the rest of the sample. See J. R. Vernon, "Ownership and Control Among Large Member Banks," Journal of Finance, XXV (June 1970), pp. 651-657.

3/ See, F. Scherer, Industrial Market Structure and Economic Performance, p. 205, n. 79.

The most important of these was bank size. Profit variance should fall as the size of bank increases.[1/] Greater geographic diversification (or branching) may also reduce profit variance.[2/] The extent of branching over the sample of banks varied considerably, depending on state regulations. Some banks have many branch offices scattered throughout an entire state, others have offices only in counties contiguous with their home office (such as the SMSA) and others have no branches at all. Finally, risk may be influenced by market variability of demand. The direction of the influence, however, is uncertain in the Lintner model since increases in the variance of demand will lower the utility maximizing price level which, in turn, lowers the variability of profits.

The model that we estimated is:

Risk = F(Market structure, Bank size, Branching
Variance of demand, Random error)

Risk is defined as the variance of profitability divided by average profitability--the reciprocal of the reward to variability ratio, i.e., the coefficient of variation of profitability for the bank.[3/] Profitability is measured by the ratio of annual net earnings to end of year assets

---

1/ This effect has been found in many studies. See, for example, H. J. Sherman, Profits in the United States, (Ithaca: Cornell University Press, 1968), pp. 101-120; S. Alexander, "The Effect of Size of Manufacturing Corporation on the Distribution of the Rate of Return," Review of Economics and Statistics, XXXI (August 1949), pp. 229-235; J. Samuels and D. Smyth, "Profits, Variability of Profits, and Firm Size," Economica, XXXV (May 1968), pp. 127-139; and, H. Stekler, "The Variability of Profitability With Size of Firm, 1947-1958," Journal of the American Statistical Association, 59 (December 1964), pp. 1183-1193.

2/ See, for example, R. Wacht, "Branch Banking and Risk," Journal of Financial and Quantitative Analysis, III (March 1968), pp. 97-107; and, L. Lauch and N. Murphy, "A Test of the Impact of Branching on Deposit Variability," Working Paper No. 69-5, Banking and Economic Research Section, Division of Research, Federal Deposit Insurance Corporation (1970).

3/ W. Sharpe, Portfolio Theory and Capital Markets (New York: McGraw Hill, Inc., 1970), pp. 154-155.

for each bank. Profit variance for each bank is computed as the sum of squared deviations of profit rates from the time trend of profit rates between 1954 and 1966. Average profitability is computed over the same period.

Market structure is measured by the three bank concentration ratio of total deposits in the bank's SMSA.[1/] Branching is measured by dichotomous variables that separate banks in states that allow unrestricted branching, restricted branching, or no branching at all. Finally, demand variability is represented by the R^2 of the time trend of retail sales in the SMSA during the sample period of 1954 to 1966. A high R^2 indicates low demand variability.

Although theory does not specify the functional form, it seems clear that the variables will affect the degree of risk in a nonlinear way. A logarithmic equation is estimated to approximate the nonlinear functional form.[2/]

The results of the tests confirm that there is a systematic relationship between the amount of risk that banks take and the monopoly power they hold.[3/] The higher the concentration ratio, the lower is

---

1/ Several other concentration measures were also used and yield very similar results.

2/ A more complete rationale for using a logarithmic equation is in the paper. Edwards and Heggestad, "Uncertainty, Market Structure, and Performance," pp. 23-24.

3/ For example, one estimated equation is:

Risk = -1.259 (Concentration) - .148 (Size) - .296 (Demand Variance)
(-3.97) (-2.01) (- .84)
+.127 (State branching) -.06 (No branching) R^2 = .20
(.93) (-.40)
"t" values are below the coefficients

the risk faced by large banks in the market. Size also has a significant influence in the expected direction. The larger the banks the less risk it takes. However, neither branching nor demand variance has a significant influence on the degree of risk. The branching variable may not be significant because of the gross measure we were forced to use. Within state-wide branching states, there may be considerable variation in the degree of branching. Demand variance is insignificant because of the conflicting effects of demand variance on profits suggested by Lintner's model.

We concluded from this study that the degree of risk faced by banks systematically falls as their market power increases. However, the model does not allow us to distinguish between the two possible sources of reduced risk--greater risk aversion and/or more favorable market opportunities for banks with monopoly power.

CHAPTER III: THE BANKING INDUSTRY

The commercial banking industry of the United States operates in an environment of regulatory protection, on the one hand, and competition on the other. Although market forces are expected to control prices and output of bank credit and services, regulation continually ameliorates the impact of competitive forces in order to prevent possible bank failures.

The market environment in which most banks operate does not guarantee the presence or strong competitive forces. Banking markets are typically oligopolistic in nature. In addition, these local oligopolies are relatively insulated from entry by banks in other markets and from new bank formations through strict chartering and branching regulations.

Economists have recognized this characteristic of banking markets for many years. As early as 1938, Lester Chandler wrote:

> ...important elements of monopoly exist in the commercial banking system, even in the absence of collusive agreements, and that it is the theory of monopolistic competition rather than the theory of pure competition, that is the more useful in explaining the rates of interest on bank loans to customers, the rates of interest paid to bank customers on time and savings deposits, and the prices paid by customers for other banking services.[1/]

This chapter will: (1) describe the structure of the banking industry; (2) analyze the impact of regulation on conduct and performance; (3) and survey the major empirical work that has tested the relationship between market structure and performance in the banking industry.

1/ Lester V. Chandler, "Monopolistic Elements in Commercial Banking," The Journal of Political Economy, XLVI (February 1939), p. 1.

A. Structure of the Banking Industry

1. Overall Banking Structure

The American banking industry's structure began to evolve in the early part of the 19th Century. The industry began with a large number of small local banks and, as a result of the spirit of that period, has remained fragmented to present times. Deane Carson has summarized the prevailing philosophy under which the banking industry was formed.

> To sum up, the American banking industry evolved within a political and economic system that was hostile to central government intervention in economic affairs, dominated by rural and small business interests through political control of state legislatures, devoted to free enterprise (including enterprise banking) and generally, although not always consistently and effectively, hostile to monopoly and large concentration of business power.[1/]

The major outcome of this populist movement was a set of Federal and state laws that restrict banks from operating in more than one state, and that even prohibit branch banking within many states. These legal barriers have resulted in an extremely large number of banks in the United States. As of December 31, 1970, there were 14,199 commercial banks; with a total of 37,166 banking offices and total assets of $535 billion.[2/] Most of the banks, however, are extremely small. (Table 1.) 56 per cent of the banks have less than $10 million in total deposits. These 8,000 small banks control only 7 per cent of the total deposits held in the commercial banking system in contrast to the few very large banks that dominate the national banking system. Although most of these banks are considerably smaller than the minimal efficient size, they are able to exist because they are located in rural areas where

---

1/ Deane Carson, "A Bank is a Bank?" in Money and Finance: Readings in Theory, Policy, and Institutions, ed. by Deane Carson (New York: John Wiley and Sons, Inc., 1972), p. 65.

2/ Annual Report of the Federal Deposit Insurance Corporation, Washington, D.C., 1970, pp. 176-192.

they are relatively isolated from any competition from larger, more efficient banks. On the other hand, the 162 banks with deposits greater than $500 million hold 46 per cent of total deposits. This overall level of concentration is not extremely high compared to many industries. However, it is fairly high when the regulatory limitations on banks' operating outside of their home states are considered. Most of these very large banks are located in the large SMSA's and tend to actively compete in the national market for large business credit. The bulk of consumer and small business banking is done by the medium size banks of $50 to $500 million in total deposits.

2. State Banking Structure

Individual states have zealously guarded their own banking systems from infringement by banks of other states. Neither branch bank systems nor holding companies can cross state lines in their banking endeavors.[1/] Therefore, the state becomes a meaningful region to analyze structure since the state structure sets the external environment for local competition. However, the state would never serve as an appropriate approximation of a banking market.

The extent of branch banking within the various states is primarily dependent on state law. The states may be classified in three categories: unit banking states, limited branching states and unrestricted branching states. In unit banking states, all branch banking is prohibited. In limited branching states, banks are permitted to branch in a small area of the state, usually the county in which the bank is headquartered or in that county plus continguous counties (such as a metropolitan area). Finally, banks may branch throughout their respective states in unrestricted branching states. Any branching, however, requires approval

1/ With the exception of a few multibank holding companies in the far West that were in existence before the Holding Company Act was passed.

Table 1. Size Distribution of Commercial Banks
December 31, 1970

Deposit Size (dollars)	Number of Banks	Per Cent of All Banks	Per Cent of Deposits of All Banks
Less than 1 million	295	2.07	0.03
1 to 2 million	929	6.54	0.26
2 to 5 million	3,304	23.26	2.02
5 to 10 million	3,493	24.60	4.54
10 to 25 million	3,501	24.65	9.75
25 to 50 million	1,337	9.41	8.32
50 to 100 million	643	4.52	8.03
100 to 500 million	535	3.76	20.54
500 to 1 billion	97	0.68	12.37
Over 1 billion	65	0.45	34.10
Totals	14,199	100.00	100.00

Source: Annual Report of the Federal Deposit Insurance Corporation, (Washington, D.C., 1970), p. 189.

by either the state banking commissioner or the Comptroller of the Currency.

These regulations naturally have a significant influence on the structure of banking in the respective states. Unit banking states are characterized by large numbers of relatively small banks. In 1961, over 50 per cent of the banks were located in the 15 unit banking states. Branching states generally have fewer banks but their banks are much larger since they are not constrained to one location and can easily expand by establishing new branches as growth patterns change within their state or within the areas where they are permitted to branch.

In addition, many states permit the formation of multi-bank holding companies; an organizational device that has become increasingly important in recent years. Their share of total banking system deposits has increased from 7.6 per cent in 1956 to 16.2 per cent in 1970.[1/] In such an organization, each affiliate bank retains some degree of independence. Control of the stock and the final authority on bank policy, however, rests with the holding company.[2/]

In terms of flexibility and strength, the holding company lies somewhere between a branch system and a group of independent banks. The holding company does not have all of the flexibility that a branch system has to shift resources between affiliates. There are legal constraints on loans between affiliates. In addition, each affiliate must keep at

---

1/ Robert J. Lawrence, "The Performance of Bank Holding Companies," Board of Governors of the Federal Reserve System, 1966, p. 2; and, Federal Reserve Bulletin, 57 (August 1971), p. A98.

