Interstate Banking, Branching, Organization Size, and Market Rivalry

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Abstract

The 1994 Reigle-Neal Act gave multistate bank holding companies the option to convert to an interstate branch bank structure by authorizing the merger of bank subsidiaries across state lines. Over the following five year period, an increasing number of banking companies, including a number of very large ones, have done so. As a result, large companies operating through interstate branches have come to account for a significant share of deposits in many local markets and relatively little research has focused specifically on the competitive effects of this trend. This is a potentially important issue because the performance and competitive effects of large, multistate branch banks could differ from those associated with the operation of separately incorporated bank subsidiaries by multibank holding companies.

In this study, measures of competitive rivalry are constructed using Summary of Deposit data for all urban (MSA) markets in the U.S. for each year over the 1995-1999 period. Tobit models are estimated using the data pooled over the entire period to determine whether and how alternative measures of the extent to which multistate banking companies operate in the market influence the rivalry variables. The aim of the analysis is to determine if the results are sensitive to the size of multistate companies, the location of the market (home state vs. out-of-state), or the organizational form used by nonlocal competitors (interstate branches vs. bank subsidiaries). The results show a positive relationship between large multistate multibank holding company (MSMBHC) deposit share and rivalry when a simple linear specification is used. Adding a concentration-MSMBHC share interaction term to the equation reveals that the positive effect of MSMBHC share on rivalry rises with market concentration. This result is largely attributable to the behavior of MSMBHCs operating outside their home state. When the separate effects of interstate branches and out-of-state bank subs are examined, only the former is found to be significantly related to rivalry. And in these equations, the pattern of the estimated coefficients on the aggregate interstate branch deposit share variables is the same as that seen in the other equations (a positive coefficient in the absence of the interaction term, and a positive coefficient on the interaction term when it is included). These results do not change, and in fact, are typically stronger when the deposit shares are calculated using only large multistate holding companies. They also do not change greatly when markets where the identity of the top-tier firms changed are excluded or when random-effects Tobit specifications are used.

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I. Introduction

Prior to the passage of the Reigle-Neal Act in 1994, multistate banking companies generally could operate only in states where they maintained a separately chartered bank subsidiary. [1] The act authorized de novo interstate branching, but more importantly, gave multistate holding companies the option to convert to an interstate branch bank structure by authorizing the merger of bank subsidiaries across state lines.[2] Over the following five-year period, an increasing number of banking companies, including a number of larger ones, have exercised this option. For example, starting from a base of roughly zero in June1994, 168 of the 348 holding company organizations with multistate operations in June 1999 operated interstate branches. By mid-1999, aggregate total deposits in interstate branches accounted for more than half (52.2 percent) of total deposits in all offices located outside the home office state of the parent organization. Aggregate interstate branch deposits of the 25 largest banking organizations represented around 88 percent of total interstate branch deposits at this time.

Although previous studies have examined the performance and competitive implications of the expansion of multistate holding companies generally, relatively little research has focused specifically on the effects of the shift toward interstate branching. This topic merits investigation given the rapid growth of the interstate

[1] A few banking companies (8) operated interstate branches in June 1994. These were permissible under the OCC's so-called "30-mile rule" prior to Riegle-Neal.

[2] Riegle-Neal permitted interstate branching by banks through merger after June 1,1997, but allowed individual states to authorize this activity prior to this date. By April 1996, 24 states had done so. For additional details, see Holland, et.al. (1996).

branch from, and because the performance and competitive effects of interstate branching could differ from those associated with the operation of separately incorporated bank subsidiaries by multistate companies. For example, evidence shows that pure branch banking organizations tend to be more efficient than MBHC organizations, ceteris paribus.[3] If the branch banking form does confer a significant cost advantage, competition might be more intense in markets with higher levels of interstate branching. Another possibility is that large interstate branch organizations might be less willing or able to compete aggressively for retail and small business customers.[4] For example, there is some evidence that larger multi-state organizations are less likely to be heavily involved in small business lending. Such organizations also typically charge higher fees and increasingly set prices uniformly for geographic areas larger than the traditional local banking market.[5] Since interstate branches are likely to retain less local decision-making authority than separate subsidiaries, any positive or negative effects associated with these pricing patterns should be observed more clearly in markets where interstate branches are relatively more important. For example, if increases in multimarket linkages do increase the likelihood of mutual forebearance, any related anticompetitive pricing effects are likely to be more pronounced in markets where large competitors operate interstate branches.[6]

In this study, the focus is on the relationship between measures of competitive market rivalry and alternative measures of the extent to which out-of-state banking companies operate in the market through interstate branches vs. bank subsidiaries.

[3] See Whalen (1997), and Jayaratne and Strahan (1998), for example.
[4] See Berger, Demsetz and Strahan (1999).
[5] See Radecki (1998).
[6] For a discussion of linked oligopoly in the context of banking, see Whalen (1996), for example.

The main advantage of using rivalry measures in a banking context is that data on bank deposits are available by branch office location, permitting market shares to be calculated for all competitors in reasonable approximations to relevant local geographic markets. Conversely, calculation of local market performance (price or profit) measures has become more difficult over time, because banks increasingly operate in greater numbers of local markets, but report consolidated financial data only for their main office location.[7] A panel data set is used. The sample includes data for all urban (MSA) banking markets in the U.S. for each year over the 1995-1999 period. Since the rivalry measures used in the study have a lower bound of zero, and a good portion of the sample observations take on this limit value, tobit models of rivalry are estimated.

Briefly, the results show a positive relationship between large multistate multibank holding company (MSMBHC) deposit share and rivalry when a simple linear specification is used. When a concentration-MSMBHC share interaction term is added to the equation, the positive effect of MSMBHC share on rivalry depends on the level of concentration. Specifically, the positive effect of a given increase in MSMBHC share rises with market concentration. Further analysis suggests that this result largely reflects the behavior of out-of-state MSMBHCs. When the separate effects of the two possible organizational forms are examined, only the interstate branch component is found to be significantly related to rivalry. And in these equations, the pattern of the estimated coefficients on the aggregate interstate branch deposit share variables is the same as that seen in the other equations. When the

[7] In addition, the data reported by banks on their reports of income and condition only allow the researcher

interaction term is excluded, the results imply that rivalry is higher the higher the aggregate market share represented by interstate branch deposits. When the interaction term is included, the results show that the effect of an increase in the interstate branch share on rivalry depends positively on the level of market concentration. These results do not change, and in fact, are typically stronger when the deposit shares are calculated using only large multistate holding companies. They also do not change greatly when markets where the identity of the top-tier firms changed are excluded or when random-effects specifications are used.

The remainder of the paper is organized as follows. Section II contains a brief review of related literature. Model specification and estimation issues are addressed in section III. The results are presented and discussed in section IV. The summary and conclusions follow.

II. A Brief Review of the Literature

a. Previous Studies of Competitive Rivalry

A number of previous studies have used measures of competitive rivalry to analyze market competition in banking. Such rivalry measures are viewed as indicators of the "conduct" component link between market structure and performance in the structure-conduct-performance paradigm. The specific rivalry

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to construct approximations to market prices.

variables used in past studies reflect changes in the shares or ranks of alternative collections of the largest competitors in local banking markets. In these studies, the focus mostly has been on the effect of market concentration and entry on rivalry.[8]

In previous studies, researchers have used several types of rivalry measure, which capture slightly different aspects of changes in dominant firm market position. One is a measure of "mobility" or rank changes among the dominant (top 3 or 5) competitors in a local market over a series of one or more relatively short time intervals. For example, Heggestad and Rhoades, sum the rank changes among the three largest competitors in urban banking markets over three consecutive two-year periods, for markets where these three competitors operated in the market in both years t and t-1.[9] Since movement of firms below the top tier into the top group could be a potentially important component of competitive conduct and is not captured by the mobility measure, these authors supplement their mobility variable with a complementary "turnover" measure, which reflects entry into the top tier of market competitors by firms with lower ranks. They define this variable as the sum of the number of instances when firms with ranks 4 through 10 in t-1 move into the top 3 in year t. In their analysis, they also use the sum of mobility and turnover as a third, more comprehensive measure of competitive rivalry.

Finally, although they argue that mobility and turnover are superior indicators of rivalry, Heggestad and Rhoades also repeat their analysis, using the sum of the absolute value of changes in the market shares of top-tier firms as an alternative

[8] These studies include Heggestad and Rhoades (1976), Rhoades (1980), Rhoades and Rutz (1981), and Bodenhorn (1990).
[9] See Heggestad and Rhoades (1976).

rivalry measure. The rationale for this last measure is that turnover may be sensitive to the relative disparity of firm sizes.

