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THE IMPACT OF BRANCH BANKING ON SERVICE ACCESSIBILITY

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Branch Banking and Service Accessibility

The relative merits of branch banking have been the subject of a significant amount of investigation in recent years. The reasons for such analysis include: the general acceptance of branching outside of, and increased acceptance within the United States, the development of a variety of devices that are undermining the prohibition of interstate branching, the legislative autonomy of individual states in determining the extent of branching, and the inconclusiveness of many past studies evaluating the policy implications of branching. In spite of the controversy, the extent of branching has expanded in recent years through developments such as liberalization of state branching statutes, interstate activity arranged through regional agreements of state legislatures, and FDIC-sanctioned "emergency" mergers.

Probably the single most meritorious feature associated with branching is improved customer service. An important element of this service is convenience generated as a result of the increased number of banking facilities. While a number of reasons can be given for expecting improved convenience in the presence of branching, a number of past studies addressing this issue have produced conflicting findings.

Given the recent increase in the level of branching activity, and the potential for forthcoming branching legislation at the national level, it is important that the impact of branching be thoroughly understood. Unfortunately, past studies have not provided adequate information, as they have measured convenience erroneously and have made assumptions concerning demographic and economic factors that could bias their findings. Additionally, most existing studies are based on a limited sample and are somewhat dated.

The purpose of this study is to reexamine the impact of branching on the accessibility of banking services, measured as the proximity of services (fa-

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cilities) to the customer. The major finding is that once economic and demographic factors are accounted for, branching restrictions are found to have significantly decreased the level of service accessibility in both metropolitan and rural areas. If this relationship continues to exist, future relaxation of branch restrictions should enable banks to better serve their customers.

Section I discusses the reasons for expecting improved service accessibility with less restricted branching and critiques the relevant literature on the subject. In Section II the model to be tested is presented, a justification is provided for the variables included in the analysis, and the data sources are presented. The empirical results are discussed in Section III. The final section summarizes the findings, offers policy recommendations, and outlines directions for future research.

I. Branching and service accessibility

The arguments for expecting less restrictive branching to result in improved service accessibility are numerous. A particular market may not justify the introduction of a new bank on the basis of cost, but be capable of supporting a branch office. With unit banking, an improvement in accessibility requires the introduction of a new bank. Economies of scale, the ability to diversify risk, regulatory barriers such as capital requirements and charter restrictions, and the ability to specialize in particular services are all reasons that the demand for banking services can be met more readily with branch offices than with newly chartered banks. However, the relationship between branching and service accessibility is ultimately an empirical question.

The findings from previous studies have been mixed. Studies conducted during the 1960s found that in branching states, the population-to-bank office ratio was substantially lower than that in non-branching states. Additionally, facilities were found to be more plentiful in smaller towns when branching was allowed ([2], [5], [6], and [7]). However, more rigorous analyses by Jacobs [9], and Lanzillotti and Saving [11], which sought to isolate the effect of branching from that of demographic differences among states, found little or a perverse relationship between branching restrictions and service availability. Savage and Humphrey [13] concluded that branching had little impact on service accessibility prior to 1970, but by 1975 a statistically significant difference in accessibility existed in statewide branching states compared to unit branching states. More recently, Seaver and Fraser ([14], [15]) have separately analyzed rural and metropolitan markets for 1970. They found that branching does result in more facilities in metropolitan areas. However, one of the most commonly acclaimed benefits of branching—improved accessibility in rural areas—was not supported.

Because the existing studies are somewhat limited, dated, and have generated mixed results, they are of limited value from a current public policy perspective. Methodological problems also exist. While the studies by Jacobs, Lanzillotti and Saving, and Savage and Humphrey took demographic differences into account, there use of statewide data has implicitly imposed rather restrictive and unrealistic assumptions on the data. Use of the state as the unit of observation implies homogeneity of the population distribution, office distribution, and the demand for banking services. Such homogeneity obviously misrepresents the spatial distribution of the demand for banking services and may generate misleading findings.[1]

Lanzillotti and Saving also used a dubious measure of population density—the ratio of non-agricultural employment to total employment.[2] While Seaver and Humphrey's more direct measure—population per square mile—is preferred, it may fail to capture variations in the density population within larger areas. For example, the same city placed within different sized geographic areas could generate significantly different density measures although the true densities for evaluating bank service accessibility are equivalent. This problem is compounded by the use of statewide data.

