GEOGRAPHIC DEREGULATION AND COMPETITION IN THE U.S. BANKING INDUSTRY

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ABSTRACT

We examine the effects of geographic deregulation on state-level competition in U.S. banking markets over the period 1976-2005. The empirical results confirm that the U.S. banks in general operated under monopolistic competition during the period examined. After partitioning the sample based on bank size we find that the market competition for large banks in Delaware, Oregon, and Rhode Island can be characterized as monopolistic while small banks in Arizona and Massachusetts seem to have operated under the conditions of perfect competition. The removal of geographic restrictions appears to have very limited and non-uniform effect on state-level competitive conduct. There is some evidence that the U.S. banking industry might have actually experienced a less competitive behavior in recent years due to increased market power of larger banks.

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1. Introduction

Prior to 1970, various intrastate branching and interstate banking restrictions confined U.S. commercial banks to operate within a specified geographic area and/or limited their expansion beyond that area for much of the twentieth century. Beginning in the 1970s, most states adopted new laws that fundamentally deregulated the banking industry in the United States. Several states removed restrictions on intrastate bank branching and permitted banks to expand across state lines, thereby "ushering an era of large regional and super-regional banks" (Kroszner, 2001). By 1990, all but three states allowed intrastate branch banking, and all states but Hawaii permitted out-of-state bank holding companies (BHCs) to buy in-state banks. Finally, the Riegel-Neal Interstate Banking and Branching Efficiency Act (IBBEA) of 1994 removed the remaining restrictions which enabled banks to establish branches and buy other banks across the country and allowed BHCs to cross state lines freely.

The evolutionary history of deregulation of banking witnessed in the decades of 1970s, 1980s, and 1990s, presents an attractive setting to study how the geographic deregulations at the state-level in different times affect the commercial banking industry. Prior studies suggest that only small and inefficient local banks are major beneficiaries of banking regulations limiting geographic expansion, thereby protecting them from stiffer competition (Kane, 1996; Jayarathe and Strahan, 1998; Kroszner and Strahan, 1999). However, critics have argued strongly against bank regulations restricting the geographical scope of commercial banking operation because such regulations contribute

to increased costs, reduced profitability (Schranz, 1993; Hubbard and Palia, 1995) and lower efficiency (Jayaratne and Strahan, 1998); help create smaller banks inhibiting diversification, thus making banks more vulnerable to bank runs and portfolio shock during economic downturns (Calomiris 1993; Demsetz and Strahan, 1995; Calomiris, 2000); allow banks to increase their market power (Rhoades, 1982; Flannery, 1984; Evanoff and Fortier, 1988; Amel and Liang, 1992); benefit smaller and less efficient banks by providing protection from the competition of larger and more efficient firms (Jayaratne and Strahan, 1998; Kroszner and Strahan, 1999; Stiroh and Strahan, 2003).

Calem (1994) finds that small banks lose market share after removal of intrastate branching restrictions. Daniels, Tirtiroglu and Tirtiroglu (2005) document that geographic restrictions on intrastate branching and interstate expansion have a negative impact on productive growth of U.S. commercial banking sector, while the removal of long standing banking restrictions has a "positive long-run influence upon banks' productivity growth". Strahan (2003) finds that the deregulation of geographic restrictions on intrastate branching and interstate banking has led to "substantial and beneficial real effects" on U.S. economy. Zardkoohi and Fraser (1998) analyze the effects of geographical deregulation on competition in U.S. banking markets using industry level data. However, the results of their study suggest that geographical deregulation has not had significant impact on competition. Dick (2004) finds that credit portfolio risk decreases and spreads fall with removal of geographic restrictions due to greater geographic diversification and an increase in competition in the credit market.

Our paper differs from the previous studies in several ways. Since most states in the U.S. deregulated their banking industry (both interstate banking and statewide

branching restrictions) in piecemeal fashion during the past three decades, this study provides a unique opportunity to examine the effects of deregulation on competition, by using an empirical strategy exploiting state-by-state differences in the timing of deregulation. Shaffer (1989) and Zardkoohi and Fraser (1998) examine the effects of geographic deregulation on competition in U.S. banking markets using industry level data. These studies have adapted the model of a comparative static framework developed by Bresnahan (1982). However, following the literature on competition in industrial organization, we employ a unique approach known as the Panzar-Rosse H-statistic developed by Panzar and Rosse (1987) and use bank-level data to analyze the competitive condition in each state during pre- and post-deregulation era. Using the largest banking dataset compiled to date, the results of this study should be helpful to policymakers and regulators who are interested in learning the effects of geographic deregulations on market competition, conduct, and the performance of U.S. commercial banking industry.