2/ It is not clear to what extent the control is actually exercised. Lawrence concludes that control is not exercised in many decisions of the banks, including pricing and loan portfolio management. See Robert J. Lawrence, "Operating Policies of Bank Holding Companies, Part I," Staff Economic Studies, Board of Governors of the Federal Reserve System, 1971, p. 17. Others have found that control is exercised. For example, see Gerald C. Fischer, "Bank Holding Company Affiliates: Branches or Unit Banks?," Journal of Business, 37 (January 1964), pp. 47-48.

least a minimal amount of capital. On the other hand, an affiliate of a holding company is considerably stronger than an independent bank of the same size. Within the legal constraints, it can draw upon the resources of other affiliates and of the holding company. Furthermore, to the extent there are economies in holding company organizations in management, correspondent services, or computer facilities; its costs will be lower than independent banks of the same size, and, therefore, its profits higher.[1/]

3. Banking Markets

As multiproduct firms, banks operate in a series of different geographic markets. They sell various kinds of credit ranging from unsecured personal and business loans to mortgages. They also offer a wide range of services including demand deposits, time and savings deposits, estate and trust planning, and safety deposit boxes. The geographic extent of the banks respective markets for various kinds of credit and for services will vary widely depending on the product and the size of the transaction.

In most product and service markets, banks must compete with at least one other type of financial institution such as savings and loan associations, mutual savings banks, credit unions, or consumer finance companies. However, the law prevents any other financial institution from issuing demand deposits. The relatively low cost funds obtained through demand deposits give commercial banks an advantage over any other of the

1/ However, reported profits may bear little relation to actual profits in any year. The holding company may choose to extract income from its subsidiary banks indirectly through devices such as high service fees rather than directly through dividends in order to minimize its tax bill. Because of this possible bias in the profitability of holding company banks, they are excluded from the sample used later in the study.

few legally-eligible specialized financial institutions in the sale of short-term business credit. As a result, commercial banks issue virtually all of this form of credit (except for the financial paper markets). Because banks have a legal monopoly in the sale of demand deposits and have a virtual monopoly in tne sale of short-term business credit, determination of the relevant market for commercial banking has centered on these two activities. Furthermore, it is likely that the market defined for the two major activities will reasonably approximate the market for many other bank activities.[1/]

The extent of the geographic market for demand deposits and short-term personal and business loans is largely determined by transaction costs. Since the products themselves are virtually homogeneous, the major distinguishing factor between banks is convenience and location. The greater the geographic distance to the bank, the greater will be the inconvenience costs of any transaction. This inconvenience becomes especially important if it is necessary for the customer to maintain a continuing relationship with the bank.[2/] For the bank, transaction costs will also increase with the distance it is located from its customers. In deposit markets, the bank will have to compensate customers for the greater inconvenience they would experience by offering higher interest rates, lower service charges, or better service.[3/] In loan markets,

---

1/ The Supreme Court has argued that the cluster of products offered by commercial banks, centered around the demand deposit monopoly, makes commercial banking a distinct line of commerce. United States vs. Philadelphia National Bank, 374 U.S. 321, 325-330, 356-365, 1963.

2/ This continuing relationship is especially important to the small business that is required to maintain its demand deposits at the same bank where it obtains its credit.

3/ The increasing use of bank by mail services for demand and savings deposits has reduced the inconvenience of banking at a greater geographic distance.

the bank will have to expend greater sums in attracting business in more remote geographic areas. For example, the time and travel expense of officers will increase with the distance traveled to attract new loans. In addition, more extensive credit investigations before loans can be made will likely be required in areas more geographically remote from the bank. Since these transaction costs are relatively independent of the size of the transaction, the distance that both customers and banks will be willing to travel will vary with the value of the transaction. The larger the transaction, the lower is the average cost to the bank and the customer of venturing outside of their immediate locale.

These costs effectively limit the market for personal deposit accounts and loans to a relatively small area--a town or a county in rural areas or a metropolitan area. Small variations in time deposit rates or service charges are unlikely to induce a customer to forego the convenience of local banking and search outside of his local area. Similarly, a bank would be reluctant to make personal loans to individuals in other cities because of the higher costs associated with these loans relative to the profits to be derived from the transaction.

The geographic market for business deposits and loans increases with the size of business and size of loan. Small business generally remain within their own metropolitan area for depository services and loans. Medium-size firms borrow in a market somewhat wider than their metropolitan area while large corporations borrow in a national market.[1/]

1/ Edwards found in the 1955 Federal Reserve Business Loan Survey that firms with assets of $5-$25 million obtain only 46 per cent of their loans from banks in their metropolitan area. Firms with less than $1 million in assets obtain approximately 90 per cent of their loans in their own metropolitan area. Franklin Edwards, "Concentration in Banking and Its Effect on Business Loan Rates," The Review of Economics and Statistics, XLVI (August 1964), p. 295.

This pattern seems again to result from the costs to banks of making loans outside of their immediate locale. While credit investigation costs and costs incurred in obtaining loan customers would not be outweighed by potential profits on small loans to small firms, profits from loans to large firms would more than outweigh the additional costs of lending outside of the local area.

The Standard Metropolitan Statistical Area (SMSA) where the bank operates will be used as its market area in this study.[1/] The SMSA has been defined by the Census Bureau to encompass the trading area of a city and therefore seems a reasonable approximation of a banking market.[2/] Almost all transactions with individuals would be restricted to the SMSA as would most transactions with small businesses.

The Supreme Court provided an excellent rationale for approximating banking markets by the SMSA in the Philadelphia National Bank Case. The Court said:

> "But that in banking the relevant geographic market is a function of each separate customers' economic scale means simply that a workable compromise must be found: some fair intermediate delineation which avoids the indefensible extremes of drawing the market so expansively as to make the effect of the merger on competition seem insignificant, because only the very largest bank customers are taken into account in defining the market, or so narrowly as to place appellees in different markets, because only the smallest customers are considered."[3/]

1/ Many other studies have used the SMSA as a market approximation. For example, see Ibid., Almarin Phillips, "Evidence of Concentration in Banking Markets and Interest Rates," Federal Reserve Bulletin, 53 (June 1967), pp. 916-926; and, Donald Jacobs, Business Loan Costs and Bank Market Structure.

2/ The Bureau of the Census defines the SMSA to include all contiguous counties to the county or counties of the central city that are "essentially metropolitan in character and are socially and economically integrated with the central city." See U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 371, "Estimates of the Population of Standard Metropolitan Statistical Areas: July 1, 1965, (Washington, D.C.: U.S. Government Printing Office, 1967), p. 12.

3/ United States vs. Philadelphia National Bank at p. 361.

4. Structure of Banking Markets

Although most banking markets are oligopolistic in structure, there is still considerable variation in the structure because of several important factors. The size or the market, branching restrictions on banks in the market, entry policies on new banks, and the extent of mergers that have taken place in the market will all exhibit important influences on the structure.

Although economies of scale are exhausted fairly rapidly, many small markets, especially in rural areas, can only support one or two banks. As the size of the market increases, the number of banks capable of operating efficiently in the market also increases. Therefore, on average, concentration is lower in larger SMSA's. (Table 2.)

Similar size markets still exhibit wide ranges in the number and size distribution of banks operating in the market. A large part of this variation may be attributed to branching laws in the market. In unit banking states, banks are unable to branch to follow shifts in populations within markets. As the population shifts to the suburbs, for example, new banks are able to enter in the desirable locations. Therefore, concentration is lower and the number of banks is greater in markets in unit banking states.

Structure will also be influenced by regulatory policies with regards to entry and mergers. In markets where new charters are extremely difficult to obtain, concentration will be high since the number of banks operating in the market will be determined by the number it was economically able to support when it was much smaller. Similarly, horizontal mergers have been approved more easily in some markets than in others; thereby increasing concentration. Finally, market structure will vary depending

Table 2. Number and Size Distribution of Banking Organizations* in Metropolitan Areas, June 1968

Population of SMSA	50,000-100,000	100,000-500,000	500,000-1,000,000	Over 1,000,000	All SMSA's
Number of Banking Organizations					
Statewide branching	6	8	15	35	13
Limited branching	5	11	18	46	16
Unit banking	7	18	38	120	29
Share of Two Largest Banking Organizations*					
Statewide branching	69.5	68.5	69.1	55.0	66.9
Limited branching	65.4	64.4	57.7	51.5	61.7
Unit banking	68.5	53.5	47.8	42.7	54.6

* Banking organizations are defined to include all members of the same holding company as one entity rather than as independent banks. The difference is small in SMSA's.

Source: "Recent Changes in the Structure of Commercial Banking," Federal Reserve Bulletin, 56 (March 1970), pp. 206-207.

on the mix of demand for bank services. In some markets, demand may be more intense for services (such as international services) that do have large economies of scale.[1/]

Concentration is extremely high on average in all SMSA's. The average two firm concentration ratio of 54.6 per cent would be considered high in most industries.[2/] Even the markets with the lowest concentration (very large SMSA's in unit banking states) still have a highly skewed average distribution of bank sizes. On average, the two largest banking

1/ Bell and Murphy do find that scale economies vary widely within product lines. Frederick Bell and Neil Murphy, Costs in Commercial Banking, pp. 245-255.

2/ Bain defines national industries as "concentrated" if the 8 firm concentration ratio exceed 70 per cent. Joe S. Bain, "Relation of Profit Rate to Industry Concentration: American Manufacturing 1936-1940," pp. 293-324. Stigler considers industries concentrated if the 4 firm concentration ratio exceeds 60 per cent. George R. Stigler, Capital and Rates of Return in Manufacturing Industries.

organizations control 43 per cent. Therefore, the remaining 118 organizations share the remaining 57 per cent of the market. The two largest each control, on average, 21.5 per cent of the market; each of the 118 others control, on average, only 0.5 per cent.

B. Regulation of the Banking Industry

The banking industry is subject to a complex system of state and Federal regulation.[1/] Although the regulatory authorities do not set prices as do public utility commissions, their influence is very strong on pricing practices in the industry; as well as on other forms of conduct.

The various regulations imposed on the banking industry were adopted at different times and, perhaps, for different reasons. A single thread of consistency, however, runs through all of the regulations. They attempt to protect bank depositors and to foster the strength and stability of the banking system. Depositors must have confidence in the safety of banks in order for the monetary system to function efficiently. Similarly, a strong commercial banking system is necessary for a healthy economy because of the importance of the banking system in the financial markets. The goals of protecting depositors and assuring the stability of the banking system have fostered two distinct forms of regulation: rules and regulations designed to restrict management discretion and rules designed to prevent "excessive" competition that might force weak banks into failure.