As mentioned above, Seaver and Fraser improved upon previous studies by narrowing the size of the unit of observation and using the county as the unit in rural areas and the SMSA in metropolitan areas. They emphasized the need to distinguish between rural and metropolitan areas, but chose to do so by analyzing each separately and utilizing different analytical techniques. Conceptually, it would be preferable to include both rural and metropolitan areas in the analysis and to distinguish between them using measurable characteristics.

The major shortcoming of past studies is the variable used to measure the level of service or accessibility. Most studies have used either the number of offices, or population per office. However, neither adequately measures service accessibility, which is a function primarily of the time, distance and cost required to obtain banking services. The appropriate measure translates to customer convenience; and the number of offices per capita is probably a poor proxy.[3] For example, utilizing this measure, an increase in the population-to-office ratio would imply a decline in service accessibility. But an actual deterioration would occur only in the extreme case where the population rise resulted in more congestion, significantly longer lines, or the refusal of customers. Insofar as floor space, the number of tellers, etc., can be expanded at a given location, this need not occur. Thus, although large metropolitan areas generally have high ratios of population to banking offices, few would argue that facility accessibility is inadequate.[4] To the contrary, throughout most metropolitan areas there are a large number of offices within walking or short driving distance. The population per office

measure could be even more biased in rural areas. In a sparsely populated area, the presence of a single office over a large geographic area would result in a low population-to-banking office ratio. However, few would argue that the accessibility of banking services was superior to that in the larger cities.

A preferred measure of service accessibility would incorporate the characteristics of time, distance, and cost incurred in obtaining financial services. Absent a direct measure of time and cost, some gauge of average distance traveled would be an appropriate proxy. Assuming a uniform distribution of bank offices and bank customers, there is an inverse relationship between distance traveled and the number of offices per unit of area. Thus, accessibility can be measured as the number of banking facilities per square mile. While this measure is a significant improvement over previously used measures, it has some similarities in that it implicitly assumes a uniform distribution of offices and customers within the unit of observation. By specifying variables to distinguish the effect of spatially concentrated demand from that of branching restrictions, and by utilizing county level or, when possible, individual banking service areas as the unit of observation, the distribution problems are further minimized.

II. Methodology

To test whether branching affects service accessibility, the impact of other factors must first be isolated. Assuming firms attempt to supply facilities based on customer demand, the factors influencing the level of accessibility include customer demand, and the degree of regulatory stringency imposed by banking authorities. Thus,

(1) $A = f(Q_d, R)$ where

A is the availability of banking services,
Q_d is the demand for services, and
R is the degree of regulatory stringency.

The demand for banking services, Q_d, is a function of particular economic and demographic factors affecting the region being evaluated. For simplicity, assume

a. bank output can be measured as a single index, Q;

b. population is uniformly distributed within the geographic unit of observation;

c. income is uniformly distributed among the population within the geographic unit of observation and the quantity of banking services demanded by each consumer is proportional to his income;

d. transportational cost are proportional to distance in all direction; and

e. competition prevails producing prices and quantities of output equal at each banking office.

Thus, consumers maximize utility by purchasing banking services at the nearest facility. Assume also that the cost of providing services can be described by

(2) $C = a - bQ + cQ^2$

where a, b, and c are parameters. The function implies some indivisibility in the provision of banking offices and a "u" shaped average cost curve. Assuming profit maximization under competitive conditions, offices will be established until the price of services, P_e, equals average cost in long run equilibrium, i.e.,

(3) $P_e = AC = a/Q - b + cQ.$

Thus, the cost minimizing output will be

$$\frac{dAC}{dQ} = 0 \quad \text{or}$$

(4) $Q^* = \sqrt{a/c}$

Since the quantity of banking services was assumed proportional to customer income, the quantity of services demanded within the service area of each office is[5]

(5) $Q = kYDR$

where k is a constant, Y is per capita income, D is population per square mile, and R is the area of each banking office's service area. Thus, substituting from the above equations,

(6) $\sqrt{a/c} = kYDR$ or

$R = \sqrt{a}/kYD\sqrt{c}$ which is the optimal size of each office's service area. Given that customers desire to minimize transportation cost, the number of offices, N, is

(7) $N = G/R$ where G = the area of the geographic unit of observation.