Our findings suggest that the U.S. banks in general operated under monopolistic competition during the sample period. After partitioning the sample based on bank size we find that the competitive behavior for large banks in Delaware, Oregon, and Rhode Island can be characterized as monopolistic, while the competitive conduct for small banks in Arizona and Massachusetts can be characterized as perfectly competitive. At the state-level, the effect of geographic deregulation on competitive conduct seems to be minor and non-uniform. Following deregulation, competition has either increased or declined in some states while staying the same in most others. There is some evidence that the U.S. banking industry might have actually experienced a less competitive

behavior in recent years due to increased market power of larger banks. Following the interstate branching deregulations, we find a certain level of decline in competition index which might be attributed to the presence of fewer number of large banks due to acquisitions and consolidation in the banking industry. Based on the estimated coefficients, the evidence suggests that banks in the U.S. were still operating under monopolistic competition during both pre- and post-deregulation periods.

The rest of the study is organized as follows. Section 2 provides a brief history of geographic deregulations. Section 3 summarizes the previous studies and methods employed to test competition in the banking literature. Section 4 presents our model, the testable hypotheses, and the data used to assess competitive conduct in the U.S. banking industry. Section 5 discusses the empirical findings and Section 6 concludes.

2. A Brief History of Geographic Deregulation of Banks

Prior to 1970s, most states had laws prohibiting branching altogether (the "unit banking states) or with limited branching, while all states forbade interstate branching. As late as 1975, only fourteen states allowed intrastate branching, while twelve states prohibited altogether. The remaining states imposed restrictions of their branching expansions of varying degree. However, between 1970 and 1994, thirty eight states removed their restrictions on branching.

In addition to facing restrictions on in-state branching, banks were effectively prohibited to cross state lines until 1980s due to states' application of the Douglas Amendment to the 1956 Bank Holding Company (BHC) Act. This amendment restricted a BHC from acquiring banks outside the state where it was headquartered unless the target bank's state permitted such acquisitions. Since no state allowed such transactions,

the amendment effectively prohibited interstate banking. In 1978, Maine permitted out-of-state BHCs to buy a Maine bank only if the home state of the acquiring BHC permitted Maine-based BHCs the reciprocal right to acquire banks there. Since no other state reciprocated and the interstate banking was effectively prohibited until 1982 when Alaska and New York passed laws similar to Maine.

Table 1 illustrates the history of the geographic deregulation of restrictions on intrastate branching and interstate banking since 1970. The first two columns relate to intrastate branching deregulation. The first column presents the year in which each state allowed branching by means of only merger and acquisition (M&A) through holding company structure. The second column presents the year in which each state permitted unrestricted statewide branching, thereby allowing banks to expand into new markets by opening new branches within the state. As seen in Table 1, most cases branching via M&A began first, and then unrestricted branching followed. Third column reports the year in which each state permitted interstate banking. By the end of 1992, all states but Hawaii had entered interstate banking agreements with other states and all states but Arkansas, Iowa, and Minnesota permitted statewide branching. However, the interstate deregulations at state level led to a different degree of market openness for each state, ranging from the least degree of market openness (regional reciprocity), to the most liberal or unrestricted market openness (national non-reciprocity). Thus, state-level geographic deregulations did not lead to unrestricted interstate branching. The process of geographic deregulations culminated in 1994 with the passage of the Interstate Banking and Branching Efficiency Act (IBBEA) of 1994, which essentially mandated unrestricted interstate banking and branching as of June 1997. Thus, the staggered timing of state-

level deregulations of both branching and interstate banking restrictions leading to IBBEA of 1994 over past three decades provides an ideal laboratory to explore how the evolutionary changes in geographical regulations in the United States affect competition in the U.S. banking industry.

