Cross sectional models of the demand for and supply of state and national bank charters

by

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I. INTRODUCTION

A. Background and Review of Previous Work

Unlike most other nations, the United States has a dual banking system. A bank may be chartered either by the state banking authority in the state where the bank is formed or by the Comptroller of the Currency. Prior to the Banking Act of 1935, this encouraged instability in the banking system. The state banking authorities and the Comptroller of the Currency competed for banks by being as lenient in the requirements as possible. It has been argued that this free and easy entry into the banking industry resulted in "excessive" competition and thus more bank failures than could be tolerated. The instability of the system prior to the Depression and the catastrophic number of failures during the early 1930's led to pressure for Congress to make the system more stable. The result was the passage of the Banking Act of 1935.

Under the Banking Act, six factors must be considered in determining whether a charter for a national bank is to be issued. These factors are: 1) the financial history and condition of the bank; 2) the adequacy of its capital structure; 3) its future earnings prospects; 4) the general character of its management; 5) the convenience and needs of the community to be served by the bank; and 6) whether or not its corporate powers are consistent with the purposes of the Act [1].[1]

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[1]All bracketed numbers refer to references in the bibliography.

These six factors can be placed into two categories: worthiness and need. All but 3) and 5) fall into the worthiness category. The worthiness criterion is used to determine whether an applicant has the character and experience to operate a bank soundly and profitably. In satisfying this criterion, the potential banker is demonstrating the potential ability to operate a bank profitably and lawfully. Factors 3) and 5) can be classified as the need criterion. Here the potential entrant must show that there is enough growth in the desired market to profitably support another bank without hurting existing banks.

These charter requirements have proved to be a substantial barrier to entry in banking. All national charter applicants are subject to these criteria. Additionally, all state charter applicants that apply for membership in the Federal Deposit Insurance Corporation (FDIC) are subject to these criteria. In some states, charter approval is contingent on the receipt of FDIC insurance by the applicant. Most banks are insured by the FDIC. In 1974, 237 commercial banks out of a total of 14,457 were not insured [5, January 1975, p. A82]. In examining the reasons given for the rejection of applications for new national banks and branches between 1941 and 1950, Shull and Horvitz found that the reason given for 53% of the rejections was "insufficient need" [31]. So, at least for national banks, the need criterion is the major reason for charter rejection.

From the inception of the need criterion until 1970, the number of head office commercial banks in the United States dec'ined fairly

steadily. The number of bank failures has remained at a low level since 1940. For example, changes in the number of bank suspensions has been below 10 in every year since 1940 [5, 1941-1975]. Many economists have argued that we are paying too high a price for reducing bank failure. That is, the charter requirements have succeeded not only in reducing the number of bank failures, but they have also reduced competition and sheltered the owners of commercial banks from competition. Alhadeff has argued that the need criterion is not a reliable way of controlling either competition or bank failure and that it would be better to eliminate this criterion and protect the public from failure directly [2]. He has also argued that there are serious barriers to entry for unit banks even without the charter requirements, eg. limit pricing by existing banks. Thus, he says, excessive competition will not occur in any case [1].

From 1935 until 1962, the number of commercial banks declined relatively steadily. The number of head office commercial banks rose from 1962 to 1964, then declined again until 1970. Since 1970, the number has risen each year. In addition, the number of new banks has risen tremendously since 1970 [5, 1936-1975]. The difference between changes in the number of new banks and changes in the number of head office banks is due to such things as voluntary liquidations, suspensions, absorptions and consolidations. This increase in the number of new banks is a particularly strange phenomenon today given the rise in the number of bank failures and the general state of the economy.

The standard explanation for the increase is that merger activity has declined. The decline in merger activity is probably the result of the state of the economy in general and the state of the stock market in particular. With the general decline in stock prices, mergers have become less attractive. If mergers are less attractive, but branch, group, and chain banks want to continue to expand, the alternative is to seek new charters (group and chain banks) and permission for more branches (branch banks). The latter will not affect new bank statistics.

Some support for this argument can be obtained by looking at data on absorptions and consolidations.[2] Absorptions and consolidations are divided into two parts: banks converted into branches and other. As can be seen in Table 1, changes in both have declined since 1971, indicating a decline in merger activity. This should then be compared with banking organization activity. Data is available on branch banking activity. As can be seen in Table 1, both the number of head office branch banks and the number of branch offices continue to rise.

Group and chain banks, both of which must acquire charters for new banks that they form, are also banking organizations. Since the Bank Holding Company Act of 1956, group banks have been required to report the number of banks in the group [3]. So data on group banks are available since 1956. However, the definition of a bank holding

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[2]Absorptions occur when one bank acquires another bank. In this case, the acquired bank becomes part of the remaining bank. With consolidations, two banks give up their charters and become one bank under a new charter.

Table 1. Changes in banking structure from 1960-1974 [5, 1961-1975]

	Changes in Absorptions & Consolidations		Branch Banking		Group Banking	
Year	Banks Converted into Branches	Other	Head Office Branch Banks	Branches	Group Bank Organizations	Number of Banks/ Branches in Group
1960	106	25	2329	10483	47	426/1037
1961	126	13	2619	11353	46	427/1107
1962	164	18	2484	12345	49	442/1215
1963	139	12	2791	13498	52	454/1278
1964	120	13	2966	14601	54	460/1379
1965	130	19	3140	15756	53	468/1486
1966	113	24	3313	16908	65	561/1807
1967	114	19	3487	17928	74	603/2085
1968	120	10	3665	19013	80	619/2262
1969	128	18	3794	20208	97	723/2674
1970	127	23	3994	21643	121	895/3260
1971	83	13	4132	23104	not available	not available
1972	106	10	4395	24622	not available	not available
1973	87	10	4724	26454	251	1815/7513
1974	105	13	5123	28244	276	2122/8887

company was changed by the Bank Holding Company Amendment of 1970 [4]. Under the old definition, a bank holding company was defined as two or more banks held together by a holding company. After 1970, the definition became one or more banks held together by a holding company. However, in 1974 (1973 data), the Federal Reserve began to distinguish between one-bank and multi-bank holding companies. The data are presented in Table 1 and it is evident that group bank activity is rising.

Chain banks (banks held together by other than a holding company) are not required to report their holding to the regulatory authorities. In some states, group banks are prohibited. Particularly if branch banking is prohibited or severely restricted and group banking is prohibited, chain banking is the obvious alternative. While chain banking activity has almost certainly risen, there is no recent information available on their activity and very little control over them.[3]

While a change in the level of merger activity is one of the reasons for a change in the number of head office banks, it is certainly not the entire explanation. There are two sides to the entry of a new bank into a market. Not only must a charter be demanded for entry to occur, but the chartering authority must also be willing to supply the charter. So any change in the number of head office banks must be explained not only by changes in demand, but also by changes in supply. Some work has been done on the demand for and supply of bank charters and bank entry.

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[3]For about the only information available on chain banking, see [9], [10].

Peltzman developed a model to determine the impact of regulation on entry into the banking industry. In his model, the rate of new bank formation is a function of the intended (desired) values of changes in the capital stock and changes in the average capital size per bank, the rate of bank mergers, and the rate of bank failures. Since he is concerned with the impact of regulation on bank entry, he also includes a dummy variable to represent the effects of regulation, where effective regulation begins with the Banking Act of 1935. Peltzman estimates that entry restrictions have resulted in an entry rate that has been 0.579% per year lower from 1936 to 1962. This amounts to a loss of 2,200 new banks that would have been formed without the entry restrictions [26].

Orr looked at barriers to entry in banking as a method of predicting bank entry in Canada. He includes measures of capital requirements, economies of scale, product differentiation, past profits, past industry growth and concentration as explanatory variables. These barriers to entry, which explain entry or the lack of it in manufacturing industries, do not explain the low rate of entry in banking. He concludes that the actual rate of entry, which is lower than the rate predicted by his model, can be attributed to the barriers created by Canada's Bank Act [25].

A third model to explain the number of new banks chartered was developed by Brown. He includes population, income, the ratio of Savings and Loan shares to commercial bank savings deposits, urbanization, and dummy variables for unit banking, statewide branching and

limited area branching as independent variables. Since insufficient need is a major reason for rejecting an application, he attempted to quantify the need criterion in terms of these economic variables. While his model performed more satisfactorily when the number of persons per banking office was the dependent variable, he concludes that a better measure of the intensity of the utilization of banking services is needed [6].

Greenbaum and Ali developed a theoretical model to explain the equilibrium level of bank charters. Here the demand for bank charters is a function of the estimated profits associated with operating a bank. The supply of newly issued and extant charters equals the number of existing charters plus a proportion of current applications that is approved. Using a simple model of the market for bank charters, they suggest that banking profits can be used to control bank entry with the same effectiveness as the current methods, but with the added advantage of reducing the need for ad hoc administrative judgements [20].

Garrison looked at the effects of charter requirements on the timing of new bank entry. He maximizes the present value of the bank with respect to time, where the present value is a function of the initial costs of beginning operation and the net cash flow of the bank. The bank will begin operating at some point in time after the potential net cash flow becomes positive. The time period before the bank enters will be shorter, the smaller the initial costs of beginning operation, the lower the rate of interest, or the faster the community is growing [19].

Using an aggregated microeconomic investment decision model, Nosari examined national bank entry. Desired national bank entry, measured by the number of unit bank applications the Comptroller of the Currency receives, is explained by the rate of return and risk in banking, the rate of return and risk in a combination asset, aggregate real wealth, and dummy variables representing the terms of the Comptrollers of the Currency from 1936 to 1968. He concludes that the expected rate of return in banking, the expected rate of return in the alternative investment, and regulatory attitudes all play a significant role in explaining desired bank entry [24].

All of these papers deal in one way or another with the impact of controls on bank entry. From these papers, it is evident that the regulations set down in the Banking Act of 1935 have been effective in restricting entry into the banking industry. However, how the banking authorities measure "need" is still not clear.

Two other articles, both dealing with dual banking and the resulting inequities in the laws, should be mentioned here. Redford discusses the history of the dual banking system and the reasons for its survival. He goes on to discuss the benefits of being a nationally chartered bank. These benefits include exemption from state "doing business" and "blue-sky" laws in out-of-state transactions, exemption from some other state taxes, and supervision and examination by only one supervisory agency rather than the two to which most state banks are subject. His conclusion is that it is history rather than logic that explains the dual banking system of the United States today [30].

Wille also discusses the inequities of the dual banking system as it presently exists. He points to the potential advantages of state regulation, such as the ability of states to better design laws and regulations to meet local and regional needs, but acknowledges that many state banking systems have failed in these areas. He discusses the burdens imposed on state banks by dual examinations and the need to obtain approval from two agencies for mergers and branches. Also mentioned are the differing interpretations of the law by the Comptroller of the Currency and the Federal Reserve and the differential taxation of national banks. He concludes that state banking agencies should be given more power and that some of the inequities should be eliminated [34].

Both of these articles stress the importance of national bank exemption from the "doing business" and "blue-sky" laws in their out-of-state transactions in encouraging large banks to be nationally chartered. Public Law 91-156 amended 12 U.S.C. 548 in 1969. Section 1(a) of this law states that a national bank headquartered in a state is subject to the same taxes as state banks headquartered in the state, with the exception of taxes on intangible personal property until January 1, 1972. Section 2, which was to become effective on January 1, 1972, permits states to tax national banks not headquartered in the state on the same basis as out-of-state state banks are taxed. Also permitted is the taxation of intangible personal property and of dividends received on shares of stock of national banks to the extent that state banks are so taxed. Section 2 was amended by Public Law

92-213 so that it became effective on January 1, 1973 rather than on January 1, 1972. These amendments eliminated the preferential tax treatment of national banks both in the state in which they are headquartered and in their out-of-state transactions. The out-of-state transactions taxation to which national banks would then be liable was of great concern to bankers and to the Congress. It would potentially raise the tax liabilities of national banks substantially. In 1973, Congress passed Public Law 93-100, which forbids states to impose any "doing business" taxes on any insured depository not headquartered in the state until January 1, 1976.[4] Congress is currently considering a further extension. So today neither state nor national banks are subject to "doing business" taxes in their out-of-state transactions as long as they are insured banks.

B. Statement of the Problem

None of the previous work has dealt specifically with the supply of and demand for new bank charters. The work by Peltzman, Orr, and Brown deals with entry into the banking industry, which is distinct from the demand for bank charters. The work by Greenbaum and Ali deals with the equilibrium level of bank charters in a theoretical framework. Nosari does look at the demand for bank charters. However, he deals only with national applications in a time series model and the results are not particularly strong. Both Redford and Wille list the advantages

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[4] For a more complete history and reading of these laws, see [33, pp. 393-394].

and disadvantages of state and national affiliation, but in neither case is a model developed or tested.

In this paper, I will attempt to carry this work a step further by developing models, to be tested with cross-sectional data, to explain the demand for and supply of both state and national charters and to explain the choice made by the applicants between state and national charters.

The purpose of this paper is three-fold. First, the factors that influence the decision to apply for a bank charter will be examined. Charter applications are more prevalent in some areas of the country than in others. This is probably due to a combination of economic and regulatory factors. Economic factors would include such variables as the profitability of banks in a particular area and the growth in population and income in the area. A major regulatory factor might be the branch banking laws of the state. If we accept the premise that more independent banks in a market will make that market more competitive,

then we need to know if the factors that play a major role in determining the number of charter applications received are primarily economic or primarily regulatory. If the primary determinants are economic, the regulatory authorities can do little to encourage entry. If, however, the primary determinants are regulatory, then the regulations should be re-examined to determine whether or not the benefits from the regulation are outweighed by the cost of reduced competition in banking markets.

Second, the demand for state bank charters will be compared to the demand for national bank charters. After a potential banker has decided to enter a market, he must decide between applying for a state bank charter and a national bank charter. Since the relative costs and benefits of the two types of charters are different, these must be weighed in the decision. Because both the state and national banking authorities are concerned with the number of banks under their jurisdiction and with charter-switching, the relative importance of the economic and regulatory factors involved in determining which route is chosen should be important to them.

Third, the supply of charters, which is the final step in the chartering process, will be examined. Once the regulatory authority receives an application, it must determine whether the application satisfies the worthiness and need criteria (meets the price) that the regulatory authority has set as its minimum standard. A substantial percentage of charter applications are rejected, which indicates that many potential bankers misjudge the price that the regulatory authority

has set. Here again, if the goal is a stable, but competitive, banking system, the costs and benefits of the factors that are the primary reasons for rejection should be re-examined.