In their 1976 study, Heggestad and Rhoades estimate rivalry equations using OLS for a sample of urban banking markets over the 1966-1972 period. The key explanatory variable in their study is market concentration, and they anticipate that higher concentration will reduce rivalry. They also include market growth, a branching dummy, the number of holding companies operating in the market, the value of market deposits acquired, and the average size of the three largest banks as additional control variables. Interestingly, the number of holding companies is included by the authors to determine whether firms with this sort of organizational form effect rivalry. They do find a negative significant coefficient on concentration, but the explanatory power of the other right-hand side variables is typically weak. But they do find a positive significant coefficient on their holding company variable in some versions of their estimated equations.

In Rhoades (1980), essentially the same data set is used, but the focus is on the effect of de novo entry on rivalry.[10] Entry is measured in three different ways: number of net entrants, the net entry rate, and a net entry dummy variable. Contemporaneous values are used for all of the entry variables. The equations are estimated using OLS. None of the entry variables were found to have a significant effect on rivalry.

In Rhoades and Rutz (1981), the same basic approach employed in Heggestad and Rhoades is used with an updated data set. Again the focus is on the effect of

concentration on rivalry. But in this study, the authors recognize that OLS is not the appropriate estimation technique given the bounded nature of their dependent variable, and so estimate a Tobit model in addition to OLS equations. Once again, their key result is a negative significant coefficient on market concentration.

Bodenhorn investigates the impact of entry, entry conditions and concentration on rivalry using an historical data set.[11] His data set consists of a panel of annual observations for six urban banking markets over the period 1834-1860.

One key difference between Bodenhorn's study and the others cited is the use of an alternative rivalry measure. The definition of this variable is given in the following equation:

$$RIV_{i,t} = \sum_{i: R_i(t) \leq \max R} \left| R_i(t) - R_i(t-1) \right|$$

where $RIV_{i,t}$ is rivalry in market i for time period t, $R_i(t)$ is the market rank of firm i at time t, and max R is the chosen market rank cutoff (5 in his study) for calculating rivalry. He argues that this measure is superior to those used in previous work, since it captures mobility among the top participants as well as entry into the top group by firms initially outside this group. Unlike the turnover measure used in other studies, he argues that this rivalry measure also reflects the size of the rank change by the firms entering the top group, which is likely to be an important determinant of competitive conduct. He recognizes that OLS is inappropriate given his dependent variable and uses Tobit regression.

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[10] Actually the sample is updated through 1974.
[11] See Bodenhorn (1990).

Although market concentration is included as an explanatory variable in his estimated rivalry equation, his focus is on entry and entry conditions. He argues that it is more likely for entry to influence rivalry with some lag and finds support for the use of lags greater than three years. He uses a free banking dummy to proxy the effect of entry conditions and finds greater rivalry in markets located in free banking states. And as in the earlier studies, he finds that higher concentration is associated with less rivalry.

b. Previous Studies of the Competitive Effects of Interstate Branching and the Expansion of Large, Multistate Organizations

Because the ability of banking organizations to branch across state lines has been limited until quite recently, only inferential evidence exists on the competitive effects of interstate branching. For example, in a recent study, Jayaratne and Strahan examine the effects of the removal of intrastate branching restrictions at the individual state level which took place prior to the 1990s, reasoning that the elimination of interstate branching restrictions will produce the same sort of effects.[12] Using state-level data, they find evidence that bank efficiency improved greatly after the removal of branching restrictions, and that cost savings were passed on to borrowers in the form of lower rates. They attribute this to the expansion of better performing organizations. They found smaller positive effects associated with the removal of restrictions on interstate banking.

In another recent study, DeYoung, et.al. examine the effects of out-of-state entry through acquisition on the cost inefficiency of local banks in urban markets.[13] Their main result is that this type of entry initially increases, but ultimately decreases the cost inefficiency of local banks in markets experiencing entry.

Neither of these studies explicitly examines whether these effects are related to the size or organizational form of the expanding banking organizations. But several other studies suggest that this might be the case. For example, recent evidence suggests that large, multistate banking organizations are more efficient.[14] Also in states where intrastate branching restrictions were removed, multibank holding companies typically merged their subsidiary banks presumably to obtain performance benefits.[15] Another study finds significant abnormal positive stock returns for holding companies that have altered their organizational form in this way, attributable to expected gains in efficiency.[16] The trend away from the use of separate out-of-state bank subsidiaries and toward greater use of interstate branches documented in table 4 reveals a general preference by multistate banking companies for the latter form when a choice is permitted. Given the removal of a variety of regulatory and technological barriers to competition over this period, expected efficiency gains are likely to be a primary factor driving banking organizations to exercise the structural option.

Taken together, this group of studies support the view that competition is likely

[12] See Jayaratne and Strahan (1997).
[13] See DeYoung, Hasan, and Kirchoff (1997).
[14] See Hughes, Lang, Mester, and Moon (1999).
[15] See McLaughlin (1995).
[16] See Whalen (1997).

to be more intense in markets, the greater the number or market share held by large, multistate branch banking organizations. Other studies, however, suggest the opposite might be true.

For example, survey evidence shows that multistate banking companies generally charge significantly higher rather than lower prices for banking services than single state banks do, even controlling for other important factors such as size and location.[17] Another recent study reports that large banking companies increasingly set uniform rates for deposits and retail loans across geographic areas that are considerably larger than even MSAs.[18] The author largely attributes the spread of broad-area uniform pricing to the consolidation of decision making at the parent company level that typically occurs when formerly separate subsidiary banks are merged and transformed into branches. Although company price uniformity did not generally extend beyond the state level during the time period examined, the possibility that companies might extend uniform pricing to multiple states as they increasingly adopt the interstate branch form is explicitly mentioned.

Regression analysis presented in the paper using 1996 data suggests that large company pricing appears to be influenced by different factors than in the past. For example, significant negative correlations between concentration and deposit rates are found at the state, but not the local market level. This finding implies that the practice of uniform pricing by larger banks could either increase or decrease competition in sub-state local markets depending upon the values of variables such as statewide concentration that appear to be significant determinants of large bank

[17] See Board of Governors (1999).

prices.

The presence of large, interstate branch organizations might also be associated with a reduction in local market competition through a linked oligopoly effect. The growth of large interstate branch organizations could imply significant increases in the number of local markets in which such rivals meet one another. The linked oligopoly hypothesis predicts that larger numbers of local market contacts increase the likelihood that large competitors recognize their mutual interdependence, and so collude rather than compete. This sort of behavior might be facilitated by the generally greater centralized control over pricing exercised by larger branch banking organizations.

Theoretical work, however, reveals that the prediction of direct relationship between linkages and the likelihood of collusion specified in the linked oligopoly hypothesis is sensitive to the assumptions made about dominant firm behavior.[19] Not surprisingly, the existing empirical evidence about the validity of the hypothesis is mixed, and mostly reflects bank behavior in an environment prior to the removal of interstate branching restrictions.[20]

In sum, a review of available evidence does not support an unambiguous prediction on the likely impact of large, multistate banking organizations on market competition, and any differential effect associated with the growth of interstate branching.

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[18] See Radecki (1998).
[19] See Mester (1987).
[20] For example, evidence supporting a pro-competitive relationship is presented in Whitehead and Luytjes (1984).

III. Model Specification Issues and Variable Definitions

a.) The Rivalry Variable

In this study, rivalry is measured using the definition proposed by Bodenhorn. Here the top three firms in the market are defined as the dominant group. Thus, this rivalry variable captures market rank changes for the top three firms in a market in time t, regardless of their market rank in t-1 (MRIV3). The lower bound of this measure is zero in markets where no changes occurred in the ranks of the top three firms for a given time interval. In markets where the market share ranks of the top firms have changed over time, the rivalry measure is positive. A one-year time interval is used to compute the rivalry measures.

Before rivalry equations were estimated with MRIV3 as the dependent variable, an attempt was made to ascertain empirically how well this rivalry measure proxies the intensity of market competition. The strategy used was to construct estimates of market prices and use simple tests to determine whether these prices were significantly related in the anticipated way to the rivalry measures. Since the rivalry measure reflects changes in dominant firm deposit shares, it is compared with three alternative measures of market deposit prices and with a measure of the commercial loan rate. The definitions of the three deposit price variables used are: (service charges on deposits plus transaction deposits interest expense)/(IPC demand deposits

plus average interest bearing transaction deposits); total interest paid on deposits/total deposits; and total interest paid on deposits/total interest bearing deposits. The loan rate is interest earned on commercial loans divided by the average volume of such loans. These measures are calculated for "single market banks" in each market for each year over the 1995-1999 interval.[21] Spearman correlations between these prices and the rivalry measures are then calculated using the available data pooled over the entire five-year period. The correlation coefficients are generally significant, and exhibit the signs they should if the rivalry measures proxy the intensity of market competition.[22]

One obvious problem with this sort of rivalry measure is a possible downward bias in markets when firms that rank in the top tier in time t were not present in the market in t-1. In this study, this bias is handled in two different ways. One is to use a measure of change in the identity of top-tier firms for the chosen time interval as a right-hand side control variable in the estimated rivalry equations. The other is to exclude markets from the analysis for any time period when the identity of any of the top tier firms changed.