Collecting terms,

(8) $N = GkYD\ \sqrt{c}\ /\sqrt{a}$

(9) $N/G = A = kYD\sqrt{c}\ /\sqrt{a}$ where A is a measure of service accessibility--offices per area--thus

(10) $A = \alpha_0 DY$ where $\alpha_0 =$ k $\sqrt{c}\ /\sqrt{a}$

and k, c, and a are constants.

Therefore, absent regulation, and given the initial assumptions, the number of banking offices per geographic area is a multiplicative function of population density, D, and per capita income, Y.

However, the initial assumptions obviously over-simplify the true situation. Uniform income and population densities do not exist, although the smaller the unit of observation the closer the assumptions approximate reality. Similarly, transportation costs are not proportional in all directions, and competition is unlikely to eliminate all differences in service price and quality. Thus, differences between geographic areas should be accounted for. The pertinent variables influencing the demand for service accessibility are, therefore,

(11) $Q_d = g(P, D, Y)$ where

P is population,
D is the distribution of the population within the unit of
observation (density),
Y is per capita income,
$g_P, g_Y > 0$, and $g_D < 0$.

The degree of regulatory stringency includes the existing restrictions on the ability to open new banking facilities, S, and, the present topic, the ability of existing banks to branch into new areas, B. Thus,

(12) $R = h(S,B)$ where

S is the state charter approval rate,
B is a binary = 1 when branching is allowed, 0 otherwise.

Combining terms,

(13) $A = f\ [g(P,D,Y), h(S,B)]$ or

(14) $A = k(P.D,Y.S.B)$ where

$k_P, k_Y, k_S, k_B > 0$ and $k_D < 0$.[6]

The equation estimated is therefore,

(15) $A = \ln \alpha_0 + B \ln \alpha_1 + \alpha_2 \ln D + \alpha_3 \ln Y + \alpha_4 \ln P + \alpha_5 \ln S$

The data utilized are from three primary sources: demographic data are from the City-County Data Files of the Bureau of the Census, financial data are from the FDIC's Summary of Deposits, and state charter approval rates are from published records of the Conference of State Bank Supervisors. A banking office was defined as a bank or branch at which both deposit and loan services are available.[7] County level data for the 48 continental states were collected. Per capita income was used to avoid collinearity problems with population levels. The percent of population in urban areas was included to capture population distribution or concentration within the unit of observation. This is considered preferable to population per square mile because it better accounts for the population distribution within the service area. Ideally, a true measure of density could be measured at various distances from each bank office. However, the use of county level data rather than data for the entire state goes far toward eliminating the problem posed by variation in population density that characterized most past studies. The state charter approval rate is an average over the three previous years. State branching status was obtained from Federal Reserve publications. Limited branching states generally limit branching to the head-office county, the head-office and contiguous counties, or a specified range from the head office (e.g., 25 miles). However, past studies have not found the extent of branching permitted (i.e., limited vs. statewide) to be important in determining service accessibility. Thus, in the initial analysis, no distinction is made between limited and statewide branching.[8] This assumption is later dropped and separate binary variables were included to isolate the effect of different degrees of branching.

III. Empirical Findings

Ordinary Least Squares estimates of equation 15 in double-log form for 1980 are presented in Table 1.[9] The results indicate that the demographic factors are all significant at the five percent level and have the expected signs. A 10 percent rise in population increases service accessibility by nearly seven percent. A 10 percent increase in per capita income increases accessibility by four percent. The branching binary is highly significant, suggesting that branch restrictions do indeed reduce bank service accessi-

bility. Similarly, the charter approval rate has the expected positive influence on accessibility.[10] Thus, entry deterrence via a stringent charter approval process and branching restrictions do impair service accessibility. The impact is quite substantial and occurs in both rural and metropolitan areas.[11]

Table 1
Bank Service Accessibility: Offices Per Square Mile
-All Counties-

Constant	Population (P)	Population Density (D)	Per Capita Income (Y)	Branching (B)	Charter Approval Rate (S)	
−16.430	.783	−.006	.400	.496	.123	R^2=.62
(27.7)	(47.0)	(4.4)	(5.9)	(13.6)	(2.0)	F = 976.2

Absolute t values are in parentheses.