In this paper it is assumed that an increase in the number of banks in a market will make that market more competitive. This is a debatable assumption. There have been numerous attempts in the literature to link concentration to bank performance and the results have not been conclusive. For example, see [18], [27], [32]. There are really two questions here. The first is whether or not the number of banks in a market or the level of concentration is related to bank performance. When this has been the question being asked, the answer has not been clear. Part of the reason for the uncertainty is based on problems with the models and measures of performance and concentration. Another part of the reason is that if there is a relationship, it is probably discrete rather than continuous [21, p. 1392]. The second question is whether or not entry of a new bank has an immediate impact on performance. D.R. Fraser and P.S. Rose found in one study of entry into isolated markets that there was a positive impact on performance. However, they could not say whether this was a long-run effect [18].

Chapter II of this paper is a discussion of the theoretical model for each of the three questions. In Chapter III the statistical technique and data used are explained, as well as the empirical models. Chapter IV contains the results and Chapter V is the conclusion.

II. THEORETICAL MODEL

A. Introduction

Bank charters are not homogeneous products, since there are differences in the costs and benefits of charters obtained from alternative sources. For any particular entrant, there are two sources: The Comptroller of the Currency and the state banking authority in the state in which that bank would be headquartered. While these charters are substitutes, they are not perfect substitutes. So for the nation as a whole, there are fifty-one slightly different charters that are provided, one for each state and the national charter. While there is some competition between each state and the Comptroller of the Currency, it is minimized by the constraint of FDIC insurance. The main result of this competition is that archaic laws and rules are probably removed more rapidly than if there were only one chartering authority. There appears to be little active price competition between the state and national authorities. That is, the chartering authorities no longer compete for banks by being lenient in their regulations governing both charter approvals and existing banks. This is to be expected since the major goal of the charter regulations is to minimize the failure rate, given an adequate level of banking services, by restricting entry. Thus, for any specific location for a new bank, the applicant faces a duopoly and both members of the duopoly are failure minimizers.

In addition, there are three sorts of charter applications: applications for primary organizations, applications for charter conversions, and applications to be issued pursuant to corporate

reorganizations. Much more information is available to the chartering authorities with the latter two cases since the bank already exists at the time the application is made. So the weights given to the supply variables may differ in each of the three instances. Also, the reasons for making the application may be different in each case. For example, the factors considered in a corporate reorganization will differ from those considered in the decision to open a new bank. In this paper, I will deal only with the demand for and the supply of charters for primary organizations in both the state and national markets. It should be understood then that the discussion of charters that follows refers only to charters for primary organizations.

The process by which equilibrium is reached in each submarket can be viewed as follows. The first step in the process is that the price of the charter is set by the chartering authority. The price is a function of the six factors that must be considered in reviewing any charter application and it is set to minimize the probability that the new bank will fail. While there is surely some trade-off between factors, there is some minimum below which no factor can fall. For example, higher expected future net returns may to some extent offset a lower level of management expertise. But there is some minimum level of expertise that must be attained in order for a charter to be granted. The applicant could acquire more expertise by paying more, but if the cost is sufficiently high, the price cannot be met. So there can be instances where the applicant cannot meet the price under any circumstances.

Once the price is set, potential bankers determine whether or not they can meet the price. In doing this, the potential applicant must determine if a bank will be profitable, given the regulations of the chartering authority, and if so, to which authority the application will be submitted. Part of the price of the charter is tangible, but a large part is not. For example, the precise measure of the need for a new bank in an area is not known to the potential banker. So the price the banker views, and thus the expected value he calculates, is a subjective value. Thus there is an element of risk involved. Since the applicant does not know with certainty whether he has met the price set by the chartering authority, he may incur the cost of applying for a charter without actually receiving one. The only way for the potential banker to ascertain whether he has correctly gauged the requirements of the chartering authority is to submit an application.

In the third and final step, the charter is reviewed by the chartering authority, which independently evaluates the application in terms of the six factors. At this stage, one of three things may occur. The charter application will either be approved or rejected, or it will be withdrawn by the applicant. As charter applications are approved and rejected, this information is fed back to other potential bankers who are preparing applications.

B. Demand for Bank Charters

Ownership of a bank is one of numerous investment opportunities.

The decision to pursue the bank ownership alternative will be based on an assessment of the return and risk in banking relative to the other investment opportunities that are available. We will assume that the investor has made the decision to consider the bank ownership alternative.

If there were no regulatory restrictions on entry into the banking industry, the decision to form a bank would be based solely on the expected rate of return and risk in banking. That is, the investor would calculate the expected value obtained from forming a bank in a particular location as follows:

$$(1) \qquad EV = \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{K_{t_o}}{(1+k)^{t_o}}$$

The discounted expected value of operating the bank is given by EV. The discounted stream of expected after-tax earnings of the bank is represented by $\int_{t=t_o}^{\infty} [R_t/(1+k)^t]dt$. One would expect this stream of earnings to rise rapidly at first and then more slowly as the bank continues in operation. The discount factor, k, includes both the required risk-free rate of return and the risk factor. The initial costs of beginning operation, K_{t_o}, includes the initial capitalization, advertising, and set-up costs and is a decision variable. Entry occurs at time t_o. In this case, entry will occur when and if the expected value of operating the bank is positive.

Nonregulatory barriers to entry might still prevent the optimal number of banks from operating in a market. Whether or not this occurs

will depend on how important the nonregulatory barriers are. That is, the greater is the competitive advantage of existing banks, the lower will be the entry rate. While the precise competitive advantage of existing banks is not known, the advantage will surely vary with different market structures. These nonregulatory barriers will be reflected in the expected after-tax earnings of the new bank and the initial cost of beginning operation.

The charter requirement is designed to restrict entry into banking in order to minimize bank failures. Because entry is restricted, existing banks are in varying degrees sheltered from competition. The degree of shelter depends on the number of bank and nonbank alternatives in the market. This shelter should have a positive implicit value for the owner of a charter. One means of taxing away at least part of this value, while restricting entry, would be for the chartering authorities to charge an explicit price for the charter. The price would be chosen to maintain the entry rate deemed desirable by the chartering authority. By raising or lowering the price, the chartering authority lowers or raises the entry rate. In this case, the expected value of the bank would be calculated as follows:

$$(2) \qquad EV = \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{(K_{t_o} + P_c)}{(1+k)^{t_o}}$$

The price of the charter, P_c, then is an additional initial cost that the potential entrant must consider. At any time, this price is known. Because entry is restricted, the discount factor, k, would be lower than in the previous case, since the risks in operating the bank should be

lower. Again, entry occurs when the expected value is positive.

In this second case, entry is restricted by the chartering authority through the price mechanism. If the applicant is willing to pay the price set by the chartering authority, the charter will be granted. However, part, but not necessarily all, of the benefit to the owner of a charter accrues to the chartering authority.

While the above two cases are ways in which the system could conceivably be constructed, neither represents the actual situation. In reality, the applicant knows that entry is restricted by the chartering authority, but does not know precisely how it is done. That is, "the convenience and needs of the community" is the mechanism used to restrict entry. But, unlike the explicit price of the second case, there is no way for the applicant to guarantee receipt of a charter.

Because the future cannot be predicted with perfect accuracy, the expected value of forming a bank in a particular market will always include an element of uncertainty. However, there is an additional element of uncertainty under the present system. The applicant must also consider the probability of obtaining a charter. While the probability can to some extent be controlled by the applicant, the applicant can never be completely certain of obtaining the charter.

Thus, two possibilities exist. If the applicant does obtain the charter, the value that accrues to the owner is:

$$EV_1 = \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{I_K + I_{AC} + I_{SC}}{(1+k)^{t_o}} \tag{3}$$

Here K_{t_o} includes not only the initial capitalization, advertising and

set-up costs, I_K, but also the application costs, I_{AC}, and the costs of acquiring the information that is presented to the authority, I_{SC}.

Equation 3 shows the expected value if the charter is obtained. However, if the applicant does not obtain the charter, the negative value that accrues to the applicant is the money that was spent in applying for the charter:

$$(4) \qquad EV_2 = -\left[\frac{I_{AC} + I_{SC}}{(1+k)^{t_o}}\right]$$

Given that two possible returns exist and that the applicant can assign a subjective probability to each of them, the expected value of the charter can be written as:

$$(5) \qquad EV = \left[\int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t} dt - \frac{I_K + I_{AC} + I_{SC}}{(1+k)^{t_o}}\right] P - \left[\frac{I_{AC} + I_{SC}}{(1+k)^{t_o}}\right] (1-P)$$

The probability of obtaining the charter (the probability of success) is represented by P.

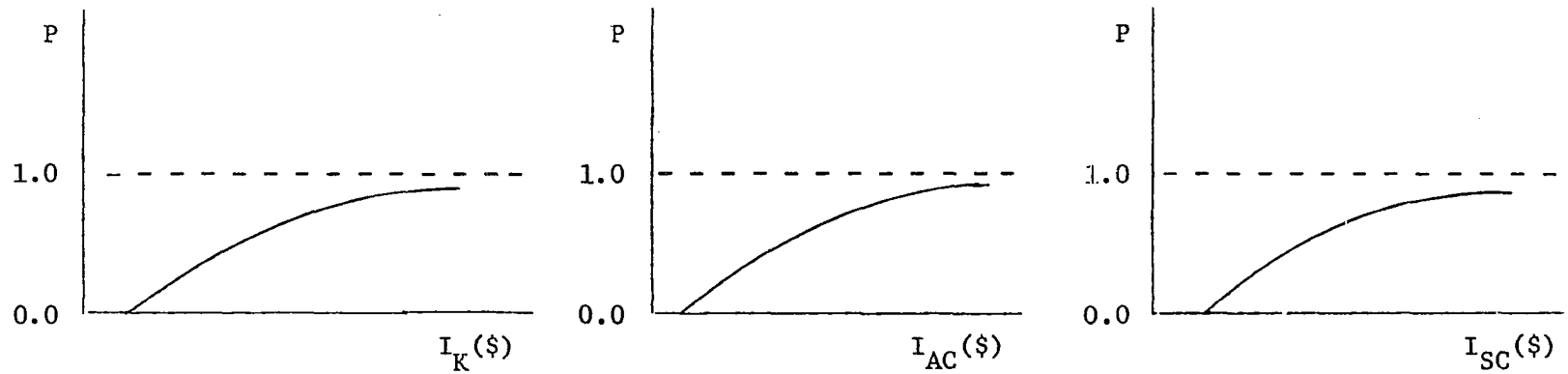
The probability of obtaining a charter is a function of five variables: the level of capitalization, I_K, the application costs, I_{AC}, the search costs, I_{SC}, the response of existing banks to entry, BR, and the attitude of the chartering authority, CA. The first three variables are controlled by the applicant; they are decision variables. The higher the level of initial capitalization, the greater will be the probability of success, the rationale being that the potential bank thus has a larger base from which to begin operations and so is regarded as safer by the chartering authority. With regard to the second variable, the more money that is spent preparing the application package, eg.

including photographs of the desired location, including survey information, etc., the greater will be the probability of success. The third method of raising the probability is to do market studies, hire experts to testify, etc. in order to make a more convincing case before the chartering authority. It should be noted that all three methods result in higher initial costs to the applicant. Thus, some trade-off between higher initial costs and the probability of obtaining the charter exists. The relationships between the three decision variables and the probability of obtaining a charter are depicted graphically in Table 2.

The probability of obtaining the charter cannot be completely controlled by the applicant. For given levels of the three decision variables, the response of existing banks to the threat of entry and the attitude of the chartering authority will determine the probability of obtaining the charter. That is, for given levels of the decision variables, the more negative the response of existing banks, i.e. the more counter-evidence they produce, and the more the chartering authority wants to restrict entry, the lower will be the probability of success.

Writing the probability of obtaining a charter as a function of the five variables that have been specified and substituting this into equation 5, we have:

Table 2. The relationships between the probability of obtaining a charter and the decision variables



$$(6) \quad EV = \left[\int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t} \, dt - \frac{(I_K + I_{AC} + I_{SC})}{(1+k)^{t_o}} \right] f(I_K, I_{AC}, I_{SC}, BR, CA)$$

$$- \left[\frac{I_{AC} + I_{SC}}{(1+k)^{t_o}} \right] [1 - f(I_K, I_{AC}, I_{SC}, BR, CA)]$$

The applicant will then maximize the expected value of the charter by choosing the appropriate values of the three decision variables, I_K, I_{AC}, and I_{SC}. In order to complete the maximization problem and obtain answers that are consistent with reality, four constraints must be included:

(i) $0 \leq f(I_K, I_{AC}, I_{SC}, BR, CA) < 1$

(ii) $I_K \geq 0$

(iii) $I_{AC} \geq 0$

(iv) $I_{SC} \geq 0$

The first constraint states that the probability of obtaining a charter ranges from zero to less than one. That is, the applicant will never be completely certain of obtaining a charter. The last three constraints are needed to avoid nonsense results. They state that the applicant can never spend negative sums of money on the decision variables.

It should be noted that there may be a positive relationship between the expected after-tax earnings of the bank and the initial capitalization, I_K. For simplicity, we have ignored this relationship, although it could certainly be incorporated.