Following standard practice, local urban markets are assumed to be approximated by MSAs. Total deposit market shares are calculated and used to rank each competing banking organization in each of these markets as of June 30 for the years 1994 - 1999. These data come from the FDIC's Summary of Deposit file. This

[21] Banking organizations are defined as "single market" if market deposits accounted for more than two thirds of their consolidated total deposits.

[22] If the intensity of competition increases with rivalry, deposit rates and rivalry should be positively correlated, and loan rates and the net fee on transactions accounts and rivalry should be negatively correlated. Using single market banks in all markets, the correlations between MRIV3 and the four price

permits three-firm rivalry measures to be calculated for each market for five one-year time periods.[23]

Descriptive statistics for the rivalry measure broken down by year appear in table 1. With the exception of 1998, the mean annual value of MRIV3 has been slightly above one for the period without a strong apparent trend. The median value also has remained constant at a lower value of zero in each year. This is not surprising, since the last column of data in table 1 suggests that the MRIV3 variable takes on a zero value in the majority of markets in each year. Given that the overall number of urban markets is roughly 328, the percentage of urban markets where MRIV3 is greater than zero has ranged from a low of roughly 34 percent in 1995 to a high of 48 percent in 1998.[24]

The last row of table 1 presents descriptive statistics for the annual market rivalry measure summed for all five years for each market. These figures serve to show that rivalry has not been concentrated in a small number of urban markets for the period. The statistics suggest that the rivalry measure has been positive in roughly 80 percent of the sample markets when the five-year period is viewed as a whole and is positive in a number of markets in more than one year.

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measures are 0.037, 0.021, -0.029 and -0.036, respectively. When banks in markets in which the identity of one of the top three firms changed are excluded, the correlations are 0.041, 0.026, -0.031 and -0.042.

[23] This statement holds as long as the identity of all top 3 firms did not change over a given year. There were 7 instances where this was the case over the sample period.

[24] The comparable figures for the other years are 40.2 percent in 1996, 35.4 percent in 1997, and 38.4 percent in 1999.

b.) Measures of Market Presence of Multistate and Nonlocal Competitors[25]

As noted previously, over the past five years, growing numbers of multistate banking firms, especially larger ones, have expanded their out-of-state operations and operate increasingly through interstate branches. Tables 2 and 3 provide some insight on this trend. Table 2 contains descriptive statistics showing that multistate multibank holding companies (MSMBHCs) continue to account for most of the interstate activity in urban banking markets. These companies as a class had average aggregate market shares of more than 60 percent in both 1995 and 1999. The data in rows 5 and 7 shows their competitive positions MSMBHCs in home state vs. out-of-state markets. In 1995, on average 32.0 percent of aggregate deposits represented MSMBHC share in home state markets, while the mean aggregate deposit share of out-of-state MSMBHCs was 31.2 percent. By 1999, out-of-state deposit share represented almost two-thirds of the aggregate market share of MSMBHCs (39.0 percent out of a total 62.1 percent). The data in the next six rows of table 2 also show that by 1999, multistate one-bank holding companies (MSOBHCs) played an expanded, but still relatively minor role in MSA markets. Their overall mean share was 9.4 percent of deposits, while the mean share represented by out-of-state activity of MSOBHCs was 2.8 percent. The last six lines of the table contain statistics for interstate measures where the data for both multibank and one bank multistate companies are combined.

[25] In this paper, nonlocal means branch deposits controlled by a banking organization headquartered in another state.

Table 3 contains similar data for large (consolidated total deposits of $25 billion or more) MSMBHCs.[26] Comparable data for MSOBHCs are not included, because there were no "large" MSOBHCs in either period. These data clearly illustrate that large MSMBHCs account for the bulk of the activity of all multistate banking organizations, particularly the portion that represents out-of-state activity by non-local competitors. For example, in 1999, the mean aggregate deposit share accounted for by all out-of-state MSMBHCs was 39.0 percent; for large MSMBHCs it was 31.6 percent.

These aggregate deposit share measures are used in rivalry equations to determine if rivalry is influenced by measures of the market presence of interstate banking organizations, especially large ones. These market-presence measures are also used to determine if the effect of interstate organizations on rivalry varies in home state vs. out-of-state markets. The variable names of each alternative measures appear in parentheses below the respective definition in table 2.

Another set of indicators of the extent of the market presence of nonlocal competitors is used in this study to determine if the organizational form (interstate branches vs. bank subsidiaries) adopted by out-of-state competitors is associated with differences in rivalry. This set consists of alternative aggregate market deposit share measures for a number of potentially relevant collections of nonlocal competitors. Descriptive statistics for these alternative measures for the years 1995 and 1999 appear in table 4. Table 5 contains the same set of variables calculated using data only for "large" organizations. In both tables, the variable names used to represent

[26] The choice of this size cut-off was somewhat arbitrary. This cut-off encompasses roughly the 20 largest

each of these classifications in the estimated rivalry equations appear below the corresponding entry in parentheses.

The first line of table 4 shows aggregate deposit share data for the most comprehensive definition of nonlocal competitors. This definition includes deposits in the interstate branches of nonlocal independent banks, deposits in the interstate branches of nonlocal banks owned by foreign bank holding companies, deposits in the "true" interstate branches of nonlocal banks owned by domestic bank holding companies, and deposits in the in-state branches of local subsidiary banks owned by out-of-state domestic bank holding companies.[27] Both the mean and median value of this aggregate deposit share measure increased roughly 10 percentage points over the period to 42.2 and 38.5 percent, respectively, clearly illustrating the growing importance of nonlocal competitors in urban banking markets over the period. The descriptive statistics in the second line show that relatively few competitors account for this considerable aggregate deposit share. The mean and median number of such competitors is around 5 and 4, respectively in 1999. The data in the third line of the table show that the nonlocal operations of domestically owned bank holding companies account for virtually all of the total. The statistics in the seventh and ninth lines of the table clearly illustrate the trend toward the use of interstate branches by domestic holding companies and away from the maintenance of separately chartered, locally headquartered bank subsidiaries. The mean and median aggregate deposit shares in the interstate branches of out-of-state domestic holding companies went

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banking organizations in each year (17 in 1995 and 18 in 1999, for example).

[27] "True" interstate branches of domestic holding companies are defined as branches outside the home office state of the parent bank and outside the headquarters state of the parent holding company. This

from roughly zero in 1995 to 22 percent and 13 percent, respectively in 1999. Over the same time period, the mean and median aggregate deposit share in the in-state branches of subsidiaries of nonlocal holding companies declined by roughly 10 percentage points to 20 and 17 percent, respectively.

Comparison of the statistics in table 5 with the corresponding entries in table 4 clearly shows that relatively large banking organizations are primarily responsible for the observed trends. For example, the mean and median aggregate deposit shares on lines 1, 3, 7, and 9 in table 5 range from roughly two-thirds to three-fourths of the corresponding entries in table 4.

These alternative aggregate deposit share measures are the key explanatory variables in the rivalry equations estimated in the study. The signs and statistical significance of the estimated coefficients on these variables show whether and how market rivalry is influenced by the presence of multistate, especially large multistate competitors. The alternative measures also provide insight on whether competitive effects differ in home state vs. out-of-state markets or vary with organizational form.

c.) Additional Control Variables

A number of other factors could influence the deposit share rivalry measures used as the dependent variable and so are included as additional control variables in the estimated equations.

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definition thus excludes interstate branches that are located in the headquarters state of the parent holding

A number of these have been used in rivalry equations estimated in previous studies. One such variable is a measure of local market concentration. Here a bank-only herfindahl index of concentration is employed (HB). Since higher concentration is expected to decrease the intensity of competition, the expected sign of this variable is negative.

The effects of the different multistate banking variables on rivalry might vary with market concentration. Accordingly, interaction variables (the product of HB and the multistate presence variable included in a particular estimated equation) are also added to expanded versions of the basic rivalry equation. The signs of the interaction variables are unclear a priori.

Market size (the log of total bank market deposits [LCBTD]) and market deposit growth (the one-year percentage change in bank market deposits [CBTDGR]) are used as indicators of market attractiveness. Presumably, larger or more rapidly growing markets are more economically attractive, and so the signs of both of these variables are expected to be positive.

Entry by de novo banks, which has been trending upward over the period examined, could also possibly influence market rivalry. Here the entry rate of de novo banks lagged one year is used as a control variable (DNRL1). Higher entry rates should increase competition and market rivalry, and so the expected sign of this variable is positive.

All of the variables are defined using only data for commercial banks. But the market presence of thrift institutions could influence rivalry among banks and varies

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company. This sort of structural arrangement is sometimes in evidence.

greatly across MSA markets. Accordingly, the ratio of total S&L market deposits to total bank plus S&L deposits is also included as a right-hand side variable in the estimated equations (SLDR). Market rivalry is likely to be more intense, the greater the percentage of market deposits controlled by S&Ls, and so the estimated coefficient on this variable should be positive.