Restrictions placed on loan and investment policies are designed to minimize the chance of bank failure. Specific regulations enumerate the "safe" types of assets that banks can hold and limit the amount of credit the bank can extend to a single borrower. In addition, the bank

1/ The banking industry is regulated by three Federal government agencies as well as by agencies in every state.

examinations apparatus works further to restrict portfolio decisions by examining loans even within the accepted categories to determine if they are safe from default and to minimize the amount banks can leverage on their capital. "Good management," as deemed by the examiner, is management that maintains a low long-term debt to equity ratio and that keeps a highly diversified portfolio of conservative loans. This attitude by examiners also tends to restrain any strong competitive moves by bankers that might be interpreted as inconsistent with safe banking.

Excessive competition in the industry is limited by regulation of the interest rates paid on deposits and by control over entry. Maximum interest rates are set on time and savings deposits and interest payments are prohibited on demand deposits; thereby limiting the possibility of excessive price competition for funds between banks as well as with other non-bank financial institutions. More important, however, to the restriction of competition are the regulations governing entry and branching. New charters are difficult to obtain;[1/] neither banks nor holding companies are allowed to establish offices across state lines; and even branching into new areas within states is severely limited, and, in fact, is totally prohibited in many states. A major criteria in determining whether to grant a new charter is whether there is a sufficient volume of new deposits in the market so that the entrant will not have to take deposits away from existing banks.

1/ Between 1961 and 1968, a relatively easy period for charters, 1322 new charters were issued. Primarily because of mergers, however, the number of banks increased from 13,431 to 13,720; an increase of only 2 per cent. Total deposits of the banking system grew by 75 per cent during the same period. See "Recent Changes in the Structure of Commercial Banking," p. 197.

Still, there is room left for substantial competition. Except for usury laws, the interest rates banks charge on loans are not regulated. Nor are the prices banks charge for other services regulated. Through tying arrangements such as compensating balances, even the usury laws can be evaded. Although maximum rates are set for time and savings deposits, the ceilings are not always "effective" and banks are free to pay less than the maximum if they choose. The prohibition of interest payments on demand deposits does not prevent nonprice competition for these funds (such as by the reduction of service charges). Therefore, regulation, although pervasive, still relies on market forces to control the most important facets of bank performance.

C. Empirical Studies of Market Structure and Performance in Banking

Market structure should have an important influence on performance in banking, despite the pervasive influence of regulation. Numerous empirical studies have been undertaken on the banking industry to test whether a relationship between market structure and performance exists at all in this highly regulated industry and to estimate the quantitative importance of the relationship.

The studies all test the effect of market structure on some measure of performance, using cross section data. Most use the interest rate charged on loans as a measure of performance, although other measures of performance are also used. The key structural variable generally used is the concentration ratio (of total deposits), which provides an estimate of the size distribution of banks in a market. Some attempt is usually made to also account for other aspects of market structure. After holding other determinants of performance constant, the studies attempt to test the influence of concentration on bank performance.

Three major studies have tested the relationship using small business loan rates in metropolitan areas as their measure of performance. The influence of market structure is likely to be stronger on small business firms since they are heavily dependent on credit and effectively limited to dealing with banks in their own metropolitan areas. In addition, they have few sources of credit other than commercial banks.

Edwards' study was the first to attempt to statistically test the structure-performance relationship.[1/] He tested the hypothesis that average small business loan rates within metropolitan areas vary directly with banking concentration. He used a multiple regression estimation model to hold constant the influence of other dimensions of market structure--growth in demand, size of market, and the restrictiveness of branching regulation--and the average size and average maturity distribution of loans in the market. His loan data were derived from the 1955 and 1957 Federal Reserve Business Loan Surveys which provide data on loans to small businesses (assets less than $1,000,000) in 49 metropolitan areas.

Edwards found that concentration, as measured by the percentage of total deposits held by the largest three banks, has a significant influence on business loan rates. The magnitude of the effect, however, is small. A ten percentage point increase in concentration, e.g., from fifty to sixty per cent, would cause an increase in average business loan rates of six basis points, approximately one per cent of the mean level of business loan rates.

1/ Franklin R. Edwards, "Concentration in Banking," pp. 294-300.

Almarin Phillips produced a more refined study of the impact of market structure on business loan rates.[1] Whereas Edwards was forced to use an SMSA average of business loan rates, which introduces several possible sources of measurement error;[2] Phillips was able to measure precisely average interest rates charged by individual banks. His study employed observations of approximately 75 banks in 19 cities for four years--1960, 1962, 1964, and 1966. Holding bank size, loan size, and regional effects constant; he concluded that, in each year, concentration has a statistically significant influence on interest rates. Again, the influence is small; a ten percentage point increase in concentration would raise loan rates by eight basis points.

Donald Jacobs has recently completed a very detailed and sophisticated analysis of the influence of market structure on business loan rates for the National Bureau of Economic Research.[3] A major improvement of his study was to specify that the true payment for a loan includes not only the interest charge, but also the opportunity cost of funds held on deposit at the bank--both compensating balances and normal demand balances. He developed a model that predicts both interest charges and deposit balances.

His model is far more comprehensive than the models utilized by Edwards and Phillips. It not only includes variables that describe market conditions but also includes variables that describe the bank-customer relationship. Included in these variables are the size of the loan, the size and activity of deposit accounts held by the business, the length of the loan, and other bank services used by the customer.

1/ Almarin W. Phillips, "Evidence of Concentration," pp. 916-926.

2/ It gives excessive weight to large loans which, in general have lower interest rates. In addition, it weights the loans of large banks more than loans of small banks. If these rates differ, and if the distribution of large and small banks differs in various SMSA's, an additional measurement error is added.

3/ Donald Jacobs, Business Loan Costs and Bank Market Structure.

Jacobs' data are drawn from a survey of banks with assets between $40 million and $400 million. He asked each bank in this survey for detailed information on loan rates and the bank-customer relationship. His questionnaire was sent to 600 banks in 1967. Of the 600 questionnaires, 160 were returned covering a total of 8,500 loans. Although the voluntary nature of the survey may have introduced systematic biases in his sample both in the types of banks that responded and in the loans that they choose to report, he nonetheless developed a data base with more comprehensive information on business loan rates and their determinants than has ever been obtained before.[1/]

Using multiple regression analysis, he tested the impact of market structure on loan rates, holding all other determinants constant. He concluded:

> ...the estimates from the regressions on the three size classes of business customers imply that loan rates are positively related to the level of concentration of deposits (of the largest three banks) in the bank market and that the size of firm, at least up to $5 million in assets, does not influence this relationship...The evidence is strong that for smaller sized firms (less than a half million in assets) unit banking markets have higher loan rates than restricted branching and statewide branching. The data also suggest that loan rates for small firms are higher in restricted than in statewide branching markets.[2/]

Jacobs, too, finds that the effect of concentration, although highly significant statistically, is small. A ten percentage point increase in concentration is associated, on average, with a 5 basis point increase

---

1/ Banks that charge excessive rates may not have responded to the survey. Similarly, the loans reported are likely to have been loans to customers whose accounts are most familiar to the banker. Since these are likely the largest customers or, at least, customers that have dealt with the bank for a long period of time, they may well pay lower rates for loans. Therefore, a downward bias is placed on reported rates.

2/ Donald Jacobs, Business Loan Costs and Bank Market Structure, p. 43.

in the business loan rate. On the other hand, Jacobs finds tnat the size of deposit balances is not affected by market structure variables. This latter result is not surprising since only compensating balances can be considered as part or the implicit payment for the loan.

A recent study that focused on another aspect of bank pricing, service charges on demand deposits, also documents the influence of market structure on bank performance.[1/] Using their previous work on bank costs and a special survey of demand deposit service charges and account characteristics, Bell and Murphy derived estimates for the annual service charge on a standardized account, as well as the marginal cost of servicing the account. After accounting for differences in the bank costs between metropolitan areas of the First Federal Reserve District (New England), they concluded that concentration has a positive, statistically significant relationship with demand deposit service charges. A ten percentage point increase in concentration would increase service charges by four per cent.[2/] They also find tnat the relationship holds irrespective of the measure of deposits that is used for the construction or the three firm concentration ratio. In addition to the concentration of total deposits, they use concentration ratios based on deposits of less than $100,000, $25,000, and $10,000 as well as concentration of the number of accounts.[3/]

1/ Frederick W. Bell and Neil B. Murphy, "Impact of Market Structure on the Price of a Commercial Banking Service," Review of Economics and Statistics, LI (May 1969), pp. 210-213.

2/ Ibid., p. 212.

3/ The use ot deposits less than $10,000 or $25,000 is thought to be a better base for calculating concentration since it measures market shares of accounts of the smaller customers that are effectively limited in their options to their metropolitan area. Including the deposits of larger firms (greater than $100,000) in the concentration measure introduces firms that are really not limited to the market. Since the largest banks generally have the large deposits, the use ot total deposits as a base biases the true concentration ratio upwards.

All of the above studies analyzed influences of concentration on a single measure of price in metropolitan areas. George Kaufman's study differs in two ways: he used several performance measures and he used rural counties in Iowa as a market approximation.[1/] Performance is measured by two price variables--the average interest rate charged on loans and the average interest rate paid on time and savings deposits; by two measures of output--the loan-to-asset ratio and the time-to-total deposit ratio and by the ratio of net current pretax earnings to assets.

Kaufman computed regressions on these various performance variables for 1959 and 1960, using as explanatory variables several alternative measures of market structure and several variables to account for market demand. He concluded: the greater was the number of banks or the lower was the percentage of deposits held by the largest bank, the lower were effective interest rates charged on loans, the higher were interest rates paid on time deposits and the greater was the ratio of time to total deposits. In addition, the greater was bank concentration, the greater were pretax earnings on assets.[2/] As in the other studies, Kaufman finds the effect of concentration to be relatively small but statistically significant for every variable except the loan to asset ratio.

Kaufman's study is complementary to the studies of business loan rates. His measures of performance are broader and indicate that market structure influences all activities of banks, not only business loan rates. However, some of his measures of performance are very crude.

1/ George Kaufman, "Bank Market Structure and Performance: The Evidence from Iowa," Southern Economic Journal, XXXII (April 1966), pp. 429-439.

2/ Ibid., p. 438

The interest charged on loans is computed from the Call and Income and Dividend Statements of the banks. This measure is very sensitive to portfolio composition and does not necessarily reflect the actual rates charged.[1/] Similarly, it gives a disproportionate weight to large loans--which Jacobs's study indicates will have lower interest rates. The profit variable is also sensitive to portfolio composition as well as other factors. However, these measurement problems are less severe for Kaufman than they might be for studies in other areas of the country. The homogeneity of rural counties in Iowa should minimize the chance for systematic bias.