Because the constraints are inequalities, nonlinear programming must be employed to solve the maximization problem. Only the last three constraints listed above are relevant to the problem. The first

constraint involves specifying the probability function correctly. That is, by definition the probability must lie between zero and one. Multiplying through equation 6, we can restate the problem as maximize:

$$(7) \qquad EV = \left\{ \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt \cdot f(I_K, I_{AC}, I_{SC}, BR, CA) - \frac{I_K}{(1+k)^{t_o}} \cdot f(I_K, I_{AC}, I_{SC}, BR, CA) - \frac{I_{AC}}{(1+k)^{t_o}} - \frac{I_{SC}}{(1+k)^{t_o}} \right\}$$

subject to:

$$\text{(i)} \quad I_K \geq 0$$
$$\text{(ii)} \quad I_{AC} \geq 0$$
$$\text{(iii)} \quad I_{SC} \geq 0$$

The Kuhn-Tucker necessary conditions for a global maximum are:

$$(8) \quad \frac{\partial EV}{\partial I_K} = \left[\int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{I_K}{(1+k)^{t_o}} \right] \cdot \frac{\partial f(I_K, I_{AC}, I_{SC}, BR, CA)}{\partial I_K} - \frac{f(I_K, I_{AC}, I_{SC}, BR, CA)}{(1+k)^{t_o}} \leq 0, \; I_K \geq 0, \; \frac{\partial EV}{\partial I_K} \cdot I_K = 0$$

$$(9) \quad \frac{\partial EV}{\partial I_{AC}} = \left[\int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{I_K}{(1+k)^{t_o}} \right] \cdot \frac{\partial f(I_K, I_{AC}, I_{SC}, BR, CA)}{\partial I_{AC}} - \frac{1}{(1+k)^{t_o}} \leq 0, \; I_{AC} \geq 0, \; \frac{\partial EV}{\partial I_{AC}} \cdot I_{AC} = 0$$

$$(10) \quad \frac{\partial EV}{\partial I_{SC}} = \left[\int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{I_K}{(1+k)^{t_o}} \right] \cdot \frac{\partial f(I_K, I_{AC}, I_{SC}, BR, CA)}{\partial I_{SC}} - \frac{1}{(1+k)^{t_o}} \leq 0, \; I_{SC} \geq 0, \; \frac{\partial EV}{\partial I_{SC}} \cdot I_{SC} = 0$$

For all three marginal conditions, if the first partial is negative, then additional amounts of that decision variable reduce the expected value and thus the optimum amount of that decision variable would be zero. If the amount of the decision variable is positive, then the first partial will be zero at the maximum. Thus, we can rewrite the Kuhn-Tucker necessary conditions for a global maximum as:

$$(11) \qquad \frac{\partial EV}{\partial I_i} \leq 0,\ I_i \geq 0,\ \text{and}\ I_i \cdot \frac{\partial EV}{\partial I_i} = 0 \ \text{where}\ i = K,\ AC,\ SC$$

That is, for the optimal solution for each decision variable, either the marginal condition holds as an equality, or the decision variable takes the value zero or both. The Kuhn-Tucker sufficient conditions for a global maximum will hold if in addition to the necessary conditions stated above, the right hand side of equation 7 is differentiable and concave in the nonnegative orthant.[5]

C. Choosing Between National and State Charters

Once it has been determined that a bank would be profitable, the applicant must choose between applying for a state charter and a national charter. The applicant calculates the relative profitability under each charter and chooses the one which is the most profitable. That is, the applicant calculates the expected value of a state chartered bank and compares that with the expected value of a nationally chartered bank, choosing the charter with the higher expected value.

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[5]For a proof of the Kuhn-Tucker conditions, see [7, pp. 704-728].

Several variables, which vary between state and national charters, enter into the calculation. The most obvious is the reserve requirement which is a cost to the bank since these are nonincome-earning assets. The effective reserve requirement for state nonmember banks is usually lower than for national banks and for state banks that join the Federal Reserve system. Even when the percentages are the same or are higher for a state bank, the effective rate is generally lower for two reasons. First, state banks are usually allowed to count respondent balances as part of their required reserves. While these are nonincome-earning assets, the bank will hold some respondent balances whether they are part of reserves or not, so counting them as reserves reduces the nonincome-earning assets the bank must hold. Second, in many states part of the state bank's reserves may be held in the form of highly liquid income-earning assets, such as Treasury bills, again reducing the nonincome-earning assets of the bank. Particularly when money is tight and interest rates are high, reserve requirements will be an important part of any decision and will have an impact on the profitability of the bank.

A second consideration is the examination cost or supervision fee assessed to a bank. State banks are examined by two regulatory authorities, the state banking authority and the FDIC, whereas national banks are only examined by the Comptroller of the Currency. So in states where examination costs are assessed or where there is an annual supervision fee, state banks will be paying fees to two authorities.

Additionally, state banks, because they are examined by two authorities, will have their normal operations interrupted more frequently than national banks.

Location and size may also be important. Rural banks and smaller banks will be more dependent on the correspondent mechanism for such things as check-clearing and borrowing to meet reserve deficiencies. State nonmember banks cannot borrow at the discount window. The importance of this service is debatable since the majority of banks never use the service. For example, "...only 63 banks (less than 15% of all members) borrowed from the Federal Reserve Bank of St. Louis in 1966, a year of wide swings in monetary conditions" [25, p.63]. However, this figure may be much higher now. In addition, the ability to borrow, even though it may never be used, may be important to the banker. To the extent that the correspondent mechanism offers the same services as the Federal Reserve system and at a lower price, a state charter will have a higher expected value.

Bank holding company and branch banking activity may also have an impact on the expected value of the bank under the different charters. It may be that the initial size of the entering bank must be larger to compete effectively with these organizations. A larger initial size will result in a different expected value.

A final criterion will be the probability of the charter application being approved. In some states, the state banking authority works closely with applicants and thus is in a position to effectively discourage the submission of applications that would eventually be rejected.

An applicant in this situation will have more information available to it as to whether an application should be submitted to the state authority. In some regions of the country, this is also true for national charters. In other states and regions, much more uncertainty is attached to the probability of obtaining a charter. Since there are costs in preparing the charter application and if the charter is rejected these costs are not offset by any gain, the applicant must take account of the likelihood of the charter being approved.

D. Supply of Bank Charters

As was noted previously, the goal of the chartering authority is to minimize bank failure within the constraint that there is an adequate level of banking services available. This is accomplished in two ways, through periodic examination of existing banks and through entry restrictions. We are concerned with the second aspect. The supply of bank charters then depends on the number and quality of applications submitted to the chartering authority and the number of banks felt by the chartering authority to be optimal for a particular market. So an application will be approved if it meets two criteria. First, there must be a need for another bank in the market. Second, the applicant must meet the standard that will result in its probable survival. Approval of an application results only when both criteria are met.

The chartering authority can influence the number of applications it receives over time both by verbal statements and actions. However, the chartering authority does not recruit applicants *per se*. That is,

whether more banking services are needed in a particular market will not be known to the chartering authority until an application from that market is received. So, the supply of new charters at any time will be some percentage of the demand for new charters:

$$S_t = aD'_t \tag{12}$$

where: S_t = supply of bank charters at time t

D'_t = applications received during time t and applications pending from time t-1

a = percentage of applications that are approved, $0 \leq a \leq 100$

Within the constraint of the applications before them, the chartering authorities can allow the supply of charters to vary from approval of all to approval of none. The percentage of applications that is approved, a, depends on the need for more banking services in the markets from which applications are received and the worthiness of the applicants.

Looking at a specific application, both of these criteria can be subsumed in the calculation of the expected value of the potential bank by the chartering authority:

$$EV = \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t}\, dt - \frac{K_{t_o}}{(1+k)^{t_o}} \tag{13}$$

where these variables are as defined previously. The values that the chartering authority uses to calculate the expected after-tax return for the potential bank will depend on market conditions, the state of

existing banks, and the worthiness of the particular applicant. Since the chartering authority will not be gathering much information on market conditions independently, it will necessarily rely on the information presented to it by the applicant and by existing banks. The worthiness criterion manifests itself in several ways. For example, whether or not the applicant has been able to hire sufficient numbers of adequately trained personnel for upper-level management positions will in part determine the expected after-tax return.

In addition, the discount factor, k, used by the chartering authority may be greater than that used by the applicant. The chartering authority may view banking as riskier than the applicant views it. The applicant knows it will have the regulatory authorities to rely on in case of trouble. This reduces the risk that the applicant alone must bear. The chartering authority, on the other hand, wants to minimize the probability of the bank becoming a problem and so may set the risk factor higher.

The proposed initial capitalization, K_{t_0}, is determined by the applicant and may be above the minimum set by statute or law. An application that does not meet the minimum level of initial capitalization will be automatically rejected. Since this is public information, one would not expect any application to fall into this category.

In this case we are dealing with a single application from a particular market. Approval occurs when the expected value is positive.

The second case that must be considered arises when more than one application for a particular market is received by the chartering

authority. It may be that the number of acceptable applicants is greater than the number of new banks the market can handle. Then the question before the chartering authority is which of the applications will be approved.

The first step in this process is to calculate the expected value of each potential bank independently. Some applications may be eliminated at this stage. The second step is to rank the remaining applications according to the calculated expected value of the bank. It should be noted that there will be differences among applications, such as differences in proposed initial capitalizations, that will result in different expected values being calculated. The application having the highest expected value is then approved. Up to this point, the process is similar to dealing with mutually exclusive projects. That is, the alternative yielding the highest discounted return is chosen. However, the similarity ends here, because the market may be able to handle more than one new bank. So once the first bank is chosen, the expected values of the other proposed banks are recalculated taking the new entrant into consideration. Again, applications are ranked. The process continues as long as there is room in the market for an additional bank, i.e. until the expected values of the remaining applications become negative.

III. EMPIRICAL ANALYSIS

A. Statistical Technique

We are concerned here with why potential banks fall into particular categories. The three areas of concern are:

1) why applications are received from some market areas and not from others
2) why applicants choose state or national affiliation
3) what criteria determine which applications will be approved and rejected

Because we want to classify the observations in each case into one of two groups, the statistical technique to be employed is discriminant analysis. The purpose of discriminant analysis is to determine the index number, based on a linear combination of the explanatory variables, which will best differentiate between the two groups.[6] Given that there are k groups with N_k observations in group k, N total observations and p variables, the key assumptions made are:

1) each of the k groups has a multivariate normal distribution with respect to the variables, $x_1 \ldots x_p$
2) the means of the x's among the k groups are different
3) the variances and covariances of the x's among the k groups are equal

Given these assumptions, the objective of discriminant analysis is to find a linear combination of the p variables which will best

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[6] For a more complete discussion of discriminant analysis, see [8, pp. 243-261].

discriminate between the groups. That is:

(14) $$Y = \lambda_1 x_1 + \lambda_2 x_2 + \lambda_3 x_3 + \ldots + \lambda_p x_p$$

where: Y = the value of the linear combination of the p variables

$\lambda_1 \ldots \lambda_p$ = the coefficients of the p variables in the linear combination

$x_1 \ldots x_p$ = the variables used for discrimination

Since we are dealing with two groups, k = 2, there will be one discriminant function.

Discriminant analysis is then used to choose the λ coefficients which make Y the best index for differentiating between members of the groups. So in the two group case, the λ's are chosen to maximize the square of the difference between the means of the linearly transformed variables per unit of their variance.

(15) $$D = \frac{(\mu_{y1} - \mu_{y2})^2}{\sigma_y^2}$$

where: μ_{y1} = mean of Y for group 1

μ_{y2} = mean of Y for group 2

σ_y^2 = variance of Y (pooled)

Once the λ's are chosen, a Y value may be computed for a particular observation. If the Y value exceeds the general mean of the two groups, that observation is allocated to the group with the higher mean. If the Y value is less, the observation is allocated to the group having the lower mean.

Two kinds of tests are then used to test the resulting function. First, one can test the discriminating power of the entire discriminant function using the Wilks' lambda statistic. The null hypothesis for this test is:

(16) $$H_o: \ \mu_k = \mu \quad \text{for } k = 1, 2$$

If the null hypothesis is accepted, then the explanatory variables do not discriminate among the groups. The Wilks' lambda statistic is defined as:

(17) $$|\Lambda| = \frac{\left| \sum_{k=1}^{2} \sum_{i=1}^{N_k} (X_{ki} - \mu_k)(X_{ki} - \mu_k)' \right|}{\left| \sum_{k=1}^{2} \sum_{i=1}^{N_k} x_{ki} x'_{ki} \right|}$$

where X_{ki} is the dependent vector variable for the i^{th} observation in the k^{th} group and μ_k is the mean vector for the k^{th} sample.

The Rao F-Ratio, which yields an approximate test of the significance of the Wilks' lambda, is actually used to test the null hypothesis of no difference between the groups. The Rao F-Ratio is:

(18) $$F = \frac{1 - y}{y} \frac{ms + 2\lambda}{2r}$$

where: $s = [(p^2q^2 - 4)/(p^2 + q^2 - 5)]^{1/2}$ $\quad q = k - 1$

$m = n - (p + q + 1)/2$ $\quad n = N - 1$

$\lambda = -(pq - 2)/4$ $\quad N =$ total number of observations

$r = pq/2$ $\quad k =$ number of groups

$y = \lambda^{1/2}$ $\quad p =$ number of variables

The degrees of freedom are $2r$ and $mx + 2\lambda$.

Second, one can perform tests of the significance of individual variables. One possibility is to use the Student's t-test. The problem with applying this test to a discriminant function is in measuring the variance of the coefficients of the discriminant function. To eliminate this problem, one can calculate the asymptotic variance of the coefficients. This will yield consistent estimates of the variance when the sample size is large. The t-statistic, that was used, tests for differences between the two group means for each variable. It is not the Student's t-test, but only tests whether assumption 2 on page 32 holds. The t-statistic is:

$$t = \frac{(\bar{X}_i - \bar{X}_j)}{S_{\bar{x}_i - \bar{x}_j}} \tag{19}$$

The degrees of freedom are $N_i + N_j - 2$.

where: $\bar{X}_i = \sum_{k=1}^{N_i} X_{ik}/N_i$ for the variable over group i, N_i is the sample size of group i

$(SD)_i = \left[\frac{N_i \sum_{k=1}^{N_i} X_{ik}^2 - (\sum_{k=1}^{N_i} X_{ik})^2}{N_i \cdot (d.f.)_i}\right]^{1/2}$ is the standard deviation with d.f. = $N_i - 1$

$S^2 = [df_i (SD)_i^2 + df_j (SD)_j^2]/[d.f._i + d.f._j]$ is the pooled estimate of the variance with $(d.f.)_i + (d.f.)_j = N_i + N_j - 2$

$$S_{\bar{x}_i - \bar{x}_j} = \left[\frac{S^2(N_i + N_j)}{N_i N_j}\right]^{1/2}$$ is the estimate of the standard error

Another way of examining the relative importance of the various variables is to use the standardized discriminant weights on each of the variables. These weights are obtained by multiplying the discriminant function by the square roots of the diagonal of the covariance matrix within classes. These weights show the relative contributions of the input variables to the discriminant function.

An alternative approach is to measure individuals against the previously determined groups in order to determine probable group membership. The underlying assumption is that a group is totally described by its mean and dispersion and that the relationship of the individual observation to the group is determined by a χ^2 which indicates how many members of the group are farther from the mean than that member, and a Bayesian probability of membership in the group based on this χ^2. For each observation, the probability of membership in group k is given by:

(20) $$\hat{p}(k) = P_1(k)/P_2$$

where: $P_2 = \sum_k P_1(k)/P_2$

$p_1 = R \cdot e^{-\chi^2/2}$

R = ratio of the group sample size to the determinant of the reduced dispersion matrix for group k

This is particularly useful in a practical situation. The observations in each sample for which low probabilities were calculated could then be re-examined to determine if some additional criteria could be included to better identify them.