Finally, since the rivalry measure possibly is biased downward in markets where firms that rank in the top tier in time t were not present in the market in t-1. The most likely reason for this sort of change over the period examined is merger and acquisition activity. One way to address this bias is to exclude all markets where the identity of any of the top three firms has changed for any year, and this is one approach used in this study. But since it is possible to calculate the rivalry measure as long as the identities of all of the top three banks have not changed, another possible approach is to retain such markets and include a measure of change in the identity of top-tier firms over time as a right-hand side control variable in the estimated rivalry equations. The control variable used here is a simple count of the number of top three firms that disappeared over the previous 12-month period (TAXTOP3). The expected sign of this variable is negative.

Finally, since the data set is a panel pooled over a five-year time period, and time-specific factors might influence market rivalry, the basic rivalry equations are also estimated with four year dummies (Y96D,Y97D,Y98D,Y99D) added to the basic set of explanatory variables. The signs of these variables are indeterminate a priori.

IV. Estimation Procedure and Results

For each interstate or nonlocal presence variable, two basic specifications of the rivalry equation are estimated for two different estimation samples. The only difference between the two specifications is that the slightly more complicated version contains a concentration-multistate bank presence interaction variable. Each equation is first estimated using the entire sample of urban markets. These results are presented in the 'A' portion of each table. Then the equations are re-estimated deleting all markets in each year where the identity of at least one of the top three firms changed over that period, removing any possible downward bias on the rivalry measures associated with the merger-related disappearance of the market leaders. These results are presented in the 'B' portion of each table.

The descriptive statistics in tables 2 through 5 indicate that most of the multistate organization and nonlocal competitive presence in the typical urban banking market is accounted for by relatively large competitors, so the approach outlined previously is at least implicitly capturing the effect of large multistate or nonlocal competitors on market rivalry. To examine more explicitly whether the size of these organizations matter, each equation is also estimated with the multistate or nonlocal organization variables constructed using only data for "large" banking companies (those with consolidated deposits of $25 billion or more). These results appear as the two equations in the four right-most columns of each table.

Given the nature of the dependent variable (a lower bound of zero and a non-trivial portion of the sample observations that take on the lower bound value), the

rivalry equations are all estimated using a standard Tobit model.[28] In addition, since the data set is a panel, a random effects Tobit model is also employed.

The results in all of the tables reveal that the estimated coefficients of most of the additional control variables included in the rivalry equations have the anticipated signs and are significant. The overall explanatory power of the estimated equations also are satisfactory. To save space, these issues are not discussed further.

The first set of estimation results are presented in tables 6A-9B for the models in which various aggregate MSMBHC market deposit shares are used to measure the competitive effect of multistate banking organizations. Table 6A contains the results for rivalry equations estimated using total MSMBHC aggregate deposit share as the multistate variable, making no distinction between whether the MSMBHC is operating in home state vs. an out-of-state market (MSMBHCDR). The equations on the left-hand sides of both panels of the table shows that this variable is insignificant for both of the estimation techniques. But when MSMBHCDR is defined to include only large multistate competitors, the estimated coefficients in the third pair of columns in both panels of table 6A are positive and significant, indicating a higher deposit share of large MSMBHCs is associated with greater market rivalry.

When the HB*MSMBHCDR interaction term is also included in the equation, the estimated coefficient on MSMBHCDR is negative and significant, while the coefficient on the interaction term is positive and significant. These results suggest that that increases in the presence of MSMBHCs is associated with increased rivalry

[28] Since the disturbance in the Tobit model might be heteroscedastic resulting in inconsistent estimates, the equations were also estimated using the corrective approach outlined in Greene (1993), pp.698-699. Use of this approach did not change the reported results in any material way and so they are not reported.

in more concentrated markets. This same pattern is evident when only large MSMBHCs are included in the market share calculations.

The results in table 6B reflect the effects of excluding markets from the estimation sample in any year when the identity of one or more of the top three firms changed. In general, the results mirror those in table 6A, although they are weaker for the more inclusive definition of MSMBHCs. The evidence again shows that rivalry tends to be higher in concentrated markets with higher aggregate MSMBHC deposit share.

Table 7A and 7B present rivalry equations when MSMBHCDR is separated into two constituent variables: the aggregate deposit share of home state MSMBHCs (MSMBHCHDR) and the aggregate share of out-of-state MSMBHCs (MSMBHCODR). This approach provides insight on whether the competitive effects of MSMBHCs differ depending on the location (relative to the home office) of the local markets. The results suggest that this is in fact the case.

Both of the two MSMBHC variables are insignificant when all organizations are included in the calculations. But when only large MSMBHCs are considered (the third set of columns in table 7A), the estimated coefficient on the home state variable remains insignificant, while that on the out-of-state variable is positive and significant, as was the case for the more comprehensive MSMBHC variable.

When interaction variables are included, again only the out-of-state MSMBHC market presence variables are significant. The pattern of signs is the same as that evident in table 6. The estimated coefficient on MSMBHCODR is negative, while that on the associated interaction term is positive and both are significant. This is the

case for both all MSMBHCs and large MSMBHCs and both estimation techniques. The results suggest higher levels of out-of-state MSMBHC competition, including large MSMBHC competition are associated with greater rivalry in concentrated markets.

The next set of tables provide insight on whether the effects of nonlocal organizations, especially large ones, on rivalry depend on the organizational from used. Table 8A contains the results for rivalry equations estimated with MSHCODR as the nonlocal competition variable and the complete sample estimation sample. For perspective, this variable is basically the sum of the out-of-state aggregate market deposit shares of MSMBHCs and the MSOBHCs.

The first equation on the left-hand side of the table shows that when MSHCODR is calculated using data for all nonlocal competitors in each market, the coefficient is positive but insignificant when the concentration-MSHCODR term is excluded. When MSHCODR is defined to include only large nonlocal competitors, the estimated coefficient in the third pair of columns in table 8A is positive and significant, indicating that increases in the share of large nonlocal competitors are associated with increases in rivalry. When the HB*MSHCODR interaction term is also included, the estimated coefficient on MSHCODR is negative, while the coefficient on the interaction term is positive and both are significant. These results suggest that increases in the presence of nonlocal holding company competition are associated with increased rivalry in more concentrated markets. This same pattern is evident when MSHCODR includes only large competitors and for both the standard and random-effects Tobit specifications.

The results in table 8B reflect the exclusion of markets in any year when the identity of one or more of the top three firms changed from the estimation sample. In general, the results mirror those in table 8A, although they are weaker in some cases. The evidence again shows that rivalry tends to be higher in concentrated markets with higher levels of nonlocal competition. This result is somewhat stronger when only large nonlocal competitors are included in MSHCODR.

The results in tables 9A and 9B show the effects of splitting MSHCODR into two constituent variables that indicate whether the market presence represents deposits in interstate branches (ISBRHCDR) or in-state branches of bank subsidiaries owned by out-of-state holding companies (OSBKHCDR). The results clearly show that the competitive effects of interstate branching, especially by large organizations differ from those associated with interstate banking (the operation of separate in-state bank subsidiaries owned by holding companies headquartered elsewhere).

The two columns on the left-hand side of table 9A shows that when all markets are included and interaction terms are excluded, only the interstate branch variable is significant. The estimated coefficient of ISBRHCDR is positive, indicating higher levels of interstate branching in urban markets by out-of-state holding companies are associated with greater rivalry. The results in the third set of columns in table 9A show that this effect is also evident when only large out-of-state competitors are considered. When interaction terms are included in the rivalry equations, again only the interstate branch variables exhibit significant coefficients. Consistent with the previous results, the estimated coefficient on ISBRHCDR is negative, and the coefficient is positive on the associated concentration interaction variable.

Table 9B shows that the key results do not change materially when markets with changes in the identity of dominant firms are excluded, although again, the results are somewhat weaker.

To summarize, the results in tables 9A and 9B reveal that the effect of interstate banking on rivalry is fundamentally different from that of interstate branching. In no case, was the estimated coefficient on the OSBKHCDR or the HB*OSBKHCDR variable ever even marginally significant. These results imply that the effects of the more comprehensive nonlocal competition variables on rivalry are driven by the behavior of nonlocal organizations operating interstate branches. The coefficient estimates suggest that the market rivalry tends to be greater, the greater the market presence of nonlocal competitors, including large ones. Further, the results suggest that this effect tends to be more pronounced, the higher the level of market concentration.

As a further check on the robustness of these results, the equations were re-estimated with numbers of multistate or nonlocal competitor variables used in place of the corresponding aggregate deposit share measure. Basically, none of the key results changed in any way, and so the estimation results are not presented.

V. Summary and Conclusions

This paper is intended to provide empirical evidence on two main issues. First, whether the growth of large, multistate banking organizations has had a beneficial

effect on local market rivalry. Second, whether the effects associated with interstate branching vs. interstate banking differ. The answer in both cases is yes.