In addition to the studies mentioned, several other studies also attempted to test the structure-performance relationship.[2/] In general, these studies are deficient either in the statistical techniques used, or in their data, so that it is difficult to derive meaningful implications from their results. However, since some find no relationship between structure and performance, it may be worthwhile to discuss three of the studies that fail to find a relationship.

1/ See Charles T. Taylor, "Average Interest Charges, the Loan Mix and Measures of Competition: Sixth Federal District Experience," Journal of Finance, XXIII (December 1968), pp. 793-804.

2/ For example, Irving Schweiger and John S. McGee, "Chicago Banking," Journal of Business, 34 (July 1961); Paul A. Meyer, "Price Discrimination, Regional Loan Rates and the Structure of the Banking Industry," Journal of Finance, XXII (March 1967), pp. 37-47; Franklin Edwards, "The Banking Competition Controversy," National Banking Review, III (September 1965), pp. 1-34; Theodore G. Flechsig, "The Effect of Concentration on Bank Loan Rates," Journal of Finance, XX (May 1965), pp. 298-311; Donald R. Fraser and Peter S. Rose, "More on Banking Structure and Performance: The Evidence from Texas;" Robert F. Ware, Banking Structure and Performance: Some Evidence from Ohio;" and, William R. Bryan, "The Determinants of Bank Profits."

Fleschig's study was directed at what he claims is a fundamental misspecification in Edwards' model. In computing his concentration ratios Edwards included deposits of mutual savings banks in determining the total deposits in the SMSA. This lowers his estimate of concentration in regions where mutual savings banks are important--primarily New England and the Mid-Atlantic states. Since interest rates as well as concentration are low in these areas, Fleschig claimed that Edwards found a spurious relationship between concentration and loan rates. He re-estimated Edwards' equation, but with dichotomous variables to account for regional effects, and found the effect of concentration is washed out by the regional variables.

Fleschigs' study has been generally discounted in the literature on two major bases. First, Edwards does account for local demand conditions and it seems reasonable that regional differences in demand should be reflected in local conditions. Second, Fleschig's definition of regions was arbitrary with little a priori justification. Other regional breakdowns (such as those used by Phillips and Jacobs) do not cancel the concentration effect.

The Ware study also failed to find any impact of market structure on performance.[1/] His study parallels the work of George Kaufman in that he uses rural Ohio counties as markets and uses county averages of bank performance--service charges on demand deposits, profitability, average interest earned on loans, and interest on time and savings deposits. He failed to find a relationship between concentration and any measure of performance.

1/ Robert F. Ware, "Banking Structure and Performance: Some Evidence from Ohio."

There are, however, several weaknesses in the study that make the results questionable. Ohio counties may not be reasonable proxies for markets.[1/] If the county "market" actually encompasses several local markets, the county concentration ratio may have no relevance to actual market conditions. Some of his other results indicate this may be true. For example, he finds that interest rates on loans increase with costs. Since the sample is relatively homogeneous in size of bank, this may indicate that small inefficient banks, with local market power, are able to pass on higher costs to customers.

Second, his measurement of performance variables are subject to criticism. Service charges on demand deposits are determined by account activity rather than by average balance. Therefore, the measure of the ratio of total service charges to total demand deposits is improper unless differences in account activity are random across counties.[2/] For this reason, no other study has used this gross measure of service charges on demand deposits. Similarly, the profit rate may be influenced by a number of other variables. In addition to other determinants of earnings, the use of capital as a base makes the profitability measure extremely sensitive to differences in leveraging between banks; a factor he does not hold constant. Unless the extent of leveraging is random with respect to concentration, his tests on profitability are biased.[3/]

1/ Kaufman was able to use the country as a market because of peculiar characteristics of Iowa. The counties are homogeneous in size with the county seat, located in the center, as the major town; making counties natural trading centers. George Kaufman, "Bank Market Structure and Performance," p. 430.

2/ See, Frederick Bell and Neil Murphy, Costs in Commercial Banking, p. 211.

3/ In fact, my sample indicates the degree of leveraging, as measured by the capital to asset ratio, decreases substantially as concentration increases.

William R. Bryan recently completed a study that analyzes the determinants of bank profitability.[1/] As a part of a larger study of "successful" management characteristics, Bryan attempted to isolate factors exogenous to bank management that explain differences in profitability. He found that market structure does not affect the profitability of banks in his sample. Deficiencies in his measurement of variables and in the statistical techniques he uses, however, substantially weaken these results.

The sample consists of 1,000 banks with total deposits between $10 and $25 million in 1963. Profitability is measured in four different ways by four year averages of the ratios of net income to assets and to capital; both before and after taxes. Multiple regressions are then calculated in which profitability is set as a function of:

1) Bank location (SMSA or not);
2) The number of competing banks in the bank's service area;
3) The degree of competition for loans;
4) The degree of competition for deposits;
5) The bank's time deposit rate;
6) The ratio of time deposits to total deposits;
7) The growth rate of deposits;
8) The size of the bank;
9) The wage bill for non-officer employees;
10) The capital to asset ratio.

The most important explanatory variable is the ratio of time deposits to total deposits--the greater is the proportion of time deposits, the lower is profitability. Bryan also finds that profitability is lower for banks in SMSAs, for banks with high employee salaries, and for banks with low deposit growth. Neither bank size nor the degree of competition in the market have a statistically significant influence on profitability.

These results, however, are questionable on several grounds. For example, it would be difficult to generalize from Bryan's results that size never has an effect on profitability. His tests are conducted on a

1/ William R. Bryan, "The Determinants of Bank Profits."

very narrow range of sizes ($10-$25 million). These banks are all below minimal optimal size. Generally, they are located in small towns or, it they are located in SMSA's, they are relatively new banks. Therefore, it is doubtful that these bank's represent the population of bank sizes.

The true relationship between competition and bank profitability is likely distorted by Bryan's method of measuring competition. To approximate the degree of competition in the market, he asked the banks in his sample to identify the number of banks in their respective service areas. He also asked them to arbitrarily rate the degree ot competition in their markets for loans and for deposits on a scale of one to five. Both of these measures are highly subjective and subject to considerable error.

The service area of a bank does not necessarily coincide with the market in which it operates.[1/] In fact, in a perfectly competitive banking market where the only distinguishing characteristic between banks is location, each bank would have a monopoly in its service area since all customers would go to the most convenient bank. In an oligopolistic market, the number of banks within any one bank's service area would depend on how the market was divided. Therefore, a low number ot banks within a service area could indicate a very competitive market or a market-sharing collusive cartel. In addition, this measure gives no information on the size disparities of banks with the service area.

1/ The service area normally entails the geographic area where a large percentage (e.g., 75 per cent or more) ot the bank's customers are located.

Bryan's technique of asking the banks to rate the degree of competition in their markets also introduces a high probability of measurement error. Businessmen are prone to argue that they are always in very competitive industries or markets no matter what the degree of competition actually is.[1/] In addition, bankers in highly oligopolistic markets have an incentive to argue their market is very competitive to preclude new entry.

Finally, the statistical tests used in the study may be biased as a result of multicollinearity in the model. (Bryan does not present the correlation matrix between independent variables.) It seems likely that the interest rate on time deposits, the time deposit to total deposit ratio, the dichotomous variable that indicates location in an SMSA, and employee salaries would be fairly highly correlated with each other--on average, banks in SMSA's pay higher salaries to employees and pay higher rates on time deposits and therefore have a higher ratio of time deposits to total deposits. Similarly, Bryan's measures of competition are likely correlated with each other and should not have all been included in the model at the same time. Whenever there are many banks in a service area, the bank is likely to report a high degree of competition for deposits and a high degree of competition for loans. The major consequence of multicollinearity is to raise the variance of estimators, increasing the probability of rejecting the true hypothesis.

In summary, the empirical studies that have tested the hypothesis that performance is determined by structure in the banking industry are not unanimous in their conclusion. However, the studies that tend to substantiate the theory generally use better data and are technically sounder.

1/ Witness the automobile and steel industries.

However, no study finds that concentration has a very large effect on prices or on the other measures of performance. The fact that any effect is found, given the poor measures of performance and the very small variations in interest rates on loans, is in itself amazing. Financial statements from banks are simply not in a form that allows precise measurement of prices or output. In addition, the surveys indicate there is very little variation in observed interest rates. For example, interest rates were rarely above 10 per cent or below the prime rate of 5.5 to 5.75 per cent in Jacobs' survey.[1/]

The lack of variation in reported interest rates found by Jacobs tend to substantiate the general feeling that competition between banks seldom occurs on the basis of price. Rather, any meaningful competition occurs through the addition of new services for customers. Therefore, profits should be used to test the structure-performance hypothesis since they account for nonprice competition such as advertising and the introduction of new services, as well as price competition.

1/ Donald Jacobs, Business Loan Costs and Bank Market Structure, p. 18.

CHAPTER IV--THE SAMPLE AND MEASUREMENT OF VARIABLES

A. Characteristics of the Sample

The sample used in this study was constructed to minimize many of the problems inherent in the samples used in other studies. The major criteria was to make the sample broad enough to allow generalization of the results to most banking markets in the U.S.

The sample was drawn from the largest six banks in 60 medium-size SMSA's throughout the country. Banks operating in the largest SMSA's (population ranks 1-8) were excluded since it may be argued that these banks actually operate in regional or national finance centers. Local market conditions only account for a small proportion of their business. The smaller SMSA's were also excluded since banks in these markets may be extremely dependent on their local non-diversified economies. Finally, the largest banks in the market were chosen primarily in order to exclude new banks from the sample. New banks, striving to achieve minimal optimal size, may not react to market structure or demand conditions in the same way as more established commercial banks.

Holding company banks are also excluded from the sample. Members of holding companies are basically different than independent banks of similar size. Their costs are likely to be somewhat lower to the extent there are economies of scale in correspondent or management services they receive from the parent holding company. However, their reported profits may be higher or lower than profits of a similar size independent bank. Depending on tax considerations and other factors, the holding company has considerable discretion in determining where to declare its profits. Since it is very difficult to control for these factors, these banks were excluded from the sample.

Out of the possible total of 360 banks, 122 had to be excluded, either because they were involved in major acquisitions, were formed during the period or because data were not available for the entire period. The remaining 238 banks, however, are fairly representative of the commercial banking industry. They are located in SMSA's that account for 30 per cent of the population of the U.S. These SMSA's are large enough to give the banks considerable discretion as to the types of portfolio they choose to hold (unlike banks in smaller towns or agricultural areas). Therefore, these banks have some control over the amount of risk they choose to take.