B. Nature of the Data

Cross-sectional data were used for this study. It was felt that a cross-sectional study was preferred to a time series study for two reasons. First, charter applications tend to be concentrated in particular areas of the country, with a cross-sectional study, these areas could be delimited and data for these areas alone could be utilized. Second, preliminary work in a time series framework with aggregate data did not yield particularly promising results. Because data on applications received in a particular year were not available in published form, these data were obtained by sending a questionnaire to the state banking authorities in each of the fifty states and by writing to the Comptroller of the Currency. The questionnaire is presented in Appendix A. The state banking authorities in forty-five states and the Comptroller of the Currency responded to the request.

Given the information obtained from these sources, the market area for each application was defined as either 1) the Standard Metropolitan Statistical Area (SMSA), as defined by the Census Bureau, or 2) the county when the application was outside an SMSA. One could argue that the market area under this definition will be too large,

particularly in unit banking states. However, it is the smallest market area for which much of the data were available. For the demand model, the individual observations were SMSAs. For the other two models, the individual observations were identified by the Census Bureau SMSA or county, the FDIC SMSA, bank holding company affiliation (dummy variable) and the proposed initial capital stock.

It was deemed desirable to have the data be as recent as possible for this study. 1973 was the latest year for which some of the data could be obtained and so this study utilizes data for 1973. The sources for these data are explained in the following sections.

C. Demand for Bank Charters

In order to test the model of the demand for bank charters, proxies must be chosen to represent the expected after-tax return and the probability of obtaining the charter. Beginning with the variables that represent the expected after-tax return, let:

$$(21) \quad \int_{t=t_o}^{\infty} \frac{R_t}{(1+k)^t} = f(POP, URB, RS, DEP, PROF, LD, DPROF, dURB/dt, dRS/dt, dDEP/dt, dPROF/dt, dLD/dt)$$

where POP = population per banking office, 1973
URB = population per square mile, 1973
RS = retail sales level, 1973
DEP = total deposits of existing banks, 1973
PROF = net income as a percentage of the capital account for existing banks, 1973
LD = ratio of total loans to total deposits of existing banks, 1973

DPROF = average return in manufacturing - average return in banking, 1973

dURB/dt = percentage change in population per square mile from 1970 to 1975

dRS/dt = percentage change in retail sales from 1971 to 1973

dDEP/dt = percentage change in total deposits from 1972 to 1973

dPROF/dt = percentage change in net income as a percentage of the capital account from 1972 to 1973

dLD/dt = percentage change in the loan to deposit ratio from 1972 to 1973

The expected after-tax return in a market area depends in part on the population in that area. This relationship is not precise, since one could find instances where a large population is not able to demand many banking services. However, one would expect in general that a larger population demands more banking services and thus the expected after-tax return should be higher. The population figures were obtained from Rand McNally's 1973 Commercial Atlas and Marketing Guide. These are population estimates. The data on banking offices was obtained from the FDIC publication Summary of Accounts and Deposits in all Commercial Banks and Mutual Savings Banks - National Summary, June 30, 1973.

Density is being used to measure the degree of urbanization, URB. As the density of an area rises, one would expect the demand for banking services within that area to rise and thus the expected after-tax return should be higher. The population figures and square miles were obtained from Rand McNally's 1975 Commercial Atlas and Marketing Guide. The estimated 1975 population was used in this calculation

since it is the future in which the potential applicant is interested. To some extent population figures from the near past are a valid measure of what could be expected to occur in the near future. But, since population estimates are readily available, one would expect the potential applicant to utilize them.

Retail trade and changes in the level of it are also measures of the wealth of a market area. While it would have been desirable to have a more comprehensive figure for business activity, retail trade figures were the only ones available for off-census years. As the level of trade rises, the wealth of the market area will rise through the activity generated by the increased trade. Again this should cause a rise in desired banking services and thus in the expected after-tax return of the bank. These data were obtained from Rand McNally's 1973 Commercial Atlas and Marketing Guide and 1975 Commercial Atlas and Marketing Guide.

The level of total deposits of existing banks and changes in that level also measure the need for banking services. Thus, increases in the level of total deposits should have a positive impact on the expected after-tax return of the potential bank. These data were obtained from the FDIC publications, Summary of Accounts and Deposits in all Commercial Banks and Mutual Savings Banks - National Summary, June 30, 1973 and Summary of Accounts and Deposits in all Commercial Banks - Regional Summaries, June 30, 1972.

The profit rate of existing banks is a measure of the desirability

of entry. High profits or positive changes in the profit rate should encourage entry and have a positive impact on the expected after-tax return of the potential bank. However, to the extent that existing banks resist entry more vehemently when profits are high and rising, entry will be discouraged. So, no sign will be assigned a priori to the coefficients on these variables. Net income as a percentage of the capital account, from Table D of the 1972 and 1973 editions of the FDIC publication Bank Operating Statistics, was used as the measure of profitability. This is a measure of the return on owners' equity. It should be noted that FDIC market areas had to be used for this variable, rather than Census Bureau SMSAs.

The loan to deposit ratio is a measure of the existing banks' abilities to meet the loan needs of the community and the community's demand for banking services. A high or rising loan to deposit ratio should have a positive impact on the expected after-tax return. This ratio was calculated from Table A of Bank Operating Statistics.

The last variable is the difference between the owners' return on equity in manufacturing and the owners' return on equity in banking. The measure used for the owners' return on equity in manufacturing was the median return on equity of the top 500 industrial corporations in the United States. The median return of 12.4% was obtained from page 231 of the May 1974 issue of Fortune. The owners' return on equity in banking was described previously. One would expect entry into banking to be a more desirable alternative as the difference

becomes smaller or negative.

It is next necessary to choose proxies for the variables that determine the probability of obtaining a charter. We can write:

(22) $P = f(COM\text{-}B_1, COM\text{-}B_2, COM\text{-}NB, CONC, BHC, dCOM\text{-}B_1/dt, dCOM\text{-}B_2/dt, dCOM\text{-}NB/dt, dCONC/dt, dBHC/dt, BB_1, BB_2)$

where:

$COM\text{-}B_1$ = number of head office banks in the market, 1973

$COM\text{-}B_2$ = number of banking offices in the market, 1973

COM-NB = number of savings & loan associations and mutual savings banks in the market, 1973

CONC = percentage of deposits held by the largest bank in the market, 1973

BHC = number of bank holding companies in the state, 1973

$dCOM\text{-}B_1/dt$ = percentage change in the number of head office banks from 1972 to 1973

$dCOM\text{-}B_2/dt$ = percentage change in the number of banking offices from 1972 to 1973

dCOM-NB/dt = percentage change in the number of savings & loan associations and mutual savings banks from 1970 to 1973

dCONC/dt = percentage change in the percentage of deposits held by the largest bank from 1972 to 1973

dBHC/dt = percentage change in the number of bank holding companies in the state from 1972 to 1973

BB_1 = dummy variable, = 1 for statewide branch banking, = 0 otherwise

BB_2 = dummy variable, = 1 for limited area branch banking, = 0 otherwise

The number of independent banking alternatives in the market may have an impact on the probability of obtaining a charter, as might the

number of banking offices. One would expect a more vigorous reaction to entry from existing banks when there are fewer banks in the market. Thus the probability of obtaining a charter should be lower. Increases in the number of head office banks and banking offices should also have a negative impact on the probability of obtaining a charter, since any increase in the demand for banking services has already been partially taken care of. These data were obtained from the FDIC publications, Summary of Accounts and Deposits in all Commercial Banks and Mutual Savings Banks - National Summary, June 30, 1973 and Summary of Accounts and Deposits in all Commercial Banks - Regional Summaries, June 30, 1972.

Nonbank financial intermediaries also offer some banking services. Even though they are not perfect substitutes, they do compete with banks in some areas. To the extent that they do compete with banks, a rise in the number of nonbank financial intermediaries should have a negative impact on the probability of obtaining a charter. This measure includes savings & loan associations and mutual savings banks, which are the major nonbank depository institutions. While it would have been desirable to include credit unions as well, these data were not available by SMSA. The data on savings & loan associations were obtained from the Federal Home Loan Bank Board publication, FSLIC-Insured Savings & Loan Associations: Combined Financial Statements. Data on savings & loan associations by SMSA were available only if there were

at least five savings & loan associations in that SMSA. Two assumptions were made so that these data could be used. First, three was arbitrarily chosen as the number of associations in the SMSA in cases where there were less than five. This may err on the high side. Second, if the area did not become an SMSA until after 1970 and had more than five associations in 1973, the number of associations in 1973 minus two was used as the 1970 figure. Data on mutual savings banks were obtained from the FDIC publications, Summary of Accounts and Deposits in all Mutual Savings Banks - National Summary, June 30, 1970 and Summary of Accounts and Deposits in all Commercial Banks and Mutual Savings Banks - National Summary, June 30, 1973. The percentage change variable uses 1970 data, rather than 1972 data, because data for 1972 were not available for mutual savings banks.

The percentage of total deposits held by the largest bank in the market is a measure of the level of concentration in that market. The percentage change in the percentage held by the largest bank is a measure of the change in the level of concentration. One would expect entry to be opposed more vigorously by existing banks when the level of concentration is high or rising. But the chartering authorities may view entry more favorably, so the sign is indeterminant. These data were obtained from the FDIC publications that were cited above.

Bank holding company activity should have a positive impact on the probability of obtaining a charter. One means of expansion for

bank holding companies is by acquiring a charter for a new bank. It may be that the chartering authorities view bank holding companies as more stable than independent banks and thus are more willing to grant charters to them. Data on bank holding company activity were available only on a state-by-state basis and include both one-bank and multi-bank holding companies. These data were obtained from the Federal Reserve Bulletin.

An expansion in banking services can be met either through new banks entering the market or through branches of existing banks entering the market. One would expect more expansion to meet a rising demand to be met through branching when the branch banking laws are more liberal. Additionally, it may be that the chartering authorities view new branches of existing banks as less risky than new unit banks. If this is the case, more liberal branch banking laws should have a negative impact on the probability of obtaining a charter. Laws permitting statewide branch banking should have a greater negative impact than laws permitting only limited area branching. However, since most limited area branching laws permit branching only in the vicinity of the head office, rather than only outside the vicinity, and most branching does occur in the vicinity of the head office bank, both kinds of laws should have a negative impact.

The discriminant model that will be calculated can be written in the following form:

$$(23)\quad Y = a_1 \ln POP + a_2 \ln URB + a_3 d\ln URB/dt + a_4 \ln RS + a_5 d\ln RS/dt + a_6 \ln PROF + a_7 d\ln PROF/dt + a_8 \ln DEP + a_9 d\ln DEP/dt + a_{10} \ln LD + a_{11} d\ln LD/dt + a_{12} \ln COM\text{-}B_1 + a_{13} d\ln COM\text{-}B_1/dt + a_{14} \ln COM\text{-}B_2 + a_{15} d\ln COM\text{-}B_2/dt + a_{16} \ln COM\text{-}NB + a_{17} d\ln COM\text{-}NB/dt + a_{18} \ln CONC + a_{19} d\ln CONC/dt + a_{20} \ln BHC + a_{21} d\ln BHC/dt + a_{22} DPROF + a_{23} BB_1 + a_{24} BB_2.$$

Variables that are level values have been put in exponential logarithmic form in order to make the magnitudes of the variables comparable. The variable DPROF and the dummy variables, BB_1 and BB_2, have not been put in logarithmic form because zeros and negative numbers are not defined.

To test this model, two groups were identified. In the first group were all SMSAs from which applications were received either by the state or national banking authority in 1973. The second group was composed of all SMSAs from which applications were not received in 1973. There were 109 observations in the first group and 116 observations in the second group. 40 SMSAs were deleted from the sample because no applications were received at the national level and no information was available at the state level.

D. Choosing Between National and State Charters

The relative costs and benefits of becoming a state or a national bank will be assessed by the applicant. As was discussed previously, there are several regulatory and nonregulatory factors that must enter into this decision. The variables that will be used to explain the grouping of applicants into either the state or the national category

are as follows:

(24) $f(URB, SMSA, KSTCK, RR, EXAM, LAW, APPR, POP, BHC, BB_1, BB_2)$

where:

URB = population per square mile in 1973

SMSA = dummy variable, = 1 for an applicant in an SMSA, = 0 otherwise

KSTCK = proposed capital stock of the entering bank

RR = dollar amount of reserves for a national bank - dollar amount of reserves for a state bank, 1973

EXAM = dummy variable, = 1 if state assesses exam costs, = 0 otherwise

LAW = dummy variable, = 1 if state applications are encouraged, = 0 otherwise

APPR = ratio of applications approved to applications approved and rejected by the state in 1973 minus the ratio of applications approved to applications approved and rejected by the Comptroller of the Currency in 1973 in that state

POP = population per banking office in 1973

BHC = dummy variable, = 1 if applicant would belong to a bank holding company, = 0 otherwise

BB_1 = dummy variable, = 1 for statewide branch banking, = 0 otherwise

BB_2 = dummy variable, = 1 for limited area branch banking, = 0 otherwise

URB and SMSA are two ways of measuring whether or not the bank is in a populated area. Banks in rural areas are more dependent on the correspondent mechanism than are banks in urban areas. URB is one means of measuring the degree of urbanization. One would expect banks to be more likely to apply for state charters where density is lower. SMSA was included as another measure of whether the application was from a rural or an urban area. Again, an applicant is more likely

to join the state banking system when the bank is outside an SMSA. The data for URB were obtained from Rand McNally's 1973 Commercial Atlas and Marketing Guide. The data for SMSA were obtained from the questionnaire.

Another nonregulatory factor is the size of the potential bank. Since the major advantages of national affiliation come only with large size, one would expect small banks to be more likely to choose state affiliation. The average amount of total deposits for a national bank in 1974 was $88.27 million, whereas it was $19.8 million for a state bank [5, September 1975, p. A15]. One measure of the size of the applicant is its proposed initial capital stock. While this is not necessarily the same as the capital stock that it will have when it opens, it does provide a measure of the expected initial size of the bank.

Reserve requirements are an important variable, particularly when money is tight. If state reserve requirements are lower than those set by the Federal Reserve, state nonmember affiliation would be more likely. It is assumed, since state reserve requirements are generally lower than national reserve requirements, that as the difference between the two becomes greater, state nonmember affiliation becomes more preferred. State reserve requirements were obtained from the appendix of an article by Robert E. Knight [22, pp. 17-20]. National reserve requirements were obtained from the Federal Reserve Bulletin. An average size bank was then chosen, along with the dollar amounts of demand and

time deposits and dollar amounts of reserves were calculated on this basis. A more complete explanation of the calculations will be found in Appendix B.