The results show a positive relationship between MSMBHC deposit share and rivalry when the simple linear specification is used, but only for large MSMBHCs. The results obtained when a concentration-MSMBHC share interaction term is added to the equation, reveal that the positive effect of MSMBHC share on rivalry depends on the level of concentration. Specifically, the positive effect of a given increase in MSMBHC share rises with market concentration. Further analysis suggests that this result largely reflects the behavior of out-of-state MSMBHCs. When the separate effects of the two possible organizational forms are examined, only the interstate branch component is found to be significantly related to rivalry. And in these equations, the pattern of the estimated coefficients on the aggregate interstate branch deposit share variables is the same as that seen in the other equations. When the interaction term is excluded, the results imply that rivalry is higher, the higher the aggregate market share represented by interstate branch deposits. When the interaction term is included, the results show that the effect of an increase in the interstate branch share on rivalry depends positively on the level of market concentration.

These results do not change, and in fact, are typically stronger when the deposit shares are calculated using only large multistate holding companies. They also do not change greatly when markets where the identity of the top-tier firms changed are excluded or when random-effects specifications are used.

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TABLE 1

Descriptive Statistics for Market Rivalry Measure

Year	Mean	Median	Min	Max	# Mkts > 0
1995	0.768	0	0	6	112
1996	1.177	0	0	23	132
1997	0.875	0	0	21	116
1998	1.488	0	0	31	158
1999	1.08	0	0	21	126
5-Year Sum	4.305	3	0	34	264

TABLE 2

Measures of the Extent of Multistate Banking Organizations in MSA Markets

	1995					1999				
	Mean	Median	Min	Max	#Mkts > 0	Mean	Median	Min	Max	#Mkts > 0
Total Market Deposit Share of All Home-State Competitors	0.678	0.724	0	1	327	0.578	0.615	0	1	330
Number of All Home-State Competitors	16.01	11	0	180		15.18	10	0	174	
Total Market Deposit Share of All Multistate Multibank Holding Companies (MSMBHCDR)	0.637	0.677	0	1	325	0.621	0.655	0.068	1	330
Number of All Multistate Multibank Holding Companies	5.046	5	0	20		5.725	5	1	22	
Total Market Deposit Share of Home-State Multistate Multibank Holding Companies (MSMBHCHDR)	0.32	0.295	0	0.962	243	0.228	0.162	0	0.911	227
Number of All Home-State Multistate Multibank Holding Companies	2.287	2	0	10		1.96	2	0	11	
Total Market Deposit Share of Out-of-State Multistate Multibank Holding Companies (MSMBHCODR)	0.312	0.263	0	1	274	0.39	0.361	0	1	309
Number of All Out-of-State Multistate Multibank Holding Companies	2.912	2	0	16		3.845	3	0	22	
Total Market Deposit Share of All Multistate Onebank Holding Companies	0.007	0	0	0.4	48	0.094	0.018	0	0.642	205
Number of All Multistate Onebank Holding Companies	0.183	0	0	3		1.278	1	0	15	
Total Market Deposit Share of Home-State Multistate Onebank Holding Companies	0.002	0	0	1	25	0.067	0	0	0.594	142
Number of All Home-State Multistate Onebank Holding Companies	0.076	0	0	1		0.671	0	0	10	
Total Market Deposit Share of Out-of-State Multistate Onebank Holding Companies	0.004	0	0	0.4	25	0.028	0	0	0.483	124
Number of All Out-of-State Multistate One-bank Holding Companies	0.101	0	0	3		0.692	0	0	12	
Total Market Deposit Share of All Multistate Holding Companies (MSHCDR)	0.644	0.688	0	1	325	0.715	0.759	0.068	1	331
Number of All Multistate Holding Companies	5.229	5	0	21		7.003	6	1	28	
Total Market Deposit Share of Home-State Multistate Holding Companies (MSHCHDR)	0.322	0.304	0	0.962	243	0.294	0.25	0	0.97	253
Number of All Home-State Multistate Holding Companies	2.363	2	0	11		2.63	2	0	16	
Total Market Deposit Share of Out-of-State Multistate Holding Companies (MSHCODR)	0.316	0.266	0	1	274	0.418	0.384	0	1	314
Number of All Out-of-State Multistate Holding Companies	3.012	2.5	0	18		4.538	4	0	24	

TABLE 3

Measures of the Extent of Multistate Banking Organizations
w/ Consolidated Total Deposits of More Than $25 Billion in MSA Markets

	1995					1999				
	Mean	Median	Min	Max	#Mkts > 0	Mean	Median	Min	Max	#Mkts > 0
Total Market Deposit Share of All Multistate Multibank Holding Companies	0.313	0.286	0	0.929	277	0.405	0.393	0	1	319
Number of All Multistate Multibank Holding Companies	2.082	2	0	7		2.807	3	0	9	
Total Market Deposit Share of Home-State Multistate Multibank Holding Companies	0.106	0	0	0.781	125	0.089	0	0	0.797	126
Number of All Home-State Multistate Multibank Holding Companies	0.637	0	0	3		0.55	0	0	3	
Total Market Deposit Share of Out-of-State Multistate Multibank Holding Companies	0.207	0.145	0	0.929	212	0.316	0.289	0	1	285
Number of All Out-of-State Multistate Multibank Holding Companies	1.415	1	0	6		2.26	2	0	9	

TABLE 4

Indicators of the Market Presence of Nonlocal Competitors of All Sizes in MSA Markets

	1995					1999				
Out-of-State Competitor Variable	Mean	Median	Min	Max	#Mkts > 0	Mean	Median	Min	Max	#Mkts > 0
Total Market Deposit Share of All Out-of-State Competitors (TOSDR)	0.322	0.276	0	1	274	0.422	0.385	0	1	314
Number of All Out-of-State Competitors (NOS)	3.122	3	0	22		4.888	4	0	32	
Total Market Deposit Share of All Out-of-State Domestic BHCs (MSHCODR)	0.316	0.266	0	1	274	0.418	0.384	0	1	314
Number of Out-of-State Domestic BHCs (NOSHC)	3.037	2.5	0	19		4.601	4	0	24	
Total Market Deposit Share in Interstate Branches of All Out-of-State Competitors (ISBRDR)	0.014	0	0	0.341	44	0.221	0.137	0	0.986	270
Number of Interstate Branch Orgs (NISBR)	0.155	0	0	5	45	2.598	2	0	22	
Total Market Deposit Share in Interstate Branches of All Out-of-State Domestic BHCs (ISBRHCDR)	0.009	0	0	0.341	27	0.217	0.129	0	0.986	268
Number of Domestic HC w/ Interstate Branches (NISBRHC)	0.091	0	0	3		2.468	2	0	21	
Total Market Deposit Share in In-State Branches of Bank Subs of Out-of-State Domestic BHCs (OSBKHCDR)	0.307	0.254	0	0.983	274	0.201	0.168	0	0.854	260
Number of Out-of-State Domestic HCs w/ In-State Bank Subs (NOSBKHC)	2.966	2	0	17		2.29	2	0	19	

TABLE 5

Indicators of the Market Presence of Nonlocal Competitors
w/ Consolidated Total Deposits of More Than $25 Billion in MSA Markets

	1995					1999				
Out-of-State Competitor Variable	Mean	Median	Min	Max	#Mkts > 0	Mean	Median	Min	Max	#Mkts > 0
Total Market Deposit Share of All Out-of-State Competitors	0.212	0.165	0	0.929	215	0.316	0.289	0	1	285
Number of All Out-of-State Competitors	1.479	1	0	6		2.399	2	0	10	
Total Market Deposit Share of All Out-of-State Domestic BHCs	0.207	0.145	0	0.929	212	0.316	0.289	0	1	285
Number of Out-of-State Domestic BHCs	1.427	1	0	6		2.302	2	0	9	
Total Market Deposit Share in Interstate Branches of All Out-of-State Competitors	0.013	0	0	0.341	31	0.174	0.09	0	0.921	227
Number of Out-of-State Competitors w/ Interstate Branches	0.098	0	0	1		1.417	1	0	6	
Total Market Deposit Share in Interstate Branches of All Out-of-State Domestic BHCs	0.008	0	0	0.341	18	0.174	0.09	0	0.921	227
Number of Domestic HC w/ Interstate Branches	0.058	0	0	1		1.417	1	0	6	
Total Market Deposit Share in In-State Branches of Bank Subs of Out-of-State Domestic BHCs	0.199	0.12	0	0.929	211	0.142	0.104	0	0.712	205
Number of Out-of-State Domestic HCs w/ In-State Bank Subs	1.381	1	0	6		0.982	1	0	8	