As can be seen in Table 2, the banks are larger, on average, than the total population of banks. There is a wide range in size of banks--the largest have several billion in total deposits, the smallest have only about 10 million in total deposits. Similarly, there is a relatively wide range in the degree of concentration in their respective markets. The highest three firm concentration ratio is 96.8 per cent; the smallest 32.9 per cent.[1/] The sample SMSA's also exhibit reasonably wide ranges of growth and income.

1/ As in all banking markets, however, the three firm concentration ratio is clustered at fairly high values. The distribution of concentration in the banks' markets is:

Concentration	Number of Banks
50% or less	27
50% - 60%	34
60% - 70%	52
70% - 80%	68
80% - 90%	33
90% - 100%	24

Table 3. Mean and Standard Deviation of Independent Variables

Variable	Mean	Standard Deviation
Total Deposits (millions)	$278.0	980.0
Time and Savings Deposits		
Total Deposits	.41	.13
Growth	1.84	.26
Per Capital Income (000)	3.88	.41
Concentration (%)	69.76	15.62

B. Measurement of Variables[1/]

Profitability is defined as the eleven year (1960-1970) average of the ratio of net income after taxes to total assets. A major advantage of using this relatively long time period is that it becomes possible to use net income after taxes as the measure of profits. Net income after taxes includes not only net operating income but also net securities gains or losses and charge-offs to reserves of loan losses, as well as taxes. Since all of these items are important in determining the total profitability of the bank, it would always be desirable to include them in the model. But the ability of the bank to manipulate these items in any one year for tax purposes introduces variation that cannot be explained by economic variables. In eleven years, however, these transitory influences should be smoothed out.

1/ Financial data for the individual banks were obtained from the Reports of Condition and Reports of Income and Dividends submitted to the Federal Deposit Insurance Corporation annually. Concentration ratios were also obtained from the Federal Deposit Insurance Corporation. Market data were obtained from U.S. Department of Commerce, The Statistical Abstract of the United States, (Washington, D.C.: U.S. Government Printing Office, 1961 and 1970).

Total assets are chosen as the base to calculate the rate of return and normalize profits with respect to bank size. Profits on assets represent the return to all productive resources controlled by the bank. In addition, the use of assets rather than capital as a base evades the difficult problem of attempting to control for the tremendous differences in leveraging between banks; some of which may be done to control risk.

The amount of capital banks are forced to maintain relative to their other assets is determined by their portfolio, by the type of regulatory agency responsible for the banks as well as by their size. Larger banks are able to obtain capital fairly easily in the capital markets, and therefore can keep an optimally low capital-deposit ratio. Smaller banks that cannot go to the capital markets must maintain a greater proportion of capital. In addition to these factors, the amount of capital maintained by each bank will depend on management risk preferences. The greater the amount of capital, the lower will be the variability of returns to capital.

The variability of profits is measured by the standard deviation of the annual ratio of profits to assets of each bank for the period 1960-1970. Profit variability is alternatively measured by the sum of squared deviations about the time trend of profitability for each bank between 1960 and 1970. This would be a superior measure if there were a time trend--bankers would be more certain each year of the level of their profits than the variability about the mean would indicate. However, the time trend is not statistically significant for most banks in the sample. Therefore, variability is calculated about the eleven year average of the profits to assets ratio for each bank.

Market structure is measured by the average three firm concentration ratio of total deposits for 1964 and 1966 in the bank's standard metropolitan statistical area (SMSA).[1/] In addition, the three bank concentration ratio of deposits less than $100,000 is also used to better estimate concentration in the local market of the banks.[2/]

The bank cost conditions are measured in two ways--the eleven year average of total deposits of the bank and the eleven year average of the ratio of time and savings deposits to total deposits.

Demand conditions are measured by several alternative variables. The position of the demand curve in price-output space is approximated by per capita income in the bank's SMSA. The higher the per capita income, the greater will be the quantity of the banks' products demanded at any price, and the greater will be their profitability. Growth in demand is measured by the ratio of 1970 retail sales to 1960 sales in the bank's SMSA. Alternatively, demand conditions are approximated by a series of regional dichotomous variables.[3/]

1/ It was necessary to attribute market factors such as concentration and demand conditions in the market of each bank's home office to profits derived from all of the bank's operations. This introduces the possibility of measurement error since banks in branching states are likely to have operations in other markets under varying conditions. The sample consists of 71 banks in unit branching states, 131 banks in limited branching states and 36 banks in unrestricted branching states. However, introduction of dichotomous variables to indicate the restrictiveness of branching laws did not affect the results significantly. Similarly, the regional demand variables did not improve the fit. Therefore, it is believed that the measurement error is not severe.

2/ The results did not differ substantially and are not presented below. Several other measures of market structure were also used such as the number of savings and loan associations in the market, the ratio of savings and loan deposits to total commercial bank deposits in the market, and dichotomous variables to measure differences in state branching laws. None of these variables proved to supplement the concentration ratio as the best measure of market structure. Only the results for the three firm concentration ratio of total deposits are presented.

3/ The regional areas are the same as used by Donald Jacobs, Business Loan Costs and Bank Market Structure, pp. 84-85. Results obtained using these variables as proxies for demand do not affect the test of the structure-profit hypotheses and are not presented below.

C. Risk Adjusted Profits

As discussed in Chapter II, it is necessary to hold constant the degree of risk each bank faces in order to compare profit rates between banks. One method of doing that is to directly include risk in the estimating equation. An alternative method presented below is to adjust each banks profit rate for the amount of risk it faces before the equation is estimated.

Banks with monopoly power clearly operate under conditions of less risk than banks in competitive markets. Their profits are more secure--they fluctuate less than profits of banks in competitive markets. A bank with monopoly power can be more certain as to the level of its profits in future years. Therefore a study that attempts to assess the impact of market structure on profitability without somehow accounting for the lower risk in monopolistic markets is misspecified.[1/]

In a recent book, Shepherd has summarized the necessity for explicitly controlling for risk in a model that explains firm profitability. He says: "Profitability embraces at least two dimensions: raw rates or return on investment and the degree of risk in these profit rates. A low-risk profit rate or 12 per cent may perhaps represent greater genuine profitability than a high-risk 24 per cent. Therefore, even if market power is enormously profitable, there may be little correlation between raw profit rates and concentration ratios (and/or any other single element of market structure).[2/]

1/ It biases the statistical test of market structure and profitability since the omitted variable, risk, is correlated with concentration as well as with profitability. For an explanation, see Jan Kmenta, Elements of Econometrics, (New York: The Macmillan Co., 1970), pp. 392-395.

2/ William T. Shepherd, Market Power and Economic Welfare, (New York: Random House, 1970), p. 187.

The theory of behavior under uncertainty does not indicate a direct method of adjusting accounting profit rates so that all of the utility inherent in the profit distribution of each firm is expressed in terms of the level of its profit rate. To accurately adjust each firm's accounting profit rates for the degree of risk it faces, it would be necessary to know each firm's management's utility function so as to net out the disutility of the risk it endures. In the absence of that knowledge, several alternative adjustment techniques are used here. They impose the same utility function with respect to risk for all bank management to hold constant management's attitude. They are all based on two critical assumptions. First, the degree of risk faced by each firm can be measured by the variability of its profit rate over time. The greater is the variability, the more uncertain is management about the expected level of its profit rate during any year. Second, realized rates of return are assumed to be unbiased estimates of expected return. On average, managers have been correct in their predicted rate of return.

Following Lintner, it is assumed that managers maximize their utility by maximizing the certainty equivalent of profits which is defined in two different ways. As in Lintner's model, the certainty equivalent of profits ($\bar{P}$) is first defined as a linear function of expected return (P_1) and variance ($\bar{P} = P_1 - b_1 V_1$). This model implies that the tradeoff between return and risk is constant (b_1) but that the elasticity of the certainty equivalent profits rate with respect to risk varies with the level of profits. The greater the certainty equivalent of profits, the less sensitive is management to changes in risk.

The second model assumes that bank managers maximize a multiplicative function of return and risk (Log $\bar{P}$ = log P_1 - b_2 log V). In this model, the elasticity of certainty equivalent profits with respect to risk is constant ($-b_2$). A one per cent increase in risk will reduce the certainty equivalent of profits by b_2 per cent.

Note that in both models, additional risk is assumed to reduce the certainty equivalent profit rate. The amount that is reduced depends on the basic tradeoff coefficients (b_1 and b_2). If bank managers are risk neutral (b = 0), both models predict maximization of expected profits. To obtain an estimate of risk-constant profit rates, b_1 and b_2 have to be specified. Estimates of b_1 and b_2 are obtained from the data and are also obtained from other studies of risk and return.

The first two adjustments of profit rates to account for risk draw on the data to estimate the tradeoff between risk and return in the industry. For all 238 banks in the sample, the linear relationship between the level of profitability and the standard deviation of profitability is calculated; i.e., $P_{1i} = a_1 + b_1 V_i + e_i$ where P_{1i} is the eleven year ratio of average profits to assets for the "i"th bank and V_i is the standard deviation of the yearly ratios of profits to assets for that bank.[1/] The estimated slope (b_1) may then be considered the industry tradeoff between return and variability of return and the intercept, a_1, may be interpreted as the risk adjusted rate of return for the industry--the rate of return when variability is zero. Risk adjusted profits are then as follows: $P_{2i} = P_{1i} - b_1 V_i$. For a given level of

1/ Alternatively, the variability of profits is measured as the standard error of estimate of the time trend of profits for each bank between 1960 and 1970. The results do not differ substantially.

profits (P_{1i}), the greater is the variability (V_i) the lower will be risk adjusted profits (P_{2i}) for the "i"th bank.[1/] The size of the adjustment depends on the linear relationship between risk and return in the industry.[2/]

The second risk adjustment technique used is very similar to the first. It again draws on the observed relationship between risk and return in the industry. This model assumes, however, that the relationship between risk and return is multiplicative ($P_1 = a_2 V^{b2}$). The model is estimated in logarithms: $\log P_{1i} = \log a_2 + b_2 \log V_i$. Risk adjusted profitability is defined as $\log P_{5i} = \log P_{1i} - b_2 \log V_i$, or $P_{5i} = P_{1i}/V_i^{b2}$.