When states assess examination costs or charge an annual supervision fee, the state chartered bank pays fees to two regulatory authorities, if it is a member of the FDIC. Additionally, more on-the-premise examinations will take place in state chartered banks, again because there are two authorities involved. It is probably the case that this cost is substantially lower to the small banks than would be the cost of a national charter. Only when the bank becomes a certain size do dual examinations and dual fee charges become onerous. Information on examination costs and supervision fees for state banks was obtained from the questionnaire.

As part of the questionnaire, state banking authorities were asked if the laws and regulations applying to state banks, as opposed to national banks, encouraged state or national affiliation or made little difference. The intent was to obtain some idea of the nature of the state laws without specifically listing a series of laws that might be pertinent. One would expect more national affiliation when the answer was little difference or encourages national affiliation, than if the answer was encourages state affiliation.

The approval rate is a measure of the probability of success. The current approval rate is used. This assumes that information is transmitted to potential applicants quite rapidly. To the extent that

potential applicants are successfully discouraged from filing an application, this measure will not be uniform across all states. By using the difference between the state and national ratios in a particular state, we not only determine which approval rate is higher, but also the magnitude of the difference. A very slight difference probably has no meaning. But, a large difference may well encourage applicants to choose one affiliation over the other.

Population per banking office was included as a measure of the size of existing banks and thus as a measure of what the size of the potential bank will ultimately be. Again, one would expect smaller banks to choose state affiliation and larger banks to choose national affiliation. These data were obtained from the FDIC publication previously cited.

Bank holding company affiliation was included as an explanatory variable under the assumption that bank holding company banks will tend to be larger and thus choose national affiliation. These data were obtained from the questionnaire.

The state branch banking laws were included under the assumption that banking organizations will be larger in branch banking states. Thus, potential entrants may expect to be larger and so will choose national affiliation. These data were obtained from the FDIC publication previously cited.

The discriminant function to be calculated then is:

$$(25) \quad Y = b_1 \ln URB + b_2 SMSA + b_3 \ln KSTCK + b_4 RR + b_5 EXAM + b_6 LAW + b_7 APPR + b_8 \ln POP + b_9 BHC + b_{10} BB_1 + b_{11} BB_2$$

Again, level values, other than dummy variables, RR, and APPR, have been put in exponential logarithmic form in order to minimize scale problems. This is particularly important here, since the capital stock variable is much larger than the other variables. RR and APPR could not be put into logarithmic form since some of the observations on these variables are zeros or negative numbers.

The two groups that were identified for this model were 1) applications received for national banks in 1973 and 2) applications received for state banks in 1973. There were 89 observations in the first group and 217 observations in the second group.

E. Supply of Bank Charters

Once a charter application is submitted, the chartering authority makes an independent assessment of the expected value of the proposed bank. We are interested here in placing applications into two categories: 1) applications approved and 2) applications rejected. In order to do this, it is necessary to choose proxies for the variables that determine the expected value of a proposed bank.

Beginning with market conditions, M, we can write:

$$(26) \quad M = f(POP, URB, dURB/dt, RS, dRS/dt)$$

where these variables are as defined previously and the sources of the data are the same. As was the case for the demand model, one would

expect higher levels of and positive changes in these variables to indicate better market conditions, so applications would more likely be approved.

In addition to general market conditions, the chartering authority will be concerned specifically with conditions in the banking industry. Banking conditions, B, can be represented by:

(27) $B = f(BSQ, DEP, dDEP/dt, PROF, dPROF/dt, LD, dLD/dt, COM\text{-}B_1, dCOM\text{-}B_1/dt)$

The only new variable here is BSQ which represents banks per square mile in 1973. This variable is a measure of the density of banking services. The number of banking offices would have been a better measure of the number of banking alternatives than is the number of head office banks. However, data on the number of banking offices by county were not available for 1972. These two variables, BSQ and $COM\text{-}B_1$ give some indication of the structure of the banking industry in a particular market. The structure is important because it may have an impact on the expected value calculated by the chartering authority. With fewer banks in a market, the negative response to the threat of entry may be greater. Thus higher values for these two variables should have a positive impact on approval, since the response will probably not be as organized or as concerted.

Better banking conditions in a particular market should be reflected by higher levels or positive changes in deposits, the owners' return on equity and the loan to deposit ratio. Thus these variables

should be positively related to approval of applications. Positive changes in the number of head office banks should be negatively related to approval of applications since changes in market and banking conditions have already been partially offset by entry.

The third area of concern to the chartering authority is the worthiness of the applicant both alone and in relationship to other applicants. We can write:

(28) $W = f(AFFIL, APP\text{-}K, KSTCK)$

where: W = worthiness of the applicant

AFFIL = dummy variable, = 1 if the applicant will be a member of a bank holding company, = 0 otherwise

APP-K = number of applications received in 1973 from that market area which had a greater proposed initial capital stock

KSTCK = proposed initial capitalization of the applicant

A member of a bank holding company has, to some extent, the rest of the system to fall back on if there is a problem. In addition, when the bank begins operations, some loan paper and deposits may flow to it from the rest of the system. Since the first two to three years of operation are the most crucial in terms of survival, these banks may have a greater chance of success in the eyes of the chartering authority. These data were obtained from the questionnaire.

When there are several applications received from one market, the chartering authority must choose among them. One proxy for the quality of an applicant is its proposed size. A larger bank should be more stable and better able to satisfy the market's demands. If this is

true, then as the number of applicants proposing larger initial capitalizations then this applicant rises, the likelihood of approval declines. These data were also obtained from the questionnaire.

Again, the proposed size of the bank is a proxy for the quality of an applicant. One would expect the proposed capitalization to be positively related to the likelihood of approval. These data were obtained from the questionnaire.

The following discriminant function is to be calculated:

$$(29) \quad Y = c_1 \text{lnPOP} + c_2 \text{lnURB} + c_3 \text{dlnURB/dt} + c_4 \text{lnRS} + c_5 \text{dlnRS/dt} + c_6 \text{lnBSQ} + c_7 \text{lnDEP} + c_8 \text{dlnDEP/dt} + c_9 \text{lnPROF} + c_{10} \text{dlnPROF/dt} + c_{11} \text{lnLD} + c_{12} \text{dlnLD/dt} + c_{13} \text{lnCOM-B}_1 + c_{14} \text{dlnCOM-B}_1\text{/dt} + c_{15} \text{AFFIL} + c_{16} \text{APP-K} + c_{17} \text{lnKSTCK}$$

Again the variables other than AFFIL and APP-K were put in exponential logarithmic form to minimize scale problems. AFFIL is a dummy variable and APP-K contains zeros on some observations, so these two variables were not transformed. This equation was run separately for national banks and then for state banks. National applications ruled on in 1973 were divided into two groups: 1) national applications approved in 1973 (118 observations) and 2) national applications rejected in 1973 (53 observations). State applications ruled on in 1973 were divided into the same two categories with 116 observations in the first and 70 observations in the second. The discriminant functions obtained were then compared to determine if and where differences arose between the national and state chartering authorities.

IV. PRESENTATION OF THE RESULTS

The results of the models that were tested are presented in the following sections. Both the t-statistic and the standardized discriminant weight for each variable are reported in the table. These are two different ways of measuring the importance of the variables. The t-statistic tests for differences between group means for a particular variable. It says nothing about the significance of the coefficient. The standardized discriminant weight, on the other hand, is obtained by multiplying the within groups standard deviation of the variable by the coefficient for that variable in the discriminant function. It indicates the relative contribution of the variable to the discriminant function. Also reported in each table are two measures of the overall significance of the discriminant function, Rao's F-Ratio approximation and the Approximate Chi-Square, as well as the means for the two groups. A total correlation matrix for each model is presented in Appendix C.

A. Demand for Bank Charters

The demand for bank charters model (equation 23) was first run using all twenty-four variables. The results are presented in Table 3. The coefficients on all but five variables had the expected sign. The Rao's F-Ratio approximation was significant at the .001 level, indicating that the variables that were included successfully discriminated between the two groups.

Table 3. Demand model I

Variable	Coefficient	t-Statistic 223 d.f.	Standardized Discriminant Weight
lnPOP	0.14850	4.64814[a]	0.85248
lnURB	-0.01798	0.79133	-0.27931
dlnURB/dt	0.31278	3.80784[a]	0.33387
lnRS	-0.04102	6.33866[a]	-0.58105
dlnRS/dt	0.04655	1.75659[e]	0.07769
lnPROF	-0.30512	1.65780[e]	-0.99682
dlnPROF/dt	-0.19592	0.15474	-0.38071
lnDEP	-0.06829	5.99737[a]	-1.12300
dlnDEP/dt	0.20364	3.20430[a]	0.24685
lnLD	0.13837	0.27793	0.21019
dlnLD/dt	0.68363	2.89780[b]	0.36417
$\ln COM\text{-}B_1$	0.02757	7.77302[a]	0.31297
$d\ln COM\text{-}B_1/dt$	0.08590	2.49240[c]	0.28075
$\ln COM\text{-}B_2$	0.19346	3.97842[a]	2.95380
$d\ln/COM\text{-}B_2/dt$	-0.24766	1.37556[f]	-0.54039
lnCOM-NB	0.00124	4.05646[a]	0.01616
dlnCOM-NB/dt	0.07374	0.64401	0.22336
lnCONC	0.01697	4.85708[a]	0.08878
dlnCONC/dt	-0.02157	1.25780	-0.02848
lnBHC	0.02296	4.04870[a]	0.41343
dlnBHC/dt	0.26774	2.17102[d]	0.52955
DPROF	-0.03982	1.65155[e]	-1.53840
BB_1	-0.09334	1.10636	-0.60726
BB_2	-0.12740	3.27587[a]	-0.92659

Group Means: SMSAs receiving applications = 0.0013642
SMSAs not receiving applications = -0.1589900

Rao's F-Ratio Approximation = 6.085538[a] with 24 and 200 d.f.

Approximate Chi-Square = 115.6859[a] with 24 d.f.

[a]Significant at .001
[b]Significant at .005
[c]Significant at .010
[d]Significant at .025
[e]Significant at .050
[f]Significant at .100

It should be noted that the signs on the coefficients must be interpreted somewhat differently in discriminant analysis than they are in regression analysis. For example, in this case the mean on the group of SMSAs in which applications were received (group 1) is higher than the mean on the group of SMSAs in which applications were not received (group 2). Thus, when the sign on the coefficient is positive, a larger value of that variable would tend to push that observation into the first group. When the sign on the coefficient is negative, a larger value of that variable would tend to push that observation into the second group.

To further illustrate this point, consider the first variable, lnPOP. It was expected that a market area with a larger population per banking office would more likely receive an application for a new charter. That is, lnPOP is positively related to the demand for bank charters. Since the coefficient on lnPOP is positive and group 1 has the higher mean, we obtained the expected sign on the coefficient.

Beginning with the variables that are proxies for the expected after-tax return, it was hypothesized that lnPOP, lnLD, dlnURB/dt, dlnRS/dt, dlnDEP/dt, and dlnLD/dt would be positively related to the expected after-tax return and thus to the demand for charters. The coefficients on these variables have the expected sign. Only the variable lnPOP is in the top ten variables based on the standardized discriminant weight.

Positive relationships were also hypothesized for lnURB, lnRS, and lnDEP. The coefficients on these variables do not have the expected sign. Both lnRS and lnDEP are relatively important in terms of contributions to the discriminant function. These variables will be discussed at greater length below.

It was hypothesized that DPROF, the difference between the return on owners' equity in manufacturing and the return on owners' equity in banking, would be negatively related to the demand for charters. The expected return in manufacturing would influence the discount rate that would be used by potential applicants. The coefficient obtained from the discriminant analysis has the expected sign and the standardized discriminant weight is relatively large.

No signs were hypothesized for the coefficients on lnPROF and dlnPROF/dt. The results indicate that high and rising levels of profits are negatively related to the demand for bank charters. Both coefficients have relatively large standardized discriminant weights.

Turning to the variables that are proxies for the probability of obtaining a charter, lnCOM-B_1, lnCOM-B_2, lnCOM-NB, lnBHC, and dlnBHC/dt were hypothesized to be positively related to the probability of obtaining a charter and thus to the demand for bank charters. The coefficients on these variables have the expected sign. The standardized discriminant weights on lnCOM-B_1 and lnCOM-NB are small.

It was expected that the variables dlnCOM-B_2, BB_1, and BB_2 would

be negatively related to the demand for bank charters. All of these coefficients had the expected sign. All of these variables have relatively large standardized discriminant weights.

Negative relationships were hypothesized for $dlnCOM\text{-}B_1/dt$ and dlnCOM-NB/dt. These coefficients do not have the expected sign. Both variables are relatively unimportant in terms of their contributions to the discriminant function.

No a priori sign was hypothesized for lnCONC and dlnCONC/dt. The results show a positive relationship between these variables and the demand for bank charters. The standardized discriminant weights are small. It would appear from the results that higher concentration ratios, lnCONC, encourage entry whereas rising concentration ratios discourage entry. This may indicate that potential applicants feel the probability of obtaining a charter is greater when there are either fewer banks or a few large banks in the market. Also, high and rising returns on owners' equity, lnPROF and dlnPROF/dt, discourage entry rather than encouraging it. That is, when returns are high or rising, existing banks may be expected by potential entrants to react more negatively to the threat of entry, thus leading to a reduction in the expected after-tax return on a new bank and in the probability of obtaining a charter.

The coefficients on the levels of retail sales, total deposits, and population per square mile do not have the expected signs. The signs on the coefficients indicate that applications tend to be received from smaller and less densely populated areas.

Areas in which the number of head office banks and the number of nonbank financial intermediaries have risen also tend to receive more applications. Neither variable contributes substantially to the discriminant function. Changes in the number of banking offices is more important than is the number of head office banks which is to be expected. Since nonbank financial intermediaries are not perfect substitutes for commercial banks, changes in the number of nonbank financial intermediaries probably should not have much of an impact on the probability of obtaining a charter.

While the coefficients on both of the dummy variables representing the branch banking laws have the expected sign, the standardized discriminant weight on the dummy variable representing limited area branch banking is larger than the other. This is contrary to what was hypothesized. However, both variables are relatively important in their contributions to the discriminant function.