3. Theory and Literature Review

The banking literature evaluates the effects of geographic deregulation on bank competition and performance. Jayaratne and Strahan (1998) find that restrictions on the geographic expansion of banks "retarded the natural process of selection" while the removal of geographic restrictions allow efficient banks to expand at the expense of inefficient ones. Their study provides evidence of significant improvement in nonperforming loans, loan loss provisions, and charge-offs following deregulation. Hannan and Prager (1998) find that the elimination of restrictions to intrastate-multibank-holding-company expansion, interstate-multibank-holding-company expansion, and interstate-branching resulted in more competitive deposit interest rates. DeYoung, Hasan, and Kirchhoff (1998) find that following the removal of the restricted interstate and intrastate banking laws, local banks' productive efficiency initially deteriorated, but then improved over time. Using bank level data, Stiroh and Strahan (2003) find that following deregulation, market shares were reallocated toward high performing institutions and this relationship was stronger in states that previously had the most restrictive regulations. Finally, Daniels, Tirtiroglu, and Tirtiroglu (2005) find that geographic restrictions to bank branching and expansion adversely affected total factor productivity of U.S. banks during 1971-1995 period. Thus, the findings of prior studies suggest that the geographic deregulation has had significant

impact on the competitive behavior of banks.

Several competing hypotheses exist regarding the effects of deregulation and concentration on the pricing behavior of firms in the economics literature. The traditional structure-conduct-performance (SCP) hypothesis suggests that firms operating in more concentrated markets can use their market power to extract high rents from their customers. A rise in concentration is regarded as increasing collusive opportunities between banks, and hence, would lead to higher prices and profitability. Alternatively, the efficient structure hypothesis (ESH) interprets the positive relationship between profitability and market concentration in a different way. It suggests that concentration might increase the overall efficiency of the banking markets if concentration is due to economies of scale, or if more efficient banks grow at the expense of less efficient banks. If this be the case, banks in concentrated markets would price their services competitively at least up to a certain point. As the third approach, the contestable markets theory (CMT) argues that competitiveness of an industry does not depend solely on market structure indicators such as concentration or number of incumbent firms; a concentrated banking industry can behave competitively if the barriers for new entrants to the market are low. The CMT asserts that incumbent firms are always vulnerable to hit-and-run entry when they try to exercise their potential market power, thus the threat of potential entry forces banks with large market shares to price their products competitively under certain conditions. These features of CMT imply that a concentrated banking market can be effectively competitive even if it is dominated by a handful of large banks.

Gilbert (1984) presents a fairly comprehensive review of the related early literature, testing the hypothesis of a positive correlation between concentration in the U.S. banking markets and bank performance. The overall evidence is ambiguous. About 50% of the studies confirm the hypothesis, but in any case variation in the market concentration has only a small impact on the performance measure employed. Gilbert strongly criticizes the fact that most of the market structure studies neglect the effect of rate regulation on bank performance, which suppresses the true relationship between market structure and performance. Empirical studies that utilize the SCP paradigm to assess the competitive conditions in major European banking markets usually provide weak support in favor of SCP over the efficient structure hypothesis [See, for example, Bourke (1989), Molyneux and Thornton (1992), and Molyneux and Teppet (1993)].

The efficient structure hypothesis (ESH) is also applied to the banking industry by Smirlock (1985), Smirlock and Brown (1986), Brozen (1982), Evanoff and Fortier (1988), and Berger and Humphrey (1991). Smirlock (1985) finds a positive relationship between market share and profitability, and no linkage between concentration and profitability. He concludes that his results support the efficient structure hypothesis. Brozen (1982) and Evanoff and Fortier (1988) report similar conclusions. However, Smirlock's conclusion is questioned by Shepherd (1986) and Rhoades (1985), for his assumption that market share can be considered as a proxy for efficiency. They maintain that market share represents market power rather than a measure of efficiency.

The new industrial organization literature offers at least two types of empirical tests for competition. The first one is the model developed by Bresnahan (1982) and Lau

(1982), which estimates an index that measures degree of rivalry by employing aggregate industry level data. The test relies on the idea that profit-maximizing firms set marginal cost equal to their perceived marginal revenue, which corresponds with the demand price in classical competitive equilibrium, but corresponds to the industry's marginal revenue in the collusive extreme. This method has been applied to banking studies to test competition in Uruguay (Spiller and Favaro, 1984), the United States (Shaffer, 1989; and Zardkoohi and Fraser, 1998), Canada (Shaffer, 1993), Finland (Vesala,1995), Colombia (Barajas et al., 1999), and seven European countries (Neven and Roller, 1999).