TABLE 6A

Estimated Rivarly Equations

Interstate Variable: MSMBHCDR

All Mkts w/ Nonmissing Data
(N=1637)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCDR	-0.28421	-0.43	-4.34139	-2.57	1.25136	2.15	-2.90787	-2.16
HB*MSMBHCDR			19.2051	2.59			19.44402	3.42
HB	-8.14558	-4.38	-20.71319	-3.94	-9.12154	-4.90	-18.41001	-5.50
LCBTD	0.07779	0.68	0.083997	0.74	-0.0014	-0.01	-0.0052	-0.05
CBTDGR	3.08961	3.44	2.67963	2.97	3.05044	3.41	2.46566	2.75
DNRL1	9.58745	2.48	9.46348	2.46	8.5229	2.21	8.13663	2.12
SLDR	3.00062	3.55	2.64332	3.10	2.47116	2.83	2.0625	2.36
TAXTOP3	-1.33731	-4.50	-1.33123	-4.48	-1.3579	-4.57	-1.31111	-4.43
Y96D	1.21144	3.03	1.18188	2.96	1.13237	2.82	1.12028	2.80
Y97D	0.29195	0.72	0.26344	0.65	0.18681	0.46	0.15968	0.39
Y98D	1.79915	4.52	1.76222	4.43	1.69302	4.23	1.65416	4.14
Y99D	1.07116	2.60	1.03878	2.53	0.97965	2.38	0.95282	2.32
CONSTANT	-1.09891	-1.96	1.60611	1.36	-1.28662	-2.70	0.72561	0.96
Sigma	4.25731		4.24611		4.2495		4.2287	
LL	-2391.0		-2387.6		-2388.7		-2383.0	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCDR	-0.18055	-0.25	-4.16903	-2.12	1.25855	2.07	-2.86412	-2.02
HB*MSMBHCDR			18.76437	2.10			19.19185	3.24
HB	-7.81593	-4.41	-20.18173	-3.13	-8.75297	-4.84	-18.04857	-5.19
LCBTD	0.084074	0.62	0.08838	0.65	0.00836	0.06	0.00185	0.01
CBTDGR	3.08115	3.19	2.69893	2.84	3.04329	3.20	2.49855	2.68
DNRL1	9.28133	2.30	9.21927	2.26	8.38663	2.10	8.07656	1.99
SLDR	2.93484	2.83	2.59559	2.42	2.41632	2.30	2.03275	1.92
TAXTOP3	-1.31151	-3.97	-1.30708	-3.94	-1.3336	-4.02	-1.2912	-3.92
Y96D	1.21471	2.70	1.18744	2.61	1.13509	2.50	1.12687	2.48
Y97D	0.29246	0.62	0.26508	0.56	0.184221	0.39	0.1607	0.34
Y98D	1.79725	4.21	1.76186	4.13	1.68988	3.93	1.65442	3.85
Y99D	1.08008	2.45	1.04686	2.36	0.98241	2.26	0.95705	2.20
CONSTANT	-1.2384	-2.08	1.43668	0.98	-1.37607	-2.87	0.63918	0.76
Sigma v	4.16522		4.16646		4.1624		4.15942	
Sigma u	0.9223		0.85946		0.8972		0.80143	
LL	-2388.4		-2385.5		-2386.4		-2381.1	

TABLE 6B

Estimated Rivarly Equations

Interstate Variable: MSMBHCDR

Mkts w/ TAXTOP3 = 0
(N=1347)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCDR	-0.20894	-0.27	-3.55668	-1.75	1.47827	2.22	-3.53447	-2.18
HB*MSMBHCDR			16.09044	1.77			23.94019	3.38
HB	-9.04015	-4.04	-19.3141	-3.08	-10.1078	-4.51	-20.9451	-5.27
LCBTD	0.04974	0.38	0.055837	0.42	-0.03826	-0.29	-0.03467	-0.26
CBTDGR	3.17766	2.90	2.84175	2.59	3.1152	2.86	2.26071	2.07
DNRL1	12.07629	2.71	11.77333	2.64	10.99914	2.47	10.17358	2.29
SLDR	3.1194	3.12	2.74339	2.69	2.49534	2.42	1.75327	1.67
Y96D	0.95378	2.10	0.93247	2.06	0.87944	1.94	0.88995	1.97
Y97D	0.26181	0.58	0.2345	0.52	0.13662	0.30	0.116	0.26
Y98D	1.95255	4.34	1.91666	4.26	1.84458	4.08	1.79312	3.98
Y99D	0.84297	1.78	0.80321	1.69	0.743	1.57	0.68139	1.44
CONSTANT	-1.10159	-1.69	1.10377	0.79	-1.27703	-2.33	1.09096	1.24
Sigma	4.50619		4.49707		4.49638		4.4696	
LL	-2049.3		-2047.7		-2046.8		-2041.1	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCDR	-0.09733	-0.12	-3.25062	-1.46	1.47268	2.06	-3.44989	-2.01
HB*MSMBHCDR			15.0687	1.52			23.36339	3.22
HB	-8.66669	-4.06	-18.3226	-2.53	-9.69696	-4.47	-20.3846	-4.89
LCBTD	0.05937	0.37	0.064401	0.40	-0.02408	-0.15	-0.02256	-0.14
CBTDGR	3.18588	2.86	2.87117	2.57	3.11958	2.84	2.29371	2.18
DNRL1	11.65157	2.44	11.44035	2.37	10.78627	2.27	10.17427	2.11
SLDR	3.02981	2.49	2.67667	2.16	2.42032	1.97	1.71278	1.39
Y96D	0.96391	1.86	0.94653	1.82	0.88622	1.70	0.90364	1.73
Y97D	0.27067	0.52	0.24608	0.47	0.14343	0.27	0.12722	0.24
Y98D	1.96393	4.20	1.93144	4.13	1.85525	3.94	1.8104	3.84
Y99D	0.8461	1.68	0.80906	1.60	0.73802	1.49	0.68472	1.38
CONSTANT	-1.27273	-1.85	0.81072	0.49	-1.38793	-2.52	0.95158	0.96
Sigma v	4.34617		4.34703		4.34587		4.34297	
Sigma u	1.2637		1.22713		1.22362		1.1258	
LL	-2045.1		-2043.8		-2043.0		-2038.1	

TABLE 7A

Estimated Rivarly Equations

Interstate Variable: MSMBHCHDR,MSMBHCODR

All Mkts w/ Nonmissing Data
(N=1637)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCHDR	-0.63071	-0.89	-2.3925	-1.21	0.90134	1.15	-1.2229	-0.56
HB*MSMBHCHDR			8.68495	0.98			10.81806	1.16
MSMBHCODR	0.462	0.07	-4.3535	-2.53	1.36854	2.26	-3.02009	-2.19
HB*MSMBHCODR			20.47954	2.77			20.2574	3.53
HB	-8.1564	-4.39	-19.1587	-3.67	-9.10396	-4.90	-17.9861	-5.35
LCBTD	0.092116	0.80	0.074618	0.65	0.00937	0.08	-0.01149	-0.10
CBTDGR	3.03504	3.38	2.45823	2.73	3.01859	3.37	2.36598	2.64
DNRL1	8.8621	2.28	8.89347	2.29	8.20508	2.11	8.08273	2.09
SLDR	3.01393	3.57	2.7836	3.26	2.5672	2.90	2.24988	2.53
TAXTOP3	-1.39358	-4.64	-1.38393	-4.62	-1.38244	-4.61	-1.33411	-4.47
Y96D	1.20492	3.02	1.19992	3.01	1.13799	2.84	1.1356	2.84
Y97D	0.27285	0.67	0.28524	0.71	0.19173	0.47	0.19016	0.47
Y98D	1.77653	4.46	1.79932	4.52	1.6902	4.22	1.69628	4.23
Y99D	1.03165	2.51	1.06988	2.60	0.96805	2.35	0.99212	2.40
CONSTANT	-1.09036	-1.95	1.24599	1.07	-1.29844	-2.72	0.59632	0.79
Sigma	4.25207		4.23357		4.24729		4.22473	
LL	-2390.1		-2385.0		-2388.5		-2382.2	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCHDR	-0.52933	-0.70	-2.31733	-0.98	0.87189	0.94	-1.32039	-0.50
HB*MSMBHCHDR			8.69192	0.77			11.09135	0.97
MSMBHCODR	0.15508	0.21	-4.1791	-2.05	1.39172	2.22	-2.96231	-1.96
HB*MSMBHCODR			20.00757	2.19			20.01131	3.07
HB	-7.85099	-4.26	-18.753	-2.90	-8.73796	-4.75	-17.6809	-5.01
LCBTD	0.09808	0.72	0.078741	0.58	0.02016	0.15	-0.00331	-0.02
CBTDGR	3.02787	3.13	2.48936	2.49	3.00991	3.14	2.39914	2.36
DNRL1	8.63488	2.14	8.74198	2.14	8.06962	2.00	7.99707	1.96
SLDR	2.95366	2.83	2.74195	2.56	2.52243	2.37	2.22098	2.08
TAXTOP3	-1.36708	-4.08	-1.36	-4.06	-1.36044	-4.01	-1.31572	-3.90
Y96D	1.2075	2.68	1.20457	2.66	1.14134	2.52	1.14166	2.52
Y97D	0.27319	0.58	0.28674	0.61	0.18967	0.40	0.19044	0.40
Y98D	1.77376	4.16	1.79735	4.22	1.68655	3.93	1.69379	3.95
Y99D	1.03971	2.34	1.07451	2.40	0.96982	2.22	0.99239	2.27
CONSTANT	-1.2273	-2.02	1.1051	0.76	-1.38991	-2.83	0.52169	0.61
Sigma v	4.16253		4.16567		4.15951		4.15831	
Sigma u	0.90989		0.7954		0.90034		0.7849	
LL	-2387.6		-2383.2		-2386.1		-2380.4	