Several variables in this model were highly correlated. In particular, lnRS, $\ln COM\text{-}B_1$, $\ln COM\text{-}B_2$, lnCOM-NB, and lnDEP are all highly interrelated. Also highly correlated are lnPROF and DPROF, as well as $d\ln COM\text{-}B_1/dt$ and $d\ln COM\text{-}B_2/dt$.

Because several variables were so highly correlated, a second model, with fourteen variables, was run. Among the variables that were highly correlated in the first model, $\ln COM\text{-}B_2$, $d\ln COM\text{-}B_2/dt$ and DPROF were retained. The choice of variables to be retained was made on the basis of the standardized discriminant weights and expected signs of the

coefficients One other variable, lnURB, was also eliminated because the standardized discriminant weight was small. The results for this model are presented in Table 4. Again, Rao's F-Ratio approximation was significant at the .001 level. In this case, the mean on the group of SMSAs receiving applications is more negative (smaller) than the mean on the group of SMSAs not receiving applications.

It was hypothesized that lnPOP, dlnURB/dt, dlnRS/dt, dlnDEP/dt, dlnLD/dt, lnCOM-B_2, lnBHC, and dlnBHC/dt were positively related to the demand for bank charters. The coefficients on these variables all have the expected sign.

Negative relationships were hypothesized for $\text{dlnCOM-B}_2/\text{dt}$, DPROF, BB_1, and BB_2. All four variables have the expected sign on the coefficient. Again, these are the same results as those obtained from the first model.

No sign was hypothesized for the coefficient on lnCONC. As in the first model, the coefficient on lnCONC indicates a positive relationship to the demand for bank charters. Again the weight indicates this variable is relatively unimportant. There is a change in sign on the coefficient on dlnCONC/dt in this model. The coefficient on dlnCONC/dt indicates that this variable is positively related to the demand for bank charters, contrary to the first model. Again the relative contribution of this variable is small.

As indicated by the Rao's F-Ratio approximation, this second model discriminated between the two groups better than did the first model.

Table 4. Demand model II

Variable	Coefficient	t-Statistic 223 d.f.	Standardized Discriminant Weight
lnPOP	-0.07967	4.64814[a]	-0.45734
dlnURB/dt	-0.31157	3.80784[a]	-0.33258
dlnRS/dt	-0.15819	1.75659[e]	-0.26399
dlnDEP/dt	-0.27365	3.20430[a]	-0.33171
dlnLD/dt	-0.81810	2.89780[b]	-0.43581
$\ln COM\text{-}B_2$	-0.09368	3.97842[a]	-1.43040
$d\ln COM\text{-}B_2/dt$	0.13409	1.37556[f]	0.29258
lnCONC	-0.00137	4.85708[a]	-0.00715
dlnCONC/dt	-0.01700	1.25780	-0.02245
lnBHC	-0.02164	4.04870[a]	-0.38971
dlnBHC/dt	-0.28785	2.17102[d]	-0.56932
DPROF	0.00879	1.65155[e]	0.33961
BB_1	0.06073	1.10636	0.39509
BB_2	0.11505	3.27587[a]	0.83676

Group Means: SMSAs receiving applications = -1.3423
SMSAs not receiving applications = -1.1819

Rao's F-Ratio Approximation = 9.069549[a] with 14 and 210 d.f.

Approximate Chi-Square = 102.1458[a] with 14 d.f.

[a]Significant at .001
[b]Significant at .005
[d]Significant at .025
[e]Significant at .050
[f]Significant at .100

The same problems remain. The weight on the dummy variable representing statewide branching is smaller than the weight on the dummy variable representing limited area branching. However, both variables are relatively important. Now, the sign on the coefficient representing the percentage change in the level of concentration is reversed. Again, it could be that potential applicants expect the probability of obtaining a charter to be greater as the market becomes more concentrated.

B. Choosing Between National and State Charters

The model used to identify the variables that are particularly important in determining whether an applicant will choose national or state affiliation (equation 25) was then run. The results of this analysis are presented in Table 5. Again, Rao's F-Ratio approximation was significant at the .001 level. The mean on the group of applicants choosing national affiliation (group 1) was higher than the mean on the group of applicants choosing state affiliation.

It was hypothesized that lnURB, lnKSTCK, and BHC would be positively related to national affiliation. That is, a larger value for the first two variables and for bank holding company affiliation (dummy variable = 1) would tend to push that observation into the group of applicants choosing national affiliation. The coefficients on all three of the variables have the expected sign.

Negative relationships between APPR, RR, and LAW and national affiliation were expected. The coefficients on these variables have

Table 5. Affiliation model I

Variable	Coefficient	t-Statistic 304 d.f.	Standardized Discriminant Weight
lnURB	0.00869	2.77681[b]	0.22423
SMSA	-0.28252	1.38327[f]	-2.36870
lnKSTCK	0.73762	9.38422[a]	8.63070
RR	-0.15487	0.43560	-2.93660
EXAM	-0.25638	1.76466[e]	-1.17640
LAW	-0.02008	0.17480	-0.15243
APPR	-0.40452	1.52913[f]	-2.45760
lnPOP	-0.02875	1.56503[f]	-0.28712
BHC	0.17341	0.74164	0.99952
BB_1	-0.20411	0.46298	-1.28690
BB_2	-0.22294	0.28618	-1.79350

Group Means: National = 9.3507
State = 8.7620

Rao's F-Ratio Approximation = 11.842158[a] with 11 and 294 d.f.

Approximate Chi-Square = 109.4825[a] with 11 d.f.

[a]Significant at .001
[b]Significant at .005
[d]Significant at .025
[e]Significant at .050
[f]Significant at .100

the expected sign. The weights on the approval rate, APPR, and the difference between national and state reserve requirements are relatively large. The weight on the dummy variable representing the state of the law, LAW, is smaller than that for the other variables.

The coefficients on the rest of the variables, SMSA, EXAM, lnPOP, BB_1, and BB_2 were expected to be positively related to national affiliation. None of the coefficients on these variables has the expected sign.

The coefficients on SMSA and lnPOP indicate that an applicant is more likely to choose national affiliation when the potential bank will be outside an SMSA or when it will be in an area where the population per banking office is smaller. In both cases, these would be more rural areas. This might imply that the correspondent mechanism is a better substitute for national affiliation when the respondent bank is closer to its correspondent, i.e. in an urban area.

The dummy variables used to represent the assessment of examination costs and supervision fees and the state of the law are probably not particularly good variables. It would have been much better to use some measure of the difference in the costs for national and state banks of a given size in a particular state in the first case. However, those data were not available. Differences in particular laws would have been a better measure in the second case.

The coefficients on both dummy variables representing the branch

banking laws of the states do not have the expected signs. That is, in areas where statewide or limited area branching is permitted, applicants tend to choose state affiliation.

The main conclusion that can be drawn from these results is that the proposed size of the bank is of primary importance in determining whether the applicant chooses state or national affiliation. The only significant regulatory factors are the difference in approval rates between the national and state authorities for that state and the difference in required reserves.

Since it was already known that large banks tend to be national banks, a second model was run without lnKSTCK in an attempt to determine if this variable was acting as a proxy for other economic and regulatory factors. Because the only difference between some of the observations was the proposed initial capital stock, twenty-three observations had to be eliminated from the group of national applications and seventy observations from the group of state applications. In addition, another variable, $APPR_1$, was included. This variable is the difference in the approval rates of the two authorities in 1972. That is, it is the same as APPR, but calculated with 1972 data. $APPR_2$ is the variable APPR of the previous model. The difference in approval rates for 1972 was included on the assumption that applicants might be concerned not only with what is currently happening, but also with what has occurred in the near past.

As can be seen from the results presented in Table 6, this model does not successfully discriminate between the two groups of applicants. The F-Ratio was not significant at the .100 level. Again the mean on the group of state applications was lower than the mean on the group of national applications. Although the discriminating power of this function is poor, there are some important changes.

Starting with the variables for which the signs on the coefficients did not change, lnURB is positively associated with national affiliation, as is BHC. The coefficients on $APPR_1$, $APPR_2$, and LAW indicate a negative association between these variables and national affiliation. As in the previous model, the weight on $APPR_2$ is relatively large. The coefficient on SMSA again does not have the hypothesized sign and the weight is relatively low.

Among the variables for which there were sign changes, the coefficients on lnPOP and EXAM have the hypothesized sign and are significant. The coefficient on RR does not have the hypothesized sign and now this variable contributes least to the discriminant function. The coefficients on BB_1 and BB_2 now have the hypothesized signs and now the weight on BB_1 is larger than the weight on BB_2.

One can conclude from these results that better measures of the regulatory variables are needed. Specifically, the magnitude of the difference in examination and supervision costs between national and state banks would be a desirable variable. A more detailed analysis

Table 6. Affiliation model II

Variable	Coefficient	t-Statistic 211 d.f.	Standardized Discriminant Weight
lnURB	0.24246	2.94428[b]	5.35200
SMSA	-0.16359	1.94492[e]	-1.18310
RR	0.03742	0.01524	0.53086
EXAM	0.38743	1.50182[f]	1.60310
LAW	-0.21033	0.80221	-1.39880
$APPR_1$	-0.17631	0.89088	-1.43670
$APPR_2$	-0.65285	1.31913[f]	-3.56240
lnPOP	0.25301	1.71571[e]	1.98550
BHC	0.27943	0.86763	1.39610
BB_1	0.31343	0.03222	1.76910
BB_2	0.14519	0.02995	1.02870

Group Means: National = 3.9044
State = 3.6240

Rao's F-Ratio Approximation = 1.175816 with 11 and 201 d.f.

Approximate Chi-Square = 12.8155 with 11 d.f.

[b]Significant at .005
[e]Significant at .050
[f]Significant at .100

of the differences in various laws and regulations applying to national and state banks would also be helpful. With this kind of information across all states, one should be better able to identify why larger banks tend to choose national affiliation.

C. Supply of Bank Charters

The entire supply model presented in equation 29 could not be run for either the national or the state groups. While the variables were not completely correlated, there was sufficient correlation, coupled with rounding error in the computer, so that three variables had to be omitted in each case. The variables that were causing the problem are as follows. lnBSQ and lnURB were highly correlated. lnRS was highly correlated with lnURB, lnDEP, and $\ln COM\text{-}B_1$. lnDEP and $\ln COM\text{-}B_1$ were highly correlated. Various combinations, omitting three of these five variables, were run. The model that was chosen omits lnURB, lnDEP, and $\ln COM\text{-}B_1$. This combination seemed best in terms of overall significance, although the results were very similar among the combinations that were tried.

1. National charters

As was stated above, this model was run with the omission of lnURB, lnDEP, and $\ln COM\text{-}B_1$. The results are presented in Table 7. Rao's F-Ratio approximation was significant at the .010 level, indi-

Table 7. National supply model

Variable	Coefficient	t-Statistic 169 d.f.	Standardized Discriminant Weight
lnPOP	-0.05523	0.64184	-0.49769
dlnURB/dt	0.55917	2.82880[b]	0.67209
lnRS	0.03472	1.56474[f]	0.81541
dlnRS/dt	0.15070	1.69586[e]	0.31490
lnBSQ	-0.03111	1.02303	-0.40510
dlnDEP/dt	-0.33364	0.00023	-0.34176
lnPROF	-0.20730	0.71099	-0.46518
dlnPROF/dt	0.03567	1.06332	0.05248
lnLD	-0.46773	1.20314	-0.64584
dlnLD/dt	0.45723	0.44179	0.22176
dlnCOM-B_1/dt	-0.06516	0.53084	-0.12973
AFFIL	-0.26747	4.60885[a]	-1.38320
APP-K	0.01465	2.68159[b]	0.51278
lnKSTCK	-0.00028	1.01532	-0.00191

Group Means: Applications approved = -0.28984
Applications rejected = -0.13673

Rao's F-Ratio Approximation = 2.827877[c] with 14 and 156 d.f.

Approximate Chi-Square = 36.6389[a] with 14 d.f.

[a]Significant at .001
[b]Significant at .005
[c]Significant at .010
[e]Significant at .050
[f]Significant at .100

cating that the discriminant function did successfully distinguish between the two groups. The mean for the group of applications that were approved is smaller than the mean for the group of applications that were rejected.

Beginning with the variables representing market and banking conditions, it was hypothesized that lnPOP, lnBSQ, dlnDEP/dt, lnPROF and lnLD would be positively related to applications approved. The coefficients on these variables have the expected sign.

Positive relationships were also hypothesized for dlnURB/dt, lnRS, dlnRS/dt, dlnPROF/dt, and dlnLD/dt. None of the coefficients on these variables have the expected sign. The weights on dlnURB/dt and lnRS indicate that these variables are relatively important in their contributions to the discriminant function. In addition, a negative relationship between approval and dlnCOM-B_1/dt was hypothesized. The coefficient on this variable does not have the expected sign and the weight is relatively small.

These results seem to indicate two things. First, the logs of the market and banking variables appear to be more important than the percentage changes in these variables in determining whether or not an application will be approved. That is, the level of market and banking conditions is more important that the change in market and banking conditions. Second, positive changes in market and banking conditions appear to be negatively related to approval of applications.

This may indicate that existing banks oppose entry more vigorously in good times and that the chartering authority is sympathetic to these demands.

Three variables represent the status of the applicant and the relationship of the applicant to other applicants. Positive relationships were hypothesized between approval and AFFIL and lnKSTCK. The coefficients on both of these variables have the expected sign. The weight on AFFIL is relatively large, whereas the weight on lnKSTCK was smaller than that for any other variable. It was also hypothesized that APP-K would be negatively related to approval. Again, the coefficient has the expected sign and the weight is relatively large.

These results support the arguments that applications for primary organizations from bank holding companies and applications with larger proposed initial capital stocks are more likely to be approved. Both of these results may be changing, given the current problems with some large bank holding company banks.

2. State charters

This model is identical to the model for national charters. The results of the model are presented in Table 8. The discriminating power of this discriminant function is not as great as for the national model. Rao's F-Ratio approximation was significant at the .050 level, indicating that the discriminant function did distinguish between the

two groups. The mean for the group of applications that were approved is smaller than the mean for the group of applications that were rejected.

Commencing with the variables that represent market and banking conditions, it was hypothesized that lnPOP, lnBSQ, dlnRS/dt, dlnPROF/dt, and lnLD would be positively related to approval. The coefficients on these variables have the expected sign and the weights are relatively large. A negative relationship between approval and dlnCOM-B_1/dt was hypothesized. The coefficient on dlnCOM-B_1/dt has the expected sign, but the weight is relatively small.

Positive relationships were also hypothesized for dlnURB/dt, lnRS, dlnDEP/dt, lnPROF, and dlnLD/dt. None of the coefficients on these variables has the expected sign. The weight on lnRS indicates that this variable is particularly important.