The second approach is the Panzar and Rosse (1982, 1987) H-statistic model (PR) which measures the extent to which changes in input prices are reflected in equilibrium revenues by using firm-level data. The PR approach has been applied extensively to examine the competitive structure of the developed and emerging banking markets. For example Shaffer (1982) for a cross-section of New York Banks; Nathan and Neave (1989) for Canada; Molyneux et al. (1994) for Germany, UK, France, Italy, and Spain; Vesala (1995) for Finland; Coccorese (1998) for Italy; Hondroyiannis et al. (1999) for Greece; De Bandt and Davis (2000) for Germany, France, and Italy; Bikker and Groeneveld (2000) for EU countries; Yildirim and Philippatos (2007a) for 14 Eastern European countries; Yildirim and Philippatos (2007b) for 11 Latin American countries; Gelos and Roldos (2004) for 13 emerging markets; and Claessens and Laeven (2004) for 50 developed and emerging countries. In general, the results of these studies suggests that the banking markets of industrialized countries and transition economies could be characterized by monopolistic competition, although some of them could not reject the

cases of monopoly for sub-samples of small banks and perfect competition for large banks in several countries.

How does our study fit within this literature? Removal of geographical restrictions of intrastate and interstate banking and branching may have important implications for U.S. banking markets. We would expect that the elimination of entry barriers should result in increased competition in the banking markets due to several factors including economies of scale and scope for larger banking organization, efficiency gains, competitive pricing of bank products and services, and geographic diversification (e.g., Baer, Evanoff, Fortier, and Mote, 1988). Thus, financial institutions realize that their local market will no longer be protected by regulation - i.e., greater competition now exists due to actual level of competition or by threat of potential entry into the market. However, the potential efficiency gains associated with reduced barriers to geographic expansion must be balanced against the potential negative effects of increased market power due to concentration. We want to re-emphasize that our paper differs from previous research in that we are not assessing the efficiency of the banks. Rather we evaluate whether the net effect of geographic deregulation in each state has led to an increase or a decrease in the degree of competition. This is an empirical question. We present, in what follows, the methodology, testable hypotheses, and data to tackle this question.

4. Empirical Model, Testable Hypotheses and Data

In order to evaluate the effects of geographic deregulations on competitive structure of the U.S. banking industry, we use a test based on reduced-form revenue

equations of the firms developed by Panzar and Rosse (1982, 1987). Based on the premise that banks will employ different pricing strategies in response to changes in input costs depending on the market structure, PR developed a so-called "H statistic" which is the sum of the elasticities of the reduced form revenues with respect to input prices. This competition index “H” actually measures the percentage change in a bank's equilibrium revenues caused by one percent change in all of the bank's input prices.

Panzar and Rosse show that the H-statistic is equal to one when the market structure is characterized as perfectly competitive, it ranges from zero and one for monopolistic competition, and is less than or equal to zero in monopoly or perfect cartel. Under the constant elasticity of demand assumption and a Cobb–Douglas production technology, it can be shown that, the magnitude of H can be interpreted as an inverse measure of monopoly power or alternatively, a measure of the degree of competition.[1] Applying this method to banking assumes that (except for the monopoly case) the test is undertaken on observations that are in long-run equilibrium, and that banks are profit maximizing firms with conventional demand and cost structures.

Following the earlier studies which employed the “H index” for competition and the "intermediation approach" to bank modeling[2], we estimate the following reduced form bank revenue equations on the overall sample as well as samples for each state.

[1] The details of formal derivation of the H-statistic can be found in Panzar and Rosse (1987) and Vesala (1995).

[2] Two empirical approaches to modeling bank output are the "intermediation" and the "production" approaches. The intermediation approach treats banks as financial intermediaries that create output only in terms of their assets, using their liabilities, labor and capital. Deposits are treated as inputs that are intermediated into banks’ outputs (loans and investments) and interest on deposits is a component of total cost, together with labor and capital costs. The production approach, views banks as firms that use capital

$$\ln (REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_{it} \quad (1)$$

where the dependent variable REV is the total (gross) operating revenue, PF is the ratio of interest expenses to total deposits (proxy for input price of deposits), PL is the ratio of personnel expense to number of full time equivalent employees, PK is the ratio of physical capital expenditure to fixed assets. The subscripts i and t denote bank i and year t. We take natural logarithms of all variables. Our model is similar to models used previously in the literature to estimate H-statistics for banking industries.