TABLE 7B

Estimated Rivarly Equations

Interstate Variable: MSMBHCHDR,MSMBHCODR

Mkts w/ TAXTOP3 = 0
(N=1347)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCHDR	-0.43731	-0.54	-1.56486	-0.69	1.350393	1.53	-1.78534	-0.72
HB*MSMBHCHDR			5.71456	0.55			16.00157	1.50
MSMBHCODR	0.02044	0.03	-4.09501	-1.96	1.52559	2.18	-3.82666	-2.29
HB*MSMBHCODR			19.52606	2.12			25.28713	3.51
HB	-9.01084	-4.03	-18.30297	-2.95	-10.09639	-4.51	-20.64633	-5.19
LCBTD	0.05841	0.44	0.044151	0.34	-0.03441	-0.26	-0.04669	-0.35
CBTDGR	3.13033	2.86	2.55068	2.33	3.10111	2.84	2.17669	1.99
DNRL1	11.62682	2.59	11.36719	2.54	10.89049	2.43	10.29056	2.30
SLDR	3.12641	3.13	2.81424	2.76	2.53577	2.42	1.8542	1.74
Y96D	0.95382	2.11	0.97153	2.15	0.88274	1.95	0.89998	1.99
Y97D	0.24437	0.54	0.25459	0.57	0.13738	0.30	0.13352	0.30
Y98D	1.93897	4.31	1.9704	4.38	1.84414	4.08	1.83741	4.06
Y99D	0.80813	1.70	0.83616	1.76	0.73637	1.55	0.72894	1.53
CONSTANT	-1.10347	-1.71	0.8706	0.63	-1.28392	-2.34	0.9996	1.13
Sigma	4.50299		4.48363		4.4956		4.46655	
LL	-2049.0		-2045.5		-2046.8		-2040.6	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSMBHCHDR	-0.33629	-0.38	-2.31733	-0.98	1.25031	1.16	-2.1359	-0.70
HB*MSMBHCHDR			8.69192	0.77			17.05183	1.28
MSMBHCODR	0.1344	0.16	-4.1791	-2.05	1.55822	2.12	-3.65942	-1.98
HB*MSMBHCODR			20.00757	2.19			24.48891	3.06
HB	-8.65287	-3.96	-18.75304	-2.90	-9.68067	-4.41	-20.1683	-4.80
LCBTD	0.0687	0.43	0.078741	0.58	-0.01732	-0.11	-0.0303	-0.18
CBTDGR	3.14104	2.81	2.48936	2.49	3.09783	2.79	2.21527	1.99
DNRL1	11.26027	2.35	8.74198	2.14	10.62103	2.23	10.20054	2.11
SLDR	3.04419	2.50	2.74195	2.56	2.49104	2.00	1.8201	1.47
Y96D	0.9623	1.86	1.20457	2.66	0.89146	1.71	0.91243	1.75
Y97D	0.25307	0.49	0.28674	0.61	0.14485	0.27	0.14189	0.27
Y98D	1.9488	4.17	1.79735	4.22	1.85411	3.93	1.8441	3.91
Y99D	0.81141	1.60	1.07451	2.40	0.7274	1.46	0.71719	1.44
CONSTANT	-1.2716	-1.83	1.1051	0.76	-1.40112	-2.50	0.88036	0.89
Sigma v	4.3444		4.16567		4.34354		4.34479	
Sigma u	1.2584		0.7954		1.22842		1.10382	
LL	-2044.8		-2383.2		-2042.9		-2037.8	

TABLE 8A

Estimated Rivarly Equations

Interstate Variable: MSHCODR

All Mkts w/ Nonmissing Data
(N=1637)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSHCODR	0.493356	1.10	-2.5543	-2.21	1.01447	1.94	-2.65288	-2.15
HB*MSHCODR			14.07907	2.86			16.40892	3.28
HB	-8.47433	-4.65	-14.96226	-5.07	-8.76982	-4.78	-15.10184	-5.60
LCBTD	0.06644	0.60	0.048924	0.44	0.048131	0.43	0.02964	0.27
CBTDGR	3.02065	3.36	2.54134	2.82	2.99281	3.34	2.41415	2.69
DNRL1	8.6514	2.22	8.52854	2.20	8.18577	3.41	8.24194	2.13
SLDR	2.97108	3.53	2.87375	3.42	2.87566	3.41	2.79858	3.33
TAXTOP3	-1.37989	-4.61	-1.37949	-4.61	-1.40369	-4.69	-1.37595	-4.61
Y96D	1.2018	3.01	1.20951	3.03	1.17513	2.94	1.1928	2.99
Y97D	0.28409	0.71	0.31056	0.77	0.24153	0.60	0.27682	0.69
Y98D	1.77537	4.46	1.82091	4.58	1.72897	4.33	1.78351	4.48
Y99D	1.0469	2.55	1.11263	2.71	0.99355	2.41	1.06173	2.58
CONSTANT	-1.33763	-2.74	0.04627	0.07	-1.28824	-2.70	0.05861	0.09
Sigma	4.2531		4.23726		4.24775		4.22825	
LL	-2390.5		-2386.4		-2389.2		-2383.9	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSHCODR	0.53663	1.11	-2.40491	-1.85	1.40876	1.88	-2.55865	-1.80
HB*MSHCODR			13.48895	2.29			16.05324	2.52
HB	-8.0948	-4.46	-14.42074	-4.05	-8.40726	-4.55	-14.72046	-4.57
LCBTD	0.077194	0.58	0.05724	0.42	0.0579	0.42	0.036736	0.27
CBTDGR	3.01375	3.12	2.57458	2.64	2.98823	3.12	2.44727	2.44
DNRL1	8.44611	2.09	8.40239	2.06	8.05524	2.01	8.15453	2.02
SLDR	2.9151	2.78	2.83784	2.68	2.81916	2.69	2.76218	2.64
TAXTOP3	-1.35592	-4.06	-1.35639	-4.06	-1.37971	-4.14	-1.35496	-4.09
Y96D	1.20486	2.69	1.21425	2.70	1.1777	2.62	1.19756	2.67
Y97D	0.2805	0.60	0.30892	0.66	0.238	0.51	0.27629	0.59
Y98D	1.77015	4.15	1.81663	4.27	1.72414	4.03	1.78079	4.19
Y99D	1.04922	2.41	1.11239	2.55	0.99597	2.28	1.06367	2.43
CONSTANT	-1.44216	-2.97	-0.08759	-0.10	-1.38227	-2.82	-0.037951	-0.05
Sigma v	4.1593		4.16342		4.15745		4.15804	
Sigma u	0.93067		0.82865		0.91389		0.80824	
LL	-2387.8		-2384.5		-2386.7		-2384.5	