Projections obtained using mean values for the independent variables indicate that counties in which branching is allowed show a significant superiority in accessibility of banking services. After accounting for demographic differences, the number of offices per square mile in the average market is approximately 20 percent greater than the sample mean when branching is allowed. Alternatively, the level of service accessibility is nearly 65 percent superior in territories allowing some form of branching.[12]

Given the above findings, it would be interesting to see whether the results are robust with respect to different types of banking markets and whether the data are stable over the entire sample—i.e., are similar results derived utilizing a subsample of the observations? An additional hypothesis that can be tested concerns the differential impact of statewide and limited branching restrictions. These issues are considered below.

Rural vs. Metropolitan Area Impact-

The findings here are in direct contrast with most past studies which found that service accessibility in rural areas was not improved by branching. To insure that the results found here are not overly influenced by observations on metropolitan markets, and that they are indeed applicable to rural areas, equation (15) was reestimated using data from rural counties only.[13] The results, reported in Table 2, are generally consistent with those found using the entire sample. While the charter approval rate was not found to be important in explaining the accessibility of banking services in rural areas, the remaining variables explain nearly half of the variation. Most impor-

tant for the current analysis is the positive influence of branching on service accessibility in rural counties.

Table 2: Bank Service Accessibility -Rural Areas-

Constant	Population (P)	Population Density (D)	Per Capita Income (Y)	Branching (B)	Charter Approval Rate (S)	
−15.723	.792	−.006	.320	.428	.058	R_2 = .44
(19.8)	(28.7)	(4.0)	(3.9)	(10.3)	(.79)	F = 369.7

Absolute t values are in parentheses.

The results suggest branching improves accessibility by nearly 18 percent in the average rural market. Alternatively, when comparing rural areas in which branching is allowed with those having only unit banks, service improves by 53 percent. This similarity with the previous estimates suggests that the positive influence of branching on service accessibility is not excessively influenced by metropolitan area observations.[14]

Modified Bank Service Area Measure-

The analysis above assumes that counties are the appropriate unit of observation. While any reduction in the size of the geographic subdivision would be an improvement over statewide analysis, it is not obvious that the county borders coincide with service market areas. Thus, it is not obvious that the county is the optimal unit of observation. The optimal unit would be small enough to minimize problems with differences in population density, without being so small that many residents would bank in other areas. Although perhaps a close approximation to the optimal unit of observation in rural areas, the county may be smaller than optimal for many metropolitan areas. Thus, an attempt was made to estimate the impact of branching using county observations in non-metropolitan areas and SMSA observations in metropolitan areas. This would be the preferred unit of observation if consumers in metropolitan areas commonly travel to the adjoining counties to conduct business, including banking.[15] The results from reestimation of the original model with the redefined bank service areas are presented in Table 3. The state charter approval rate was omitted from the equation because many of the SMSAs cross state lines.[16] The results again indicate that branching areas are characterized by superior service accessibility. Although the income variable becomes insignificant, the other variables are significant and have the expected influence, and the co-

efficient of the branching binary suggests a 55 percent improvement in service accessibility for customers in regions characterized by branching.

Table 3
Bank Service Accessibility
-Modified Service Areas-

Constant	Population (P)	Population Density (D)	Income (Y)	Branching (B)	
−13.039	.628	−.001	.204	.450	$R_2 = .53$
(20.4)	(34.8)	(.68)	(2.8)	(11.1)	$F = 738.6$

Absolute t values are in parentheses.

Impact of Limited vs. Unlimited Branching-

Given that the preceding results consistently suggest that branching results in improved service accessibility, the analysis can be taken a step further to determine the impact of the specific type of branching restriction. Most past studies have found little difference in accessibility between states permitting limited branching and those permitting statewide branching. This conclusion seems somewhat curious given the institutional characteristics of limited branching restrictions. For example, home-office protection laws are prevalent in limited branching states. Additionally, limited branching restrictions restrict expansion to a specific geographic region. While statewide branching territories may still place restrictions on expansion, the barriers are probably, on average, less of a deterrent to establishing new facilities. Thus, one would expect customers in statewide branching states to be better served than those in limited branching areas. The reason for this is that banks based in metropolitan areas allowing statewide branching may also enter distant rural markets as well as other metropolitan markets.