The coefficients on several variables changed sign between this model and the model for national charters. The coefficients on dlnRS/dt, lnPROF, dlnPROF/dt, and dlnCOM-B_1/dt all have different signs. In both models, the weights on the logs of most of the level market and banking variables are greater than the weights on the percentage changes in those variables. There were, however, changes in the relative importance of the variables.

Turning to the variables representing the applicant, it was

Table 8. State supply model

Variable	Coefficient	t-Statistic 184 d.f.	Standardized Discriminant Weight
lnPOP	-0.05945	1.18022	-0.63198
dlnURB/dt	0.29106	1.71162[e]	0.25025
lnRS	0.04731	0.98130	1.33920
dlnRS/dt	-0.53804	0.14715	-0.40384
lnBSQ	-0.02770	0.16444	-0.39978
dlnDEP/dt	0.20016	0.52317	0.15499
lnPROF	0.15854	1.69836[e]	0.31819
dlnPROF/dt	-0.19692	1.10974	-0.27543
lnLD	-0.50997	2.28427[d]	-0.74305
dlnLD/dt	0.49606	0.51128	0.28732
dlnCOM-B_1/dt	0.08013	0.84868	0.14443
AFFIL	-0.00414	0.45089	-0.02047
APP-K	0.00046	1.88274[e]	0.03280
lnKSTCK	-0.05198	3.52877[a]	-0.51265

Group Means: Applications approved = 0.008930
Applications rejected = 0.079584

Rao's F-Ratio Approximation = 2.043725[e] with 14 and 171 d.f.

Approximate Chi-Square = 27.3842[d] with 14 d.f.

[a]Significant at .001
[d]Significant at .025
[e]Significant at .050

hypothesized that AFFIL and lnKSTCK would be positively related to approval. The coefficients on these variables have the expected sign. The importance of the coefficients, as indicated by their weights, is reversed from the national model. Here, the weight on lnKSTCK is relatively large, whereas the weight on AFFIL is not. A negative relationship between approval and APP-K was hypothesized. As in the national model, the coefficient has the expected sign, but now the weight is relatively low.

The results on the nonmarket variables indicate that state chartering authorities are primarily interested in the proposed size of the bank. An application will more likely be approved when the applicant proposes a larger initial capital stock. The state chartering authorities do not seem particularly concerned with bank holding company affiliation, unlike the national chartering authority.

V. SUMMARY AND CONCLUSIONS

In this paper, I attempted to go beyond the previous work by dealing explicitly and separately with the demand for and supply of state and national charters and the choice between state and national affiliation in a cross-sectional framework. The results of these three models are positive. They tend to support the argument that both market and regulatory variables are important in determining the demand for and supply of bank charters.

Beginning with the demand model, it appears that the smaller model presented in Table 4 is the better model in terms of overall discriminating ability. One can conclude that, at least for 1973, both market and regulatory variables are important in determining whether a charter will be received from a particular SMSA. The market variables are those variables that serve as proxies for the expected after-tax return. The regulatory variables are those that are proxies for the probability of obtaining a charter. In this latter category are included both the attitude of the chartering authority and the response of existing banks to entry, which influences the chartering authority. Among the regulatory variables, the signs and weights on the coefficients for the level and rate of change in bank holding company activity support the hypothesis that bank holding companies attach a higher value to the probability of obtaining a charter. The one surprising result here is that limited area branch banking laws are more important than statewide branch banking laws in discouraging entry. But, both are important to the

discriminant function.

The model used to distinguish between national and state charter applications yielded the most interesting results. The major conclusion that could be drawn from the model presented in Table 5 is that larger banks tend to be national banks. While historically this has been the case, the argument was that one important incentive for large banks to choose national affiliation was the tax advantage enjoyed by national banks in their out-of-state transactions. This argument was no longer valid in 1973. As was noted previously, Congress had legislated equal tax treatment for all federally insured depository institutions by 1973. While the law was in a state of flux in 1973, i.e. changes were still being made, it was clear that the result would continue to be equal tax treatment for national banks and federally insured state banks.

The proposed capital stock variable was omitted in the model presented in Table 6. This was done primarily to determine what would then happen to the coefficients on the other variables and because the weight on that coefficient was so much larger than the others. When that variable was eliminated, the overall discriminating power of the model was drastically reduced. However, the coefficients on all but two of the remaining variables then had the hypothesized sign. It is clear that while the examination costs and approval rates, in particular, are important in discriminating between the two groups,

better measures of these variables are needed. That is, particular laws and costs of being either a national or a state bank need to be identified and incorporated in the model.

The supply models that were proposed successfully discriminated between approved and rejected charters. The variables representing market and banking conditions gave confused results. In general, the logs of the level variables contributed more to the discriminant function than did the percentage changes in these variables. In both the national and state models, the signs on lnPOP, lnBSQ, and lnLD were as hypothesized. In both models, the coefficients on the variables representing the quality of the applicant alone and in relation to other applicants had the hypothesized signs. In the national model, the number of applications from a particular market with larger proposed capital stocks was important in determining whether the applications would be approved or rejected. A major difference in the results between these models may be noted. The proposed size of the applicant is more important to state chartering authorities, whereas bank holding company affiliation is more important to the national chartering authority.

It should be noted that these are cross-sectional models based on data for one year, 1973. In order to determine the long-run validity of these models, it would be necessary to test these models using data for several years. The years should be chosen to incorporate

various market, banking and regulatory conditions. However, within the confines of this proviso, one can conclude that discriminant analysis can be successfully applied to a cross-sectional model dealing with bank charters. In addition, the results indicate that the chartering authorities can control new bank entry not only through changes in the approval rate, but also by influencing the number of charters that are submitted. Thus, over time the chartering authorities have two mechanisms for controlling entry, rather than only one.

VI. BIBLIOGRAPHY

1. Alhadeff, David A. "Barriers to Bank Entry." Southern Economic Journal 41 (April 1974):589-603.

2. Alhadeff, David A. "A Reconsideration of Restrictions." Quarterly Journal of Economics 74 (May 1962):246-263.

3. Bank Holding Company Act of 1956. Statutes at Large, vol. 70 (1956).

4. Bank Holding Company Act of 1956, amendments. Statutes at Large, vol. 80 (1970).

5. Board of Governors of the Federal Reserve System. Federal Reserve Bulletin. Washington, D.C.: Board of Governors of the Federal Reserve System, 1936-1975.

6. Brown, William J. "Entry into Commercial Banking Markets: An Exploratory Study." American Statistical Association Business and Economics Statistics Section Proceedings 126 (1966): 314-316.

7. Chiang, Alpha C. Fundamental Methods of Mathematical Economics. New York: McGraw-Hill Book Company, 1974.

8. Cooley, William W. and Lohnes, Paul R. Multivariate Data Analysis. New York: John Wiley and Sons, Inc., 1971.

9. Darnell, Jerome C. "Chain Banking." National Banking Review 4 (March 1966):307-331.

10. Darnell, Jerome C. "Chain Banking Ownership and Operation." National Banking Review 4 (December 1966):193-199.

11. Federal Deposit Insurance. Statutes at Large, vol. 49 (1935).

12. Federal Deposit Insurance Corporation. Bank Operating Statistics. Washington, D.C.: Federal Deposit Insurance Corporation, 1972-1973.

13. Federal Deposit Insurance Corporation. Summary of Accounts and Deposits in all Commercial Banks - Regional Summaries, June 30, 1972. Washington, D.C.: Federal Deposit Insurance Corporation, 1972.

14. Federal Deposit Insurance Corporation. Summary of Accounts and Deposits in All Commercial Banks and Mutual Savings Banks - National Summary, June 30, 1973. Washington, D.C.: Federal Deposit Insurance Corporation, 1973.

15. Federal Deposit Insurance Corporation. Summary of Accounts and Deposits in all Mutual Savings Banks - National Summary, June 30, 1970. Washington, D.C.: Federal Deposit Insurance Corporation, 1970.

16. Federal Home Loan Bank Board. FSLIC - Insured Savings and Loan Associations: Combined Financial Statements. Washington, D.C.: Federal Home Loan Bank Board, 1970, 1973.

17. "Fortune Directory of the 500 Largest Industrial Corporations." Fortune 89 (May 1974):230-257.

18. Fraser, Donald R. and Rose, Peter S. "Bank Entry and Bank Performance." Journal of Finance 27 (March 1972):65-78.

19. Garrison, Roger W. "The Effects of Charter Requirements on the Timing of Bank Entry." Working Paper, Federal Reserve Bank of Kansas City, January 1975.

20. Greenbaum, Stuart I. and Ali, Mukhtar M. "Entry, Control and the Market for Bank Charters." Journal of Finance 29 (May 1974): 527-535.

21. Holland, Robert C., et al. "Research into Banking Structure and Competition." Federal Reserve Bulletin 50 (November 1964): 1392.

22. Knight, Robert E. "Reserve Requirements, Part I: Comparative Reserve Requirements at Member and Nonmember Banks." Federal Reserve Bank of Kansas City Monthly Review (April 1974):3-20.

23. Luttrell, Clifton B. "Member Bank Borrowing: Its Origin and Function." Quarterly Review of Economics and Business 8 (Autumn 1968):55-65.

24. Nosari, Eldon Joe. "National Bank Entry." Ph.D. dissertation, University of Kentucky, 1972.

25. Orr, Dale. "The Economic Determinants of Entry." Canadian Journal of Economics 7 (February 1974):82-99.

26. Peltzman, Sam. "Bank Entry Regulation: Its Impact and Purpose," in Studies in Banking Competition and the Banking Structure, p. 285-299, ed. Administrator of National Banks, U.S. Treasury. Washington, D.C.: Government Printing Office, January 1966.

27. Phillips, Almarin. "Evidence on Concentration in Banking Markets and the Interest Rate." Federal Reserve Bulletin 53 (June 1967): 916-926.

28. Rand McNally & Company. 1973 Commercial Atlas and Marketing Guide. Chicago: Rand McNally & Company, 1973.

29. Rand McNally & Company. 1975 Commercial Atlas and Marketing Guide. Chicago: Rand McNally & Company, 1975.

30. Redford, Emmette S. "Dual Banking: A Case Study in Federalism." Law and Contemporary Problems 31 (Autumn 1966):749-773.

31. Shull, Bernard and Horvitz, Paul M. "Branch Banking and the Structure of Competition," in Studies in Banking Competition and the Banking Structure, p. 99-139, ed. Administrator of National Banks, U.S. Treasury. Washington, D.C.: Government Printing Office, January 1966.

32. Smith, William Paul. "Measures of Banking Structure and Competition." Federal Reserve Bulletin 51 (September 1965):1212-1222.

33. Taxation, U.S. Code, Supp. III, vol. 12, sec. 548 (1973).

34. Wille, Frank. "State Banking: A Study in Dual Regulation." Law and Contemporary Problems 31 (Autumn 1966):733-748.

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VIII. APPENDIX A: REPLICA OF THE QUESTIONNAIRE

Iowa State University of Science and Technology Ames, Iowa 50010

Department of Economics

Dear Sir:

I am doing my dissertation on bank entry at Iowa State University. As part of this study, I want to compare the supply and demand for state bank charters with the supply and demand for national bank charters in 1972, 1973, and 1974. In particular, I want to determine which factors are most important in determining the number of applications that are submitted and approved and why applicants choose either a state or a national charter. Most of the information I need is available in published data, such as the FDIC's Bank Operating Statistics and the Census Reports.

The most important data are those on charter applications, which are not readily available. In order to do this study, I need to know the counties in which applications for primary organizations of banks were received and approved in 1972, 1973, and 1974. I would appreciate it if you would fill out the information on the following pages. The back of the third page is addressed and stamped, for your convenience. If this information is contained in your Annual Reports, you could just send them to me.

I will be using Standard Metropolitan Statistical Areas data so I need to know the county or city from which the application was received. Under no circumstances will individual bank applications be identified when the dissertation is written. However, you could send the information as follows: County Name: Application 1, Application 2, etc. As I said, I need either the name of the county or city to identify the SMSA.

I would appreciate it if you would return this as soon as possible. If you would like a copy of my results, I would be pleased to send it to you. I will be finished by next summer at the latest. Thank you very much for your help.

Sincerely,

Coleen Pantalone

Applications for new state charters received in 1972, 1973 & 1974.* (identify by county or city)	Year in which the application was received	Year in which the application was:		Proposed initial capital stock of applicant ($)	Did the applicant plan to:		
		Approved	Rejected		join the Federal Reserve System?	join the FDIC?	be a member of a bank holding company?

* do not include charters issued pursuant to corporate reorganization or conversions from national to state charters

1. What were the reserve requirements on net demand deposits for state banks in:

   1972? _____

   1973? _____

   1974? _____

2. What were the initial capital stock requirements for state banks in a city with a population of 25,000 in:

   1972? _____

   1973? _____

   1974? _____

2. Are state bank examination costs assessed to the individual bank?

   Yes _____

   No _____

4. If examination costs are assessed to individual banks, what was the approximate cost for a bank with total assets of less than $25 million in:

   1972? _____

   1973? _____

   1974? _____

5. In your opinion, do the laws and regulations (for example, loan limits) applying to state banks, as opposed to national banks:

   _____ encourage applications to apply for state charters rather than national charters

   _____ encourage applicants to apply for natioanl charters rather than state charters

   _____ make little difference in the applicant's decision

6. Would you like a copy of my results?

   Yes _____

   No _____

IX. APPENDIX B: METHOD OF CALCULATING REQUIRED RESERVES

In order to determine the difference in national and state reserve requirements for each state, it was necessary to construct a balance sheet for an average bank and compute the dollar amount of required reserves on the basis of that balance sheet. An average balance sheet was constructed by dividing the assets and liabilities of all commercial banks on December 31, 1973 by the total number of banks. These data were obtained from pages A18 and A19 of the June 1974 Federal Reserve Bulletin. Required reserves, including reserves held against both demand deposits and time deposits, were then calculated for each state and for national banks.

Since in many states United States government securities may be used to satisfy part of the reserve requirement, merely calculating required reserves would not be adequate. So, the next step was to calculate the amount of vault cash and "due froms" a bank would have to hold to satisfy the reserve requirement. That is, when United States government securities could be applied to part of the reserve requirement, these amounts were subtracted from required reserves.