The estimated coefficients of tradeoff between risk and return are extremely low in the banking industry. ($b_1 = .299$ and $b_2 = .047$).[3/] In contrast, Fisher and Hall find $b_1 = 1.05$ on a sample of large firms

---

1/ Since $P_{1i} = a_1 + b_1 V_i + e_i$, where e_i is the residual value for the "i"th bank, $P_{2i} = (P_{1i} - b_1 V_i) = a_1 + e_i$. The new adjusted profit figure becomes, in essence, the intercept--the level of profits the "i"th bank would earn if the amount of risk it faced were zero. The P_{2i} then measures comparable profits for all banks in the dimension of risk (zero risk) and may be considered each bank's certainty equivalent profit rate. The residual is the repository for all other influences on the bank's profit rate.

2/ This technique is very similar to the adjustment used by Fisher and Hall to obtain estimates of industry "risk adjusted" rates of return. They also regress each firm's variability of profits and skewness of profits on its average rate of return but include a system of dichotomous variables representing each firm's respective industry. The coefficients of the dichotomous variables are estimates of average risk adjusted returns for each industry. Whereas their technique allows them to test for the significance of their estimates, it collapses information on individual companies into averages. See I. N. Fisher and G. R. Hall, "Risk and Corporate Rates of Return," Quarterly Journal of Economics, LXXXIII (February 1969), pp. 79-92.

3/ The actual equations are: (1) $P_{1i} = .115 + .29926\ V_i$ $R^2 = .0130$
(1.76)
(2) $\text{Log } P_{1i} = -1.825 + .04697 \text{ Log } V_i$ $R^2 = .0077$
(1.355)

b_1 is significant at the 90 per cent level of confidence, b_2 at the 80 per cent level. ("t" values are in parentheses.)

in several industries.[1] Cootner and Holland, using a slightly different measure of risk--the variability of the company's return around its industry mean, find $b_1 = .955$ on a similar sample of large firms in several industries.[2]

There are two possible explanations for the low estimate of b_1 in the banking industry. Bankers may be more aggressive than corporate executives in general and weigh risk fairly low relative to profit rates in their decisions. In this case, the adjustment of accounting profit rates for risk should be small. This seems unlikely, however, given the traditional conservatism of commercial banking. Second, the low estimates of b_1 (and b_2) may have resulted from the pervasive regulation of the banking industry. The primary objective of regulation is to prevent bank failure. Portfolio restrictions limit the ability or desire of bankers to attempt to undertake highly profitable investments with their concomitant high risk. The estimated tradeoffs (b_1 and b_2) therefore represent the utility tradeoff between risk and return within the constraint of bank regulation. The differences in the estimated b_1 and estimates in the other studies may then be attributed to regulation and do not represent the true risk coefficients of commercial bankers. Therefore, alternative values of b_1 and b_2 are specified that may better approximate the true tradeoff.

The first additional adjustment is to subtract one-half of the standard deviation of profits ($P_{3i} = P_{1i} - .5V_i$) from average profits for each bank.[3] This adjustment assumes greater risk aversion than is

---

1/ Fisher and Hall, "Risk and Corporate Rates of Return," p. 85.

2/ Paul M. Cootner and Daniel M. Holland, "Rate of Return and Business Risk," The Bell Journal of Economics and Management Science, I (Autumn, 1970), pp. 211-218.

3/ This adjustment was first used by William G. Shepherd, "The Elements of Market Structure," Review of Economics and Statistics, LIV (February, 1972), pp. 25-37, p. 38, n. 15.

estimated for the banking industry but still less than the risk aversion found in other industries. Second, the risk tradeoff coefficient estimated independently by Hall and Fisher and Cootner and Holland is imposed on the banking industry. This estimate of risk adjusted profits is accounting profits minus the standard deviation of profits ($P_{4i} = P_{1i} - V_i$).

Finally, two additional coefficients are specified for the multiplicative model. P_6 is defined as profits divided by the square root of the standard deviation of profits ($P_{6i} = P_{1i}/V_i^{.5}$), implying an elasticity of -.5 between risk and return. P_7 specifies unitary elasticity between risk and return ($P_{7i} = P_{1i}/V$).

In summary, several plausible forms of banks manager's utility functions are specified and used to devise alternative estimates of risk adjusted profitability. These estimates of risk adjusted profit rates are then incorporated into a general model of bank profit rate determination.

CHAPTER V--THE MODEL AND EMPIRICAL RESULTS

A. The Market Structure-Profitability Model

Price theory indicates that market structure should influence the profitability of banks, all other determinents held constant. To test the relationship, therefore, the other important exogenous determinants of profitability must be included in the model. The entire model is:

Profitability = f (concentration, size, cost structure, demand, growth in demand, risk, random error)

As the level of concentration increases in the bank's market (the market structure approaches monopoly), profitability should increase. Bank size is included to hold constant any scale economies or economies of large size that may exist in commercial banking. Similarly, the banks' cost structure, as measured by the ratio of time and savings deposits to total deposits should influence profitability. On average, the greater the proportion of time and savings deposits to total deposits, the lower will be profitability of the bank. The greater cost of these deposits relative to demand deposits outweighs their benefits of requiring less reserves and being longer term liabilities that will support more profitable long-term assets.[1/] Demand conditions are included in the model to account for the position of the market demand curve and its growth over time.

Finally, the amount of risk managers are willing to undertake will influence the profitability of their banks. The more risk they take, the greater will be the profit rates. Risk is incorporated in the model either directly as an independent variable, or indirectly as an adjustment to accounting profit rates.

1/ Inclusion of the ratio of time and savings deposits to total deposits requires the assumption that the distribution of deposits is exogenous or predetermined for each bank. Omitting this variable does not significantly influence the coefficients on concentration but does lower the fit of the entire equations.

B. Direct Tests of the Market Structure-Risk-Profitability Hypothesis

In this section, the empirical results are presented when risk is included directly in the regression model as an explanatory variable. The variables used in the analysis are:

P_1 = The annual average of net income after taxes to total assets of the bank between 1960 and 1970 (per cent);

S = Average total deposits of the bank between 1960 and 1970 (millions of dollars);

T = Average ratio of time and savings deposits to total deposits for the bank between 1960 and 1970;

G = Ratio of 1970 retail sales in the bank's market to 1960 retail sales;

I = 1969 per capita income in the bank's market;

C = Average of 1964 and 1966 three bank concentration ratio of total deposits in the bank's market;

V = The standard deviation of profits to assets for the bank between 1960 and 1970.

The models testing the continuous impact of market structure on profitability, holding risk constant, are presented in Table 4. Since economic theory does not yield any information on the functional form of the relationship, the model is tested as a linear relationship and as a multiplicative relationship. The linear model tested is:

$$P = B_1 + B_2 S + B_3 T + B_4 G + B_5 I + B_6 C + B_7 V + E$$

E is assumed to be distributed normally with mean zero and constant variance. In equations 1 and 3, the variance of the firms profit rates is excluded to demonstrate the effect of omitting risk when testing the market structure profitability relationship. The multiplicative model is specified as:

$$P = B_1 S^{B_2} T^{B_3} G^{B_4} I^{B_5} C^{B_6} V^{B_7} E$$

where E is assumed to be distributed as log normal. An advantage of this model is that the coefficients yield estimates of the elasticity of profits with respect to the independent variables. The model is estimated in logarithms:

$$\log P_1 = \log B_1 + B_2 \log S + B_3 \log T + B_4 \log G + B_5 \log I + B_6 \log C + B_7 \log V + \log E$$

In both models, the expected signs of the coefficients are: $B_1 > 0$; $B_2 > 0$; $B_3 < 0$; $B_5 > 0$; $B_6 > 0$; and, $B_7 >$. The expected sign of B_4 is not clear from theory.1/

The results demonstrate that risk is an important determinant of bank profits. Furthermore, the fact that both the coefficient and the level of significance of concentration increases when risk is introduced in the model demonstrates that banks with monopoly power are trading off some of their potential profits for less risk. The elasticity of profits with respect to concentration is actually considerably larger (11 per cent) when the amount of risk banks take is held constant.

With the exception of the size variable, the other variables have their expected influence. The ratio of time and savings deposits to total deposits is always significant. Per capita income is significant in the multiplicative model, perhaps indicating a non-linear relationship between profits and demand. The growth variable is never significant. This is consistent with the possible conflicting influences suggested by economic theory.2/

1/ See p. 13 above.

2/ Concentration was also included as a discrete variable which divided markets into three groups--less than 60 per cent; 60-80 per cent, and, greater than 80 per cent. After holding all determinants of profits constant, average profits for the three groups were significantly different from each other. Risk premiums were calculated for each group as suggested by Fisher and Hall. (See footnote 2, page 59 above.) The average risk premium fell as concentration increased but only slightly. The small effect of differences in risk is likely due to the clustering of concentration ratios around 70 per cent.

Table 4. Effect of Introducing Risk as an Independent Explanatory Variable in the Profitability Equation

Equation	Dependent Variable	Constant	Size	Time and Savings Deposits: Total Deposits	Growth	Income	Concentration	Risk	$R^2/F_{6,236}$
				Linear Equations					
1	P_1	1.09	-.016	-.00046	-.111	.065	.00292		.07
		2.86****	.90	3.28****	1.54	1.41	2.40***		3.43***
2	P_1	.98	-.010	-.00047	-.110	.072	.00309	.376	.08
		4.10****	.50	3.41****	1.54	1.56	2.54***	1.79*	3.54***
				Multiplicative Equations					
3	P_1	.45	-.006	-.107	-.145	.088	.135		.06
		2.02**	.56	2.94****	1.23	1.79*	2.06**		3.14***
4	P_1	.40	.001	-.104	-.142	.086	.150	.061	.07
		1.79*	.10	2.87****	1.21	1.76*	2.28**	1.66*	3.10***

* Significant at the 5 per cent level, one tailed test.
** Significant at the 2.5 per cent level, one tailed test.
*** Significant at the 1 per cent level, one tailed test.
**** Significant at the 0.5 per cent level, one tailed test.

The variance of profits can be expected to fall with bank size.[1/] The larger the bank, the more diversified it is and the lower will be the variability of its income stream. Therefore, it is possible that there is a problem of heteroskedasticity in the model. This problem is corrected by using weighted regressions where all variables are multiplied by the square root of the bank's deposits.[2/] The results do not differ substantially from the uncorrected model.[3/]

C. Indirect Tests of the Market Structure-Risk-Profitability Hypothesis

An alternative method of accounting for different degrees of risk inherent in bank profit rates is to adjust profit levels to reflect differences in risk. A major advantage of the technique is that it allows for the possibility of assuming different degrees of risk aversion for the industry. By increasing the weight placed on risk in determining risk adjusted rates, it is possible to simulate greater degrees of risk aversion in the industry.

The results of the analysis are presented in Tables 5-7. Profit measures P_2 - P_4 represent increasing degrees of risk aversion in the industry assuming a linear trade-off between return and risk.