Utilizing the notation used previously, equation (14) becomes

(14′) $A = j(P, D, Y, S, LB, SWB)$ where

log (LB) is a binary variable = 1 in limited branching states, 0 otherwise,
log (SWB) is a binary = 1 in statewide branching states, 0 otherwise;
with $'j_{LB} > 0$, $'j_{SWB} > 'j_{LB}$.

The results, reported in Table 4, indicate that countries characterized by either statewide or limited branching legislation have greater service accessibility then counties in unit banking states. Both branching binaries are

positive and significant at the 5 percent level. Quite surprisingly, however, the coefficient on the limited branching binary is significantly larger than that on the statewide variable. This suggests that, once demographic and demand differences are accounted for, service accessibility is greater in limited branching markets than in the less restricted statewide branching regions.[17]

The reasons for this result are not obvious. One possible explanation is that, because of ongoing changes in branching laws, the banking system is in disequilibrium and adjustments are continuing. Only after the adjustment process is over will the full impact of unlimited branching be realized. This possibility is suggested by the fact that unit states have had their legislation in place, on average, longer than branching states.[18] Additionally, all recent legislative changes affecting branching status have been to allowed some form of branching where it was prohibited or to liberalize it where it was already permitted. However, most states with unrestricted branching have at one time had limited branching status. Less accessibility in statewide branching areas implies that accessibility has deteriorated after restrictions were lifted.

An alternative explanation of this finding is that banks in limited branching regions tend to introduce an excessive number of offices to protect or "secure" their positions in the local market. The local market is easier to protect by this "space packing" behavior because the cost to a competitor of entering a new market (de novo entry) will be greater than the cost to an existing local bank which can expand by branching. By introducing a number of new offices the potential benefits to new entrants decrease further. Thus, with limited branching, offices may be opened almost exclusively to deter entry by de novo banks. Potential entrants would then view the potential market share as being too small. If banks are allowed to branch throughout a larger region (e.g., statewide) the cost of entering a particular geographic market would be lower. Existing banks may still open facilities to protect their local markets, but would not expect to be as successful at curtailing entry over the larger geographic area. Thus, banks may consider new branches or markets based on more standard economic criteria. Instead of simply flooding the local market, bank management would evaluate market opportunities and make decisions based on the viability of the individual office.[19] Moreover, once wider branching is allowed, some banks may close offices opened only for entry deterrence purposes and search out new, profitable markets. However, it is not obvious that those responses can explain the magnitude of the difference in the branching coefficients in Table 4.

Table 4
Bank Service Accessibility: Separating Statewide and Limited Branching Impacts

Constant	Population	Population Density	Income	S	LB	SWB	
−18,383	.785	−.008	.596	.333	.702	.088	$R^2 = .64$
(31.2)	(48.7)	(5.8)	(8.8)	(5.3)	(18.5)	(2.0)	F = 906.7

Absolute t values are in parentheses.

IV. Summary and Conclusions

The purpose of this paper has been to test the impact of branching on the accessibility of banking services—measured as the number of branch offices per square mile. The findings consistently indicate that accessibility is improved when branching is allowed. In fact the improvement is quite substantial—holding demographic factors constant, branching increases the number of banking offices per square mile by 65 percent.

In contrast to previous findings, the results held true for both metropolitan and rural areas. Thus, the benefit perhaps most commonly held to be associated with branching—improved service accessibility in rural areas—is supported. The results serve to support recommendations for liberalizing branching legislation at the state level. While direct quantitative extrapolations of the effects on service accessibility of interstate branching cannot be make, the results tend to support interstate branching. However, many factors other than convenience would be impacted by interstate branching and must also be considered.

A surprising result, and one requiring additional research, was that limited branching apparently resulted in more offices per square mile than did unlimited branching. This may result from market preemptive behavior in which banks saturate local markets with branches in order to lower the potential profitability of new entrants. This type of behavior is well documented in the industrial organization literature and is likely to be more prevalent in areas, such as limited branching states, where the number of potential entrants is small and the feasibility of deterring entry is high. To the extent that it is prevalent in the banking industry, further relaxation of branching restrictions may avoid "unnecessary" office expansion.