The final problem was in finding a way to handle "due from other banks" which count as part of required reserves for most state banks, but not for national banks. Since both national and state banks hold "due froms", the options were either to add them to national required reserves or subtract them from state required reserves. The second

option was chosen. Thus, the figures actually used were 1) vault cash plus deposits at the federal reserve banks for national banks and 2) vault cash for state banks. For each state then, RR is the difference between 1) and 2).

X. APPENDIX C: TOTAL CORRELATION MATRICES

Table C1. Total correlation matrix for demand model I

	lnPOP	lnURB	dlnURB/dt	lnRS	dlnRS/dt
lnPOP	1.00000				
lnURB	-0.01596	1.00000			
dlnURB/dt	0.19278	-0.24978	1.00000		
lnRS	-0.06429	0.48797	0.00417	1.00000	
dlnRS/dt	0.03127	-0.37257	0.45333	-0.10506	1.00000
lnPROF	0.23753	-0.47901	0.15372	-0.28075	0.28058
dlnPROF/dt	0.26721	-0.29818	0.01093	-0.20016	0.06372
lnDEP	0.06471	0.43229	0.00616	0.96783	-0.15936
dlnDEP/dt	-0.05199	-0.26277	0.29445	0.10654	0.26932
lnLD	-0.29264	0.27595	-0.13082	0.33754	-0.17987
dlnLD/dt	-0.01270	0.14089	0.02977	0.24563	-0.11760
$\ln COM\text{-}B_1$	0.18112	0.30118	0.01389	0.80915	-0.02622
$d\ln COM\text{-}B_1/dt$	-0.15588	-0.08865	0.08003	0.14093	0.47892
$\ln COM\text{-}B_2$	-0.29612	0.49647	-0.09257	0.92287	-0.16037
$d\ln COM\text{-}B_2/dt$	-0.18359	-0.17249	0.15743	0.10480	0.65088
lnCOM-NB	0.09599	0.63734	-0.23115	0.79758	-0.28464
dlnCOM-NB/dt	0.07829	-0.05314	0.17656	-0.19384	0.27888
lnCONC	-0.21872	-0.09801	-0.16882	-0.32964	-0.07695
dlnCONC/dt	0.13240	0.18224	-0.15025	-0.08753	-0.50011
lnBHC	0.54364	-0.01802	0.10618	-0.00359	0.03957
dlnBHC/dt	0.14455	0.17181	-0.02155	-0.10311	0.16948
DPROF	-0.25573	0.47893	-0.16101	0.29751	-0.27679
BB_1	-0.28243	0.00446	0.11750	0.12811	0.01109
BB_2	-0.34963	0.27010	-0.31338	-0.01911	-0.15659

lnPROF	d1nPROF/dt	lnDEP	d1nDEP/dt	lnLD	d1nLD/dt	$lnCOMB_1$
1.00000						
0.60864	1.00000					
-0.21670	-0.13302	1.00000				
0.17321	0.02745	0.13646	1.00000			
-0.55586	-0.36662	0.29022	-0.02555	1.00000		
-0.13159	-0.10267	0.25931	0.01323	0.27872	1.00000	
-0.04838	-0.01257	0.80864	0.16505	0.12031	0.22621	1.00000
0.03683	-0.06328	0.10682	0.38581	0.06749	0.11765	0.24220
-0.36606	-0.30164	0.89076	0.08305	0.44010	0.22134	0.68869
0.08298	-0.00555	0.05948	0.41613	0.04775	0.00992	0.20134
-0.26663	-0.14463	0.76324	-0.05095	0.25247	0.13142	0.66591
0.07951	0.13612	-0.20438	0.13325	-0.16573	-0.04519	-0.12705
-0.16572	-0.10896	-0.31936	-0.17722	0.25101	-0.12094	-0.60553
-0.09260	-0.08810	-0.06967	-0.29380	0.07075	0.02734	-0.22716
0.17131	0.27891	0.02847	0.00581	-0.32960	0.06671	0.27525
0.17869	0.13988	-0.13879	0.04133	-0.21525	-0.13635	-0.05378
-0.99239	-0.59423	0.23233	-0.16903	0.55878	0.14111	0.07936
-0.41811	-0.33229	0.05481	0.00865	0.38216	0.01489	-0.14661
-0.02214	-0.05967	-0.00619	-0.12091	0.11708	0.03746	-0.12024

Table C1 (Continued)

	dlnCOMB$_1$/dt	lnCOM-B$_2$	dlnCOM-B$_2$/dt	lnCOM-NB	dlnCOM-NB/dt
lnPOP					
lnURB					
dlnURB/dt					
lnRS					
dlnRS/dt					
lnPROF					
dlnPROF/dt					
lnDEP					
dlnDEP/dt					
lnLD					
dlnLD/dt					
lnCOM-B$_1$					
dlnCOM-B$_1$/dt	1.00000				
lnCOM-B$_2$	0.15996	1.00000			
dlnCOM-B$_2$/dt	0.69933	0.12988	1.00000		
lnCOM-NB	-0.01083	0.73338	-0.05962	1.00000	
dlnCOM-NB/dt	0.13998	-0.24192	0.12629	-0.10468	1.00000
lnCONC	-0.04618	-0.21447	-0.10598	-0.27247	-0.04339
dlnCONC/dt	-0.48689	-0.09772	-0.61705	0.04594	-0.03511
lnBHC	-0.02240	-0.22400	-0.03500	0.02074	0.01124
dlnBHC/dt	0.14737	-0.16730	0.13436	-0.00178	0.25109
DPROF	-0.02217	0.38518	-0.07002	0.28085	-0.06831
BB$_1$	-0.02474	0.23171	-0.03696	-0.03299	-0.04049
BB$_2$	0.04726	0.13622	-0.02637	0.11509	-0.05314

lnCONC	dlnCONC/dt	lnBHC	dlnBHC/dt	DPROF	BB_1	BB_2
1.00000						
0.27252	1.00000					
-0.36592	-0.09420	1.00000				
0.00244	-0.02883	0.22034	1.00000			
0.13479	0.07814	-0.16954	-0.17682	1.00000		
0.27821	0.11349	-0.61301	-0.29953	0.40433	1.00000	
0.13420	-0.00677	0.01039	0.18302	0.03069	-0.51632	1.00000

Table C2. Total correlation matrix for demand model II

	lnPOP	dlnURB/dt	dlnRS/dt	dlnDEP/dt	dlnLD/dt	$\ln COM\text{-}B_2$
lnPOP	1.00000					
dlnURB/dt	0.19278	1.00000				
dlnRS/dt	0.03127	0.45333	1.00000			
dlnDEP/dt	-0.05199	0.29445	0.26932	1.00000		
dlnLD/dt	-0.01270	0.02977	-0.11760	0.01323	1.00000	
$\ln COM\text{-}B_2$	-0.29612	-0.09257	-0.16037	0.08305	0.22134	1.00000
$d\ln COM\text{-}B_2/dt$	-0.18359	0.15743	0.65088	0.41613	0.00992	0.12988
lnCONC	-0.21872	-0.16882	-0.07695	-0.17722	-0.12094	-0.21447
dlnCONC/dt	-0.13240	-0.15025	-0.50011	-0.29380	0.02734	-0.09772
lnBHC	0.54364	0.10618	0.03957	0.00581	0.06671	-0.22400
dlnBHC/dt	0.14455	-0.02155	0.16948	0.04133	-0.13635	-0.16730
DPROF	-0.25573	-0.16101	-0.27679	-0.16903	0.14111	0.38518
BB_1	-0.28243	0.11750	0.01109	0.00865	0.01489	0.23171
BB_2	-0.34963	-0.31338	-0.15659	-0.12091	0.03746	0.13622

dlnCOM-B_2/dt	lnCONC	dlnCONC/dt	lnBHC	dlnBHC/dt	DFROF	BB_1	BB_2
1.00000							
-0.10598	1.00000						
-0.61705	0.27252	1.00000					
-0.03500	-0.36592	-0.09420	1.00000				
0.13436	0.00244	-0.02883	0.22034	1.00000			
-0.07002	0.13479	0.07814	-0.16954	-0.17682	1.00000		
-0.03696	0.27821	0.11349	-0.61301	-0.29953	0.40433	1.00000	
-0.02637	0.13420	-0.00677	0.01039	0.18302	0.03069	-0.51632	1.00000

Table C3. Total correlation matrix for affiliation model I

	lnURB	SMSA	lnKSTCK	RR	EXAM
lnURB	1.00000				
SMSA	0.70887	1.00000			
lnKSTCK	0.46261	0.28674	1.00000		
RR	0.06258	-0.18215	0.28428	1.00000	
EXAM	0.21446	0.19740	0.17255	-0.13721	1.00000
LAW	-0.02256	0.07930	-0.06418	-0.07166	-0.02250
APPR	0.06014	-0.02854	0.18004	0.16818	-0.18472
lnPOP	0.48292	0.50902	0.07545	-0.32351	0.16052
BHC	0.03967	0.09861	-0.03627	-0.00267	0.03218
BB_1	0.05529	0.00092	0.23381	0.11952	-0.05044
BB_2	-0.03996	-0.16647	0.09706	0.20690	-0.29670

LAW	APPR	lnPOP	BHC	BB_1	BB_2
1.00000					
-0.15292	1.00000				
0.24154	-0.12633	1.00000			
-0.10134	-0.05456	0.04784	1.00000		
-0.21248	0.34759	-0.27547	-0.07796	1.00000	
-0.05891	-0.00463	-0.31909	-0.01183	-0.28148	1.00000

Table C4. Total correlation matrix for affiliation model II

	lnURB	SMSA	RR	EXAM	LAW
lnURB	1.00000				
SMSA	0.68777	1.00000			
RR	0.05102	-0.16895	1.00000		
EXAM	0.17236	0.18561	-0.15026	1.00000	
LAW	-0.14031	0.01942	-0.01341	-0.09455	1.00000
$APPR_1$	-0.15757	-0.16723	0.18021	-0.19963	-0.04618
$APPR_2$	0.08570	-0.00730	0.07453	-0.14589	-0.16219
lnPOP	0.39066	0.46277	-0.28568	0.09465	0.16018
BHC	0.04256	0.14501	-0.04861	0.07621	-0.04267
BB_1	0.13883	0.05403	0.08554	0.02039	-0.17195
BB_2	0.06814	-0.07874	0.18785	-0.29772	0.02029

$APPR_1$	$APPR_2$	lnPOP	BHC	BB_1	BB_2
1.00000					
0.02028	1.00000				
-0.25351	-0.09752	1.00000			
0.00618	-0.09369	0.09572	1.00000		
0.43738	0.35491	-0.20352	-0.11716	1.00000	
0.13858	-0.03378	-0.16806	-0.05719	-0.37086	1.00000

Table C5. Total correlation matrix for national supply model

	lnPOP	dlnURB/dt	lnRS	dlnRS/dt	lnBSQ	dlnDEP/dt
lnPOP	1.00000					
dlnURB/dt	-0.33419	1.00000				
lnRS	0.52479	-0.14408	1.00000			
dlnRS/dt	-0.28290	0.48572	-0.12756	1.00000		
lnBSQ	0.18612	-0.08723	0.68277	-0.21902	1.00000	
dlnDEP/dt	-0.20150	0.37079	-0.16495	0.30402	-0.22065	1.00000
lnPROF	-0.51191	0.40344	-0.40563	0.35325	-0.33830	0.31170
dlnPROF/dt	-0.48070	0.28884	-0.23021	0.19864	-0.16407	0.11255
lnLD	0.30363	-0.43268	0.37901	-0.25417	0.11041	-0.17299
dlnLD/dt	0.19632	-0.03564	0.11953	-0.12934	0.16399	-0.03092
dlnCOM-B_1/dt	0.13166	0.00599	0.24760	0.04607	0.15139	0.38917
AFFIL	-0.10883	-0.01747	-0.14696	0.06078	-0.08451	-0.04778
APP-K	-0.06371	0.09297	0.39561	0.06054	0.25555	-0.09575
lnKSTCK	0.45720	-0.06713	0.35098	-0.10269	0.29313	-0.07880

lnPROF	dlnPROF/dt	lnLD	dlnLD/dt	dlnCOM-B$_I$/dt	AFFIL	APP-K	lnKSTCK
1.00000							
0.61857	1.00000						
-0.47297	-0.22587	1.00000					
-0.19424	-0.05642	0.29998	1.00000				
-0.14968	-0.16708	0.14751	0.17999	1.00000			
-0.02339	-0.00627	-0.04420	-0.12933	0.00171	1.00000		
0.04282	0.19583	0.21160	-0.00935	-0.04038	-0.11928	1.00000	
-0.36392	-0.31905	0.20181	0.22243	0.16980	0.10558	-0.26346	1.00000

Table C6. Total correlation matrix for state supply model

	lnPOP	dlnURB/dt	lnRS	dlnRS/dt	lnBSQ	dlnDEP/dt
lnPOP	1.00000					
dlnURB/dt	0.13691	1.00000				
lnRS	0.65837	0.22853	1.00000			
dlnRS/dt	0.09999	0.46707	0.04789	1.00000		
lnBSQ	0.20010	0.01876	0.66964	-0.19167	1.00000	
dlnDEP/dt	-0.05714	0.27142	-0.11027	0.42651	-0.30808	1.00000
lnPROF	-0.26176	0.09175	-0.39886	0.16494	-0.51466	0.27442
dlnPROF/dt	-0.32171	-0.00713	-0.22535	-0.03337	-0.24465	0.08501
lnLD	0.34673	0.01185	0.50261	-0.04032	0.40230	0.00456
dlnLD/dt	0.25170	-0.08317	0.22663	-0.23201	0.24146	-0.16888
dlnCOM-B_1/dt	0.10455	0.22543	0.31800	0.43362	0.18127	0.26181
AFFIL	-0.21370	-0.11017	0.00452	-0.24558	0.18388	-0.06690
APP-K	0.07760	0.29484	0.45492	0.13364	0.29146	0.04243
lnKSTCK	0.51976	-0.08749	0.23653	-0.01715	0.12877	-0.01824

lnPROF	d1nPROF/dt	lnLD	d1nLD/dt	d1nCOM-B_1/dt	AFFIL	APP-K	lnKSTCK
1.00000							
0.56842	1.00000						
-0.44422	-0.30315	1.00000					
-0.17533	-0.05239	0.46240	1.00000				
-0.10100	-0.13200	0.18319	0.18421	1.00000			
-0.21533	-0.03096	0.05001	-0.08145	-0.06459	1.00000		
-0.03280	0.00233	0.19658	-0.09623	0.05326	-0.06289	1.00000	
-0.25035	-0.26517	0.39192	0.26388	0.13964	-0.25030	-0.22762	1.00000