TABLE 8B

Estimated Rivarly Equations

Interstate Variable: MSHCODR

Mkts w/ TAXTOP3 = 0
(N=1347)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSHCODR	0.379496	0.74	-2.63272	-1.92	0.98107	1.63	-3.10606	-2.09
HB*MSHCODR			14.19378	2.37			18.594	3.01
HB	-9.25061	-4.21	-15.2352	-4.51	-9.55768	-4.34	-16.0214	-5.15
LCBTD	0.041432	0.32	0.029352	0.23	0.02403	0.19	0.012614	0.10
CBTDGR	3.11096	2.84	2.61823	2.39	3.06307	2.81	2.34202	2.14
DNRL1	11.42582	2.54	11.07052	2.47	10.89288	2.43	10.676	2.39
SLDR	3.09992	3.10	2.90021	2.90	3.03139	3.04	2.78275	2.79
Y96D	0.95237	2.10	0.97807	2.17	0.936258	2.07	0.97166	2.16
Y97D	0.252371	0.57	0.27477	0.61	0.2089	0.47	0.24446	0.55
Y98D	1.93699	4.30	1.9795	4.41	1.89846	4.21	1.96141	4.36
Y99D	0.82041	1.73	0.87076	1.84	0.76156	1.60	0.82557	1.74
CONSTANT	-1.28893	-2.30	-0.0036	-0.01	-1.27389	-2.33	0.12664	0.18
Sigma	4.50322		4.48718		4.49706		4.4742	
LL	-2049.0		-2046.3		-2048.0		-2043.5	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
MSHCODR	0.43695	0.79	-2.27995	-1.53	1.05333	1.62	-2.81439	-1.66
HB*MSHCODR			12.65698	1.90			17.42431	2.32
HB	-8.83239	-4.09	-14.2356	-3.47	-9.1717	-4.17	-15.3146	-4.13
LCBTD	0.055883	0.35	0.04283	0.27	0.03732	0.23	0.023981	0.15
CBTDGR	3.12195	2.80	2.68326	2.37	3.07536	2.77	2.40347	2.13
DNRL1	11.07047	2.31	10.87867	2.26	10.62645	2.23	10.56364	2.21
SLDR	3.02182	2.47	2.85289	2.32	2.95015	2.41	2.73204	2.26
Y96D	0.9611	1.86	0.98444	1.91	0.9415	1.82	0.97745	1.90
Y97D	0.25793	0.50	0.27935	0.54	0.21126	0.41	0.24873	0.48
Y98D	1.94455	4.16	1.98779	4.27	1.904	4.05	1.96534	4.20
Y99D	0.81544	1.64	0.86241	1.73	0.75567	1.51	0.81868	1.64
CONSTANT	-1.42334	-2.56	-0.25265	-0.26	-1.39818	-2.49	-0.05979	-0.07
Sigma v	4.34216		4.34947		4.33825		4.34394	
Sigma u	1.26693		1.17732		1.2583		1.14463	
LL	-2044.8		-2042.8		-2043.8		-2040.3	

TABLE 9A

Estimated Rivarly Equations

Interstate Variable: ISBRHCDR,OSBKHCDR

All Mkts w/ Nonmissing Data
(N=1637)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
OSBKHCDR	-0.31299	-0.56	-2.0928	-1.50	0.608246	0.92	-1.39301	-0.92
HB*OSBKHCDR			8.60215	1.45			9.4226	1.51
ISBRHCDR	1.7755	2.59	-2.69782	-1.70	1.56977	2.08	-4.01171	-2.39
HB*ISBRHCDR			19.69292	3.13			23.73464	3.74
HB	-8.59486	-4.70	-14.5371	-4.93	-8.78663	-4.79	-14.7279	-5.46
LCBTD	0.04187	0.38	0.01559	0.14	0.041734	0.38	0.01384	0.12
CBTDGR	3.19658	3.54	2.98819	3.22	3.06592	3.41	2.82038	3.04
DNRL1	7.9527	2.04	8.05133	2.07	7.9265	2.04	8.21869	2.12
SLDR	2.6493	3.11	2.4732	2.90	2.71364	3.16	2.548	2.12
TAXTOP3	-1.36268	-4.53	-1.34293	-4.49	-1.39919	-4.67	-1.34953	-4.53
Y96D	1.13701	2.84	1.14276	1.87	1.15613	2.89	1.16434	2.93
Y97D	0.03858	0.09	0.103337	0.25	0.154999	0.37	0.22849	0.55
Y98D	1.43875	3.42	1.5371	3.66	1.61631	3.90	1.71967	4.17
Y99D	0.68424	1.57	0.82398	1.89	0.87319	2.04	1.01486	2.37
CONSTANT	-0.99489	-1.97	0.25082	0.36	-1.17194	-2.39	0.07665	0.12
Sigma	4.24692		4.22558		4.24809		4.21833	
LL	-2387.4		-2382.5		-2388.7		-2381.7	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
OSBKHCDR	-0.26084	-0.50	-1.93466	-0.94	0.665105	1.10	-1.2365	-0.53
HB*OSBKHCDR			7.98005	0.82			8.84232	0.82
ISBRHCDR	1.80407	2.09	-2.59235	-1.17	1.57487	1.66	-4.00674	-1.48
HB*ISBRHCDR			19.3005	2.01			23.70195	2.00
HB	-8.22934	-4.26	-14.0306	-3.82	-8.4304	-4.33	-14.3424	-4.23
LCBTD	0.05249	0.39	0.023152	0.17	0.051653	0.38	0.019632	0.14
CBTDGR	3.18813	3.24	3.01285	3.03	3.0574	3.10	2.84914	3.06
DNRL1	7.75205	1.88	7.92173	1.92	7.81068	1.89	8.14119	1.97
SLDR	2.60284	2.44	2.44128	2.30	2.6683	2.47	2.51367	2.35
TAXTOP3	-1.33882	-3.96	-1.3231	-3.92	-1.37503	-4.10	-1.33168	-4.03
Y96D	1.14015	2.53	1.1471	2.54	1.15927	2.57	1.1694	2.59
Y97D	0.03687	0.08	0.10249	0.22	0.155485	0.33	0.23141	0.49
Y98D	1.43712	3.19	1.53489	3.43	1.61713	3.64	1.72219	3.92
Y99D	0.68908	1.49	0.82582	1.79	0.88124	1.94	1.02347	2.27
CONSTANT	-1.09922	-2.02	0.124473	0.14	-1.27079	-2.35	-0.02353	-0.03
Sigma v	4.15902		4.15715		4.15966		4.14881	
Sigma u	0.89958		0.79795		0.90352		0.80458	
LL	-2385.0		-2380.7		-2386.2		-2379.9	

TABLE 9B

Estimated Rivarly Equations

Interstate Variable: ISBRHCDR,OSBKHCDR

Mkts w/ TAXTOP3 = 0
(N=1347)

TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
OSBKHCDR	-0.36285	-0.56	-0.89031	-0.49	0.66598	0.88	-0.41822	-0.21
HB*OSBKHCDR			2.82204	0.35			5.39742	0.60
ISBRHCDR	1.67638	1.98	-3.05793	-1.70	1.47332	1.57	-4.65634	-2.39
HB*ISBRHCDR			20.67948	2.93			25.67566	3.59
HB	-9.47254	-4.30	-14.31972	-4.22	-9.6186	-4.36	-15.24665	-4.88
LCBTD	0.00914	0.07	-0.02412	-0.19	0.01589	0.12	-0.017587	-0.14
CBTDGR	3.23675	2.94	3.22816	2.82	3.10721	2.84	2.97849	2.58
DNRL1	11.19658	2.49	11.50839	2.56	10.81291	2.41	11.16061	2.50
SLDR	2.85683	2.84	2.71512	2.70	2.91881	2.88	2.78065	2.75
Y96D	0.90132	1.99	0.91194	2.02	0.92204	2.04	0.93727	2.08
Y97D	0.00162	0.01	0.08206	0.18	0.13041	0.28	0.23103	0.50
Y98D	1.64321	3.46	1.76731	3.72	1.81235	3.87	1.94954	4.17
Y99D	0.44668	0.88	0.61814	1.20	0.65119	1.30	0.84268	1.68
CONSTANT	-0.95861	-1.64	0.02818	0.04	-1.17499	-2.07	-0.018264	-0.03
Sigma	4.49807		4.47532		4.49771		4.46345	
LL	-2047.2		-2042.9		-2047.8		-2041.4	

Random Effects
TOBIT

	All Bank Orgs				Bank Orgs > $25 Bil. Consol TD			
Variables	COEFF	Z	COEFF	Z	COEFF	Z	COEFF	Z
OSBKHCDR	-0.297273	-0.48	-0.42372	-0.19	0.78654	1.10	0.15178	0.07
HB*OSBKHCDR			0.73975	0.07			3.0717	0.29
ISBRHCDR	1.709478	1.70	-2.80644	-1.07	1.46556	1.31	-4.59971	-1.48
HB*ISBRHCDR			19.65967	1.77			25.38856	1.93
HB	-9.051072	-3.94	-13.2805	-3.09	-9.22367	-4.02	-14.46476	-3.77
LCBTD	0.02363	0.15	-0.012994	-0.08	0.03029	0.19	-0.00835	-0.05
CBTDGR	3.2572	2.90	3.33264	2.78	3.11564	2.77	3.09468	2.55
DNRL1	10.79264	2.21	11.2589	2.30	10.5477	2.16	11.03529	2.25
SLDR	2.78038	2.22	2.66282	2.13	2.85543	2.24	2.73376	2.17
Y96D	0.90763	1.76	0.91748	1.77	0.9285	1.79	0.94455	1.83
Y97D	0.00657	0.01	0.0853	0.16	0.1443	0.27	0.24372	0.45
Y98D	1.6522	3.27	1.77088	3.54	1.83058	3.67	1.96436	4.00
Y99D	0.44661	0.82	0.61534	1.12	0.66251	1.24	0.85489	1.60
CONSTANT	-1.09245	-1.72	-0.2276	-0.23	-1.313	-2.09	-0.23063	-0.26
Sigma v	4.34075		4.33834		4.34021		4.32777	
Sigma u	1.25092		1.1743		1.25194		1.16756	
LL	-2043.1		-2039.5		-2043.6		-2038.0	