[1] Jacobs was well aware of this shortcoming, see [9] page 340, but accepted it because of "the low level of... knowledge as to the correct definition of a banking market". Although the knowledge of precise markets may be unknown for studies evaluating service accessibility, a local region measure is expected to be more applicable.

[2] Lanzillotti and Saving [11] were forced to use this questionable proxy because of data limitations. They were aware of its limitations.

[3] That distance traveled to obtain service has not been utilized in most previously studies is somewhat surprising given that past authors have essentially supported it as the preferred measure. Seaver and Fraser ([14] p. 154, fn.) stated. . . "the term availability of banking services is meant to describe the proximity of services to the customer. . . . . An increase in the number of offices in a given economic environment would be expected to increase the availability of banking services . . ."It would appear that number of offices per unit of area would better fit this definition than their measure, population per office. See Mote [12] for an early discussion of distance traveled as the appropriate measure of bank service level.

[4] In fact, the statistics suggest just the opposite. Counties including San Francisco, Chicago (Cook), Philadelphia, and St. Louis have office to population ratios *below* the national average. There are over 500 counties with ratios higher than New York. At the other extreme, rural counties which are sparsely populated often have a relatively high ratio (e.g., Jones, South Dakota has one of the highest in the country). This also shows the inadequacy of statewide observations. Pertinent local measures could be obliterated when aggregating to the state level.

[5] The standard, although heroic assumption of homogenous demand density within the geographic unit of observation significantly simplifies the analysis. It results in the 'proportionality of transportation cost' assumption influencing only the consumers choice of banking facility, the closest, and not the quantity demanded by each consumer. Dropping this assumption, the transportation cost would be incorporated by the consumer into a total price resulting in fewer services being demanded by customers located further away from the bank facility. This would cause the optimal-equal-sized-institutions providing the service to be smaller. However, this would not impact the direction of influence of the variables discussed in the text.

More rigorously, in determining P_e both production and transportation cost should be included in deriving the total cost and optimal output level, Q*, associated with minimum "total" average cost. This occurs where the absolute value of the slope of the two average cost curves (production and transportation) are equal. If average transportation cost is an increasing function of output, a realistic assumption, the minimum of "total" cost will be at a smaller output level than minimum production cost.

[6] Coefficients on regulatory stringency measures are expected to be positive because of the manner in which they are defined, i.e., S is the approval rate, and B is one if branching *is* allowed, zero otherwise.

[7] The exclusion of counties without offices, the merging of independent cities into the appropriate counties, and merging data from the Census and FDIC data resulted in 3018 county level observations. Five years of data were employed to

obtain an approval rate for Rhode Island because of a lack of sufficient information for the previous three years.

[8] See Seaver and Fraser [14] Gilbert [5]; and Savage and Humphrey [13] for a discussion of results indicating that the distinction between statewide and limited restrictions is of little importance. However, Wood [18] found substantial differences.

[9] The decision to utilize a double log form equation was based on the existence of a quadratic cost function and profit maximizing firm behavior.

[10] There is no reason to expect the degree of regulatory stringency at the Federal level to differ across political boundaries, however, state differences will exist. There is a legitimate concern about the consistency of the S variable across states. Perhaps after a learning period, applicants in some states become aware of the requirements of the state banking authorities and will file for charters only when nearly certain of acceptance. This could bias the approval rate upward and, if this level of knowledge is not constant across states, could cause it to be a poor measure of regulatory stringency. Taking a three-year average could partially offset this. To test for this potential bias the reported regressions were reestimated without the S variable and the impact was marginal. No deterioration, of significance level sign change, or decline in explanatory power occurred. This was the case for the regressions shown later in the study also. While not reported, these regression results are available from the author on request.