1/ See footnote 2 on page 23 above for several empirical studies in other industries that have found this effect.

2/ Several studies have used this correction. For example, see Marshall Hall and Leonard Weiss, "Firm Size and Profitability," p. 324.

3/ The regressions are:

$$P_1 = \underset{(4.3)}{2.56} - \underset{(3.1)}{.00003}\ S + \underset{(2.1)}{.0026}\ C + \underset{(4.2)}{.253}\ G + \underset{(6.2)}{.00004}\ I - \underset{(4.9)}{.0002}\ T$$

without including the variance as a separate independent variable and, when variance is included,

$$P_1 = \underset{(5.9)}{2.45} - \underset{(1.9)}{.00002}\ S + \underset{(2.2)}{.0027}\ C + \underset{(4.0)}{.239}\ G + \underset{(5.6)}{.00003}\ I - \underset{(5.2)}{.0002}\ T + \underset{(2.5)}{12.7}\ V$$

"t" values are in parentheses--All are significant at the 2 per cent level.

Similarly, measures P_5 - P_7 represent increasing degrees of risk aversion assuming a multiplicative tradeoff between return and variance.

Two implications are clear from the simple regressions as well as from the tests on the entire model. (1) Concentration has a significant influence on bank profitability. (2) Adjustments of the accounting profit rates to reflect the degree of risk encountered by the banks increase the estimated impact of concentration. These results generally hold no matter how the model is specified. Furthermore, within the linear adjustments (P_2 to P_4), the greater the adjustment (b_1), the greater the confidence level of the concentration coefficient, and the greater the elasticity of profits with respect to concentration. The same results are derived from the multiplicative adjustments.

Although the study clearly indicates that concentration has a significant impact on bank profitability, the quantitative importance of the relationship is small. A 10 percentage point increase in concentration, which is approximately a 14 per cent increase from the mean level of concentration, increases accounting profits by 1.9 per cent from the mean profit level. (Table 4.) Adjusting for risk increases not only the degree of confidence in the structure performance relationship, but also the magnitude of the effect. By introducing risk as a separate explanatory variable, the estimated impact of the same increase in concentration rises to 2.1 per cent. Alternatively, if the full linear adjustment for risk is taken as in P_4 (Table 7), profit would increase by 3.3 per cent. The full multiplicative adjustment almost triples the estimated impact of concentration on profitability.

The strength of the effect of concentration on performance in this sample does not differ substantially from the influence of concentration found in other studies in the banking industry. (Table 8.) On average, the influence of concentration on profitability is substantially greater than the influence on business loan rates but smaller than the effect found by Kaufman on gross earnings and by Bell and Murphy on service charges.

Table 5. Simple Regressions
("t" values in parentheses)

Linear Equations

Profit Measure	Constant (%)	Concentration	$R^2/F_{1,236}$
P_1	.99 (11.40)****	.00233 (1.918)*	.0153 3.68
$P_2 = P_1 - .2993V$	.99 (10.60)****	.00249 (2.067)**	.0178 4.28*
$P_3 = P_1 - .50V$	.86 (10.00)	.00261 (2.159)**	.0194 4.66*
$P_4 = P_1 - V$	.74 (8.34)****	.00289 (2.334)***	.0226 5.45*
$P_5 = P_1/V^{.05}$	1.31 (11.42)****	.00331 (2.06)**	.0177 4.24*
$P_6 = P_1/V^{.5}$	20.17 (7.77)****	.0970 (2.673)****	.0294 7.15***
$P_7 = P/V$	400.40 (3.66)****	3.847 (2.510)***	.0260 6.30*

Multiplicative Equations

Profit Measure	Constant (%)	Concentration	$R^2/F_{1,236}$
P_1	3.825 (26.87)****	.122 (1.85)*	.012 3.45*
$P_2 = P_1 - .299V$	3.759 (29.30)****	.143 (2.04)**	.013 4.18*
$P_3 = P_1 - .500V$	3.709 (27.24)****	.160 (2.15)**	.015 4.62*
$P_4 = P_1 - V$	3.555 (19.99)****	.214 (2.20)**	.016 4.86*
$P_5 = P_1/V^{.05}$	3.791 (31.75)****	.132 (2.034)**	.017 4.14*

Table 5 (cont'd.)

Profit Measure	Constant (%)	Concentration	$R^2/F_{1,236}$
$P_6 = P_1/V^{.5}$	3.486 (22.38)****	.230 (2.71)****	.030 7.34***
$P_7 = P_1/V$	3.147 (12.92)****	.338 (2.55)***	.027 6.49*

* Significant at the 5 per cent level, one tailed test.
** Significant at the .025 per cent level, one tailed test.
*** Significant at the 1 per cent level, one tailed test.
**** Significant at the .5 per cent level, one tailed test.

Table 6. Regression Results--Full Model

Linear Equations

Profit Measure	Constant	Size	Time and Savings Deposits: Total Deposits	Growth	Income	Concentration	$R^2/F_{5,236}$
P_1	1.09	- .016	- .00046	- .111	.065	.00292	.0689
	(4.68)****	.90	3.28***	1.54	1.41	2.40***	3.43***
$P_2 = P_1 - .299V$	1.02	- .011	- .00047	- .110	.070	.00305	.0744
	(4.33)****	.60	3.40****	1.55	1.53	2.525***	3.73***
$P_3 = P_1 - .50V$	.94	- .0075	- .00048	- .110	.074	.00314	.0778
	(4.07)***	.39	3.46****	1.55	1.61	2.597****	3.91***
$P_4 = P_1 - V$	.79	.0015	- .00051	- .109	.083	.00336	.0848
	(3.35)***	.08	3.54****	1.51	1.76*	2.72****	4.30***
$P_5 = P_1/V^{.05}$	1.44	- .014	- .00064	- .148	.093	.00405	.0756
	(4.67)***	.54	3.46****	1.56	1.51	2.518***	3.79***
$P_6 = P_1/V^{.5}$	10.0	1.39	- .0168	- 2.65	2.44	.1002	.1290
	(3.17)****	2.47***	3.93****	1.27	1.81*	2.824****	6.87***
$P_7 = P_1/V$	463.5	94.0	- .0571	-73.17	76.68	3.583	.1419
	(1.63)	3.99****	3.33****	.84	1.36	2.413***	7.67***

* Significant at the 5 per cent level, one tailed test.
** Significant at the 2.5 per cent level, one tailed test.
*** Significant at the 1 per cent level, one tailed test.
**** Significant at the .5 per cent level, one tailed test.
"t" values are below coefficients.

Table 7. Regression Results--Full Model

Multiplicative Equations

Profit Measure	Constant	Size	Time and Savings Deposits / Total Deposits	Growth	Income	Concentration	$R^2/F_{5,232}$
P_1	3.452	.006	.107	.145	.088	.135	.063
	12.02****	.57	2.94****	1.23	1.79*	2.06**	3.14****
$P_2 = P_1 - .299V$	3.348	.0	- .109	- .152	.095	.159	.065
	14.00****	.01	2.80****	1.20	1.80*	2.26**	3.24****
$P_3 = P_1 - .50V$	3.267	.005	- .110	- .157	.100	.177	.067
	12.87****	.40	2.65****	1.17	1.79*	2.37***	3.31****
$P_4 = P_1 - V$	3.010	.019	- .103	- .174	.119	.233	.060
	9.04****	1.23	1.91*	.99	1.62	2.39***	2.94*
$P_5 = P_1/V^{.05}$	3.411	.0	- .104	- .142	.087	.147	.067
	15.34****	.02	2.89****	1.21	1.77*	2.26**	3.32****
$P_6 = P_1/V^{.5}$	3.045	.050	- .083	- .121	.073	.256	.125
	10.77****	3.91****	1.82*	.81	1.17	3.09****	6.66****
$P_7 = P_1/V$	2.637	.107	- .060	- .097	.057	.378	.153
	6.070****	5.38****	.85	.42	.60	2.96****	8.39****

* Significant at the 5 per cent level, one tailed test.
** Significant at the 2.5 per cent level, one tailed test.
*** Significant at the 1 per cent level, one tailed test.
**** Significant at the 0.5 per cent level, one tailed test.

Table 8. Effect of a 10 Percentage Point Increase in Concentration on Bank Performance in Selected Studies

Study	Variable	Absolute Increase (%)	Per Cent Increase
Edwards	Business Loan Rates	.046	1.0
Phillips	Business Loan Rates	.055	1.0
Jacobs	Business Loan Rates	.046	.7
Kaufman	Pretax Earnings/Assets	.066	4.0
Bell and Murphy	Demand Deposit Service Charges	N.A.	4.0
Heggestad*	Net Income After Taxes/ Total Assets		2.1

* Model with risk included as a separate explanatory variable.

CHAPTER VI--CONCLUSION

A. Results of Study

This study has made two important contributions to the knowledge of the influence of market structure on bank performance. First, it is one of the first studies to find a statistically significant relationship between accounting profit rates and concentration. The study also demonstrates that differences in risk taking distort the relationship between concentration and profitability. Finally, it presents a method for adjusting profit rates for differences in risk.

There are several possible reasons that this study found a relationship between concentration and profitability while others did not. Since the data used are required by law to be reported to the Federal Reserve, there are probably less errors in these data then in data obtained from public sources. In public statements, banks earning high profits have an incentive to minimize their apparent profitability in order to deter entry. Similarly, banks earning low profits have an incentive to exaggerate their profitability in order to keep stockholders happy. Therefore, published profit data tend to understate differences between markets. Secondly, the study uses a better definition of profits then most other studies--net income after taxes. This measures the total profitability of the bank. Studies that have analyzed net operating income miss a potentially important contribution to profitability--net securities gains and losses--and do not take into account differing tax rates for individual banks. For example, a bank that holds a high proportion of tax free municipal bonds will show a low net operating earnings rate relative to its rate of return after taxes. Finally, a longer time period is considered then most other studies. The longer time period allows transitory influences on profitability to be washed

out and is more consistent with the theoretical conception of the relationship between market structure and profitability.

Second, a plausible explanation for the failure of other studies to find a relationship between market structure and profitability is advanced. Although it is not the only conceivable explanation (X efficiency may be another), it seems reasonable that banks with monopoly power do trade off some of their potential profits for reduced risk. This idea has been advanced by many economists and was tested by the author and Frank Edwards. The empirical tests demonstrate that accounting for risk either directly by entering risk in the regression equation as a determinant of profitability or indirectly by adjusting accounting profit rates for differences in risk increases the measured impact of monopoly power on profitability.

B. Implications of Results

Perhaps the major implication of the study is that market structure does influence bank profitability, even without adjusting for the bias introduced by differences in risk taking. Since profitability may be interpreted as a summary index of performance that includes both price and nonprice aspects of competition, this is strong evidence that the market can be relied upon to control the behavior of banks. Furthermore, market forces should be given a greater role in bank regulation. They could be augmented by allowing more entry, by dropping price regulation, and by liberalizing branching restrictions.

The second major result is that banks with monopoly power are systematically reducing the risk they take at the expense of greater profitability. Unless the social welfare function weighs the stability

of the banking system extremely high relative to the output of credit, this behavior is contrary to the public interest.

If the loan portfolio is used by banks to lower their risk exposure, a most likely consequence is a reduction in the supply of loans. Furthermore, there is likely to be a redistribution of types of loans within the portfolio as market power changes. More risky consumer loans and mortgages will be reduced. The distribution of the business loan portfolio may change as well as market power increases. The conservative, monopolistic bank may make loans only to "safe" business firms--large firms and firms in monopolistic markets. Since bank credit is an important factor of production for almost all firms, this behavior could conceivably increase concentration in other sectors making new entry and expansion by smaller firms more difficult because of foreclosure of credit.

The attempt to reduce risk may take forms other than manipulation of the loan portfolio. Banks with monopoly power may attempt to differentiate their products more extensively and thereby reduce the probability of losing business to other banks. This could be done by increasing advertising and by extensive branching to preempt other banks from finding desirable locations. In both cases costs are increased and the public welfare is reduced.

In summary, this study has shown that market structure influences both the amount of risk banks will take and the amount they will compete. It seems clear, therefore, that it is desirable to augment market forces to regulate bank behavior--since the stronger is the degree of competition in banking markets, the better will be the performance of the banking industry.

LIST OF REFERENCES

LIST OF REFERENCES

A. Books

Bell, Frederick W. and Murphy, Neil B., Costs in Commercial Banking: A Quantitative Analysis of Bank Behavior and Its Relation to Bank Regulation. Research Report No. 41, Federal Reserve Bank of Boston, April, 1968.

Berle, Adolph A. and Means, Gardiner C., The Modern Corporation and Private Property. New York: MacMillian, 1932.

Bryan, William R., "The Determinants of Bank Profits," Research Report Number 8, the American Bankers Association, 1972.

Caves, Richard, American Industry: Structure, Conduct, Performance. Englewood Cliffs, New Jersey: Prentice-Hall, 1967.

Collins, Norman H. and Preston, Lee E., Concentration and Price Cost Margins in Manufacturing Industries. Berkeley: University of California Press, 1968.

Fellner, William, Competition Among the Few. New York: Knopf, 1949.

Galbraith, John Kenneth, The New Industrial State. Boston: Houghton Mifflin, 1971.

Jacobs, Donald, Business Loan Costs and Bank Market Structure. New York: National Bureau of Economic Research, 1971.

Kmenta, Jan, Elements of Econometrics. New York: The MacMillian Company, 1970.

Scherer, Frederick W., Industrial Market Structure and Economic Performance. Chicago: Rand, McNalley and Company, 1970.

Sharpe, William, Portfolio Theory and Capital Markets. New York: McGraw Hill, Inc., 1970.

Shepherd, William G., Market Power and Economic Welfare. New York: Random House, 1970.

Sherman, H. J., Profits in the United States. Ithaca: Cornell University Press, 1968.

Stigler, George R., Capital and Rates of Return in Manufacturing Industries. Princeton: Princeton University Press, 1963.

B. Articles

Alexander, Sidney S., "The Effect of Size of Manufacturing Corporation on the Distribution of the Rate of Return." Review of Economics and Statistics, XXXI (August, 1949), 229-235.

Bain, Joe S., "A Note on Pricing in Monopoly and Oligopoly." American Economic Review, XXXIX (1949), 443-464.

Bain, Joe S., "Relation of Profit Rate to Industry Concentration: American Manufacturing 1936-1940." Quarterly Journal of Economics, LXV (August, 1951), 293-324.

Bell, Frederick W. and Murphy, Neil B., "Impact of Market Structure on the Price of a Commercial Banking Service." Review of Economics and Statistics, LI (May, 1969), 210-213.

Carson, Deane, "A Bank is a Bank?" Money and Finance: Readings in Theory, Policy, and Institutions. Edited by Deane Carson, New York: John Wiley and Sons, Inc., 1972.

Caves, Richard, "Uncertainty, Market Structure and Performance: Galbraith as Conventional Wisdom." Industrial Organization and Economic Development, edited by J. W. Markham and G. F. Papanek, New York: Houghton Mifflin, 1970.

Chandler, Lester V., "Monopolistic Elements in Commercial Banking." The Journal of Political Economy, XLVI (February, 1938), 1-22.

Cootner, Paul M. and Holland, Daniel M., "Rate of Return and Business Risk." The Bell Journal of Economics and Management Science, I (Autumn, 1970), 211-226.

Edwards, Franklin, "Concentration in Banking and Its Effect on Business Loan Rates." The Review of Economics and Statistics, XLVI (August, 1964).

Edwards, Franklin, "The Banking Competition Controversy." National Banking Review, III (September, 1965), 1-34.

Edwards, Franklin R. and Heggestad, Arnold A., "Uncertainty, Market Structure and Performance: The Galbraith-Caves Hypothesis and Managerial Motives in Banking." Quarterly Journal of Economics, forthcoming.

Fischer, Gerald C., "Bank Holding Company Affiliates: Branches or Unit Banks?" Journal of Business, 37 (January, 1964), 47-48.

Fisher, I. N. and Hall, G. R., "Risk and Corporate Rates of Return." Quarterly Journal of Economics, LXXXIII (February, 1969), 79-92.

Fisher, I. N. and Hall, G. R., "Risk and Corporate Rates of Return: Reply." Quarterly Journal of Economics, LXXXV (August, 1971), 518-522.

Flechsig, Theodore G., "The Effect of Concentration of Bank Loan Rates." Journal of Finance, XX (May, 1965), 298-311.

Fraser, Donald R. and Rose, Peter S., "More on Banking Structure and Performance: The Evidence from Texas," Journal of Financial and Quantitative Analysis, VI (January, 1971), 601-611.

Hicks, J. R., "Annual Survey of Economic Theory: The Theory of Monopoly." American Economic Association, Readings in Price Theory, edited by Kenneth E. Boulding and George J. Stigler, Chicago: Richard D. Irwin, 1952.

Kaufman, George, "Bank Market Structure and Performance: The Evidence From Iowa," Southern Economic Journal, XXXII (April, 1966), 429-439.

Larner, Robert S., "Ownership and Control in the 200 Largest Non-financial Corporations," American Economic Review, LVI (September, 1966), 777-787.

Lawrence, Robert J., "The Performance of Bank Holding Companies." Staff Economic Study, Board of Governors of the Federal Reserve System, 1966.

Lawrence, Robert J., "Operating Policies of Bank Holding Companies, Part I." Staff Economic Study, Board of Governors of the Federal Reserve System, 1971.

Lintner, John, "The Impact of Uncertainty on the 'Traditional' Theory of the Firm: Price Setting and Tax Shifting." Industrial Organization and Economic Development, edited by J. W. Markham and G. F. Papanek, New York: Houghton Mifflin, 1970.

McGuire, J. W.; Chiu, J. S. Y.; and Elbing, A. O., "Executive Income, Sales, and Profits." American Economic Review, LII (September, 1962), 753-761.

Manne, H. Michael, "Seller Concentration, Barriers to Entry, and Rates of Return in Thirty Industries, 1950-1960." Review of Economics and Statistics, XLVIII (August, 1966), 296-307.

Meyer, Paul A., "Price Discrimination, Regional Loan Rates, and the Structure of the Banking Industry." Journal of Finance, XXII (March, 1967), 37-47.

Monsen, R. J., Jr., and Downs, Anthony, "A Theory of Large Managerial Firms." Journal of Political Economy, 73 (June, 1965), 221-236.

Murphy, Neil B. and Lauch, L., "A Test of the Impact of Branching on Deposit Variability." Working Paper No. 69-5, Federal Deposit Insurance Corporation, 1970.

Phillips, Almarin, "Evidence of Concentration in Banking Markets and Interest Rates." Federal Reserve Bulletin, 53 (June, 1967), 916-926.

Pratt, J., "Risk Aversion in the Small and The Large." Econometrica, 32 (January-April, 1964), 122-136.

"Recent Changes in the Structure of Commercial Banking." Federal Reserve Bulletin, 56 (March, 1970).

Rothschild, K. W., "Price Theory and Oligopoly." American Economic Association, Readings in Price Theory, edited by Kenneth E. Boulding and George J. Stigler, Chicago: Richard D. Irwin, 1952.

Samuels, J. M. and Smyth, D. J., "Profits, Variability of Profits, and Firm Size." Economica, XXXV (May, 1968), 127-139.

Schweiger, Irving and McGee, John S., "Chicago Banking." Journal of Business, 34 (July, 1961).

Shepherd, William G., "The Elements of Market Structure." Review of Economics and Statistics, LIV (February, 1972), 25-37.

Stekler, H., "The Variability of Profitability with Size of Firm." Journal of the American Statistical Association, 59 (December, 1964), 1183-1193.

Taylor, Charles, T., "Average Interest Charges, the Loan Mix, and Measures of Competition: Sixth Federal District Experience." Journal of Finance, XXIII (December, 1968), 793-804.

Vernon, J. R., "Ownership and Control Among Large Member Banks." Journal of Finance, XXV (June, 1970), 651-657.

Wacht, R., "Branch Banking and Risk." Journal of Financial and Quantitative Analysis, III (March, 1968), 97-197.

Ware, Robert F., "Banking Structure and Performance: Some Evidence from Ohio." Federal Reserve Bank of Cleveland Economic Review, March, 1972, 3-12.

C. Documents

Federal Deposit Insurance Corporation, Annual Report of the Federal Deposit Insurance Corporation. Washington, D. C., 1970.

Federal Reserve Bulletin, 57 (June, August, 1971)

U.S. Bureau of the Census, Current Population Reports, Series P-25, No. 371, "Estimates of the Population of Standard Metropolitan Statistical Areas: July 1, 1965." Washington, D. C.: U.S. Government Printing Office, 1967.

U.S. Department of Commerce, Statistical Abstract of the United States. Washington, D. C.: U.S. Government Printing Office, 1961 and 1970.

United States vs. Philadelphia National Bank, 374 U.S. 321, 1963.