[11] Data adjustments were required because of the format in which Census and FDIC data are presented. Independent city data for St. Louis, Baltimore, and a number of Virginia cities were combined with the appropriate county. SMSA areas were also aggregated across SMSAs in Virginia. Although the results were robust with respect to the inclusion or exclusion of these adjustments, they are considered necessary for consistency. Tests for homoskadasticity of the error terms could not be rejected. There is no evidence to suggest that the results are driven by influential observations, or are significantly impacted by multicollinearity. Utilizing the Belsley-Kuh-Welsch [3] single row deletion technique to identify influential observations, 87 observations (2.8 percent) were identified as leverage points and falling outside of the acceptable range of their COVRATIO measure (suggested as the most comprehensive diagnostic measure, p. 48). Reestimation with these observations deleted resulted in very similar findings, i.e., each coefficient had similar magnitude and standard error. Casual inspection for multicollinearity suggests there is no significant problem and the largest correlation coefficient, .60, was that relating population density to population. However, correlation coefficients may not be a good indicator of potential multicollinearity problems ([3], p. 92). For a more detailed analysis, condition indexes and variance decomposition proportions were calculated and only one index was found to be above the critical value of 30 ([3], p. 156). The high variance decomposition proportions ($>.5$) associated with this index are associated with the intercept and per capita income. Auxiliary regressions found no suggestion of deteriorating collinearity. Data for 1970 was collected for comparison purposes. However, data measuring the degree of regulatory stringency (charter approval rates) were not available during this period, thus, identical regressions could not be compared. Results for 1970 excluding the stringency variable indicated similar findings (t values in parentheses):

$$\begin{array}{lccccccc} A = & -16.8 & + & .72(P) & -.005(D) & + & .59(Y) & + & .27(B) \\ & (29.1) & & (40.8) & (-3.9) & & (7.4) & & (7.8) \end{array}$$

$R^2 = .56$, $F = 941$. The 1970 estimates were also consistent with those for 1980 for the subsample regressions discussed elsewhere in this article.

[12] An alternative means to view service accessibility is to analyze the number of alternatives available from which customers may choose. An increase in the number of offices may lead to improved service accessibility, however, variety and competition will exist only if the institutions are not affiliated. Substituting the number of banking organization per square mile as the dependent variable generated results (for 1980) suggesting branching does not lead to decreases in this measure of accessibility, i.e.,

$$\begin{array}{lccccccccc} ORG = & -13.44 & + & .51(P) & - & .003(D) & + & .34(Y) & + & .16(S) & - & .03(B) \\ & (-23.2) & & (31.1) & & (-2.6) & & (5.1) & & (2.5) & & (-.76) \end{array}$$

$F = 378$
$R^2 = .39$

where t values are in parentheses. Analysis considering the number of organizations per service area (instead of the ratio) has been undertaken elsewhere and suggest that once consideration is given to the impact of changes in antitrust enforcement prior to and after the 1960 Bank Merger Act, and the adjustment period required for entry, branching does not have a measurable impact on the number of organizations. See Evanoff and Fortier [4].

[13] The contrast with the findings of Seaver and Fraser may be due to the different measure of the accessibility variable. See [14]. Rural is defined as counties not located within an SMSA.

[14] However, a Chow test rejected the hypothesis of identical functions for both rural and metropolitan areas at the 1% confidence level; $F = 26.6$ compared with a critical value of $F_{5,3008} = 3.02$. Thus, separate regressions should be considered. Results utilizing metropolitan area counties only were (t value in parentheses):

$$\begin{array}{lccccccccc} A = & -17.07 & + & .69\ (P) & -.004\ (D) & + & .55\ (Y) & + & .74\ (B) & + & .35\ (S) \\ & (15.2) & & (20.0) & (-.71) & & (4.0) & & (9.5) & & (3.2) \end{array}$$

with $R^2 = .59$, $F = 191$.

[15] In the Seventh Federal Reserve District many of the banking markets in non-SMSA areas are either counties or combinations of entire counties. For details see [1]. SMSAs, or SMSA equivalents in New England, are as defined by the Census Department. SMSAs were omitted in the few areas which had conflicting branching laws. Service area may be a more appropriate description than banking market for the present analysis.

[16] Estimates excluding SMSAs crossing state lines resulted in estimates not appreciably different from those in Table 3.

[17] While surprising, similar results were found in previous studies when the dependent variable was defined as the number of offices, or offices per capita. See [11] pp. 783-4, [15] pp. 75-77, and [18].

[18] If the system is not in equilibrium, the estimated results may be biased. If this is indeed the case, then a dynamic model may be more appropriate.

[19] Discussions with Chicago Federal Reserve Bank personnel involved with analyzing Seventh District mergers and market structure indicate that this market preemption behavior, regardless of the stand-alone viability of the individual office, is not uncommon in limited branching states throughout the district. Entry deterrence via space packing behavior has been evaluated in other industries; see [16] and [17].

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