Previous studies used both interest revenue and total revenue as the dependent variable. Although financial intermediation still constitutes the core business in commercial banking, recent studies on banking activities indicate that non-interest income is increasingly becoming a significant source of earnings. Considering this trend, we used total revenues in the model.[3] A number of banks specific factors (BSF) , included to account for size, risk, and deposit mix differences, are similar to those used in previous studies. These factors are the log of total assets (TA) as a proxy for economies or diseconomies of scale, the log ratio of equity to total assets (EQTY) as the risk variable, and the log ratio of demand deposits to total liabilities (DDEP) accounts for differences in the deposit mix. Change in real State Gross Domestic Product (GDP) is added in estimations to account for the macroeconomic environment in which the bank operates for each state.

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and labor to produce loans and deposits. Since deposits are considered as output, the interest expense on deposits is not included in the costs. For further discussion of these approaches, see Berger et al. (1987)

[3] For robustness check, we have also run all the tests with only interest revenue as the dependent variable. Our conclusions stayed broadly the same. For brevity, we do not report those results.

The size variable (TA) accounts for cost differences related to bank size and also controls for greater portfolio and loan diversification associated with larger banks. An important implication of asset diversification is less risk and hence a lower required rate of return. We do not know the ex-ante effect of size differentials in assets among banks on the revenue generating process, and therefore we do not have any expectation on the sign of the coefficient for the size variable. In commercial banking, equity capital constitutes the most expensive marginal source of funding. To the extent it is allowed by regulation, a lower level of equity capital will imply a lower average cost of funds and higher interest (and total) revenue, everything else being constant. Therefore, we expect to get a negative coefficient for the equity (EQTY) variable. The demand deposits (DDEP) variable is expected to affect positively the total revenue.

Under the PR framework, the H statistic is equal to the sum of the elasticities of the revenue with respect to the three input prices:

$$\mathbf{H = h_1 + h_2 + h_3} \qquad \mathbf{(2)}$$

The testable hypothesis for monopolistic competition is:

$$\mathbf{0 < H = h_1 + h_2 + h_3 < 1,} \qquad \mathbf{(3)}$$

where $H \leq 0$ is monopoly and $H=1$ is perfect competition.

The regression models are estimated by the ordinary least squares (OLS) method on the pooled sample of banks and years for each state, implicitly assuming that standard errors are independently distributed across banks and over time. When we run the model on the full sample we added state dummy variables to account for differences in operating environment and macroeconomic conditions.

Bank data are collected from the reports of Income and Conditions (Call Reports) for each state over 30 years between 1976 and 2005. These data are deflated by the consumer price index and stated in 1990 dollars. The final sample consists of 341,584 bank-year observations (11,395 banks on average per year). Table 2 provides sample statistics for each variable for each state and for the entire country over the sample period.

5. Empirical Results

Previous studies employing the PR method in evaluating competitive structure generally concentrated on the examination for a single country or a sample of several countries. The unique structure of the U.S. banking markets and the availability of the banking data for longer term provides us with the opportunity to perform various analyses in several dimensions. The regression results that are based on the overall sample on a pooled data set (with state dummy variables added into the model in Equation (1) provides a general picture of the competitive structure of in banking over the sample period. We also classify banks in our sample based on asset size, (large and small banks with total assets above and below the median asset size for a given year in the sample) and estimate their H-statistics. Separation of small banks from their larger counterparts is important for several reasons. First, small banks generally attract relationship-based customers, as opposed to large banks, which tend to produce more transaction-driven services (Kwast et al. 1997). Second, these different business practices might have different implications for cost and revenue structures. Third, Berger and Humphrey (1991) report a greater variation in costs and profits for smaller banks as opposed to larger banks, suggesting that separate treatment of banks based on size may allow for more precise estimate of competitive behavior.

Furthermore, in order to account for geographical scope of banking services, we examine the competitive conditions in each state separately. For the entire sample and sub-samples, we run the model for three different time horizons-1976-85, 1986-95, and 1996-2005 to examine the change in competitive conditions. Finally, we also compute the competition index for individual states before and after the years of interstate banking deregulation to see the impact of deregulation on bank competition.

5.1 Estimation for the Pooled Sample

The competitive position tests for the pooled data are reported in Table 3. Almost all of the estimated coefficients are statistically significant at the 1% level. All tests confirm the good fit of models. The estimated regression equations explain 98% of the variability in revenues for the overall sample and large banks and 94% variability in revenues for the small banks. Specification test fails to reject the null hypothesis of no specification error.

Although the coefficients on the bank specific factors are of secondary interest to our analysis, we report them nevertheless for the overall sample and size-based sub-samples along with H statistics in Table 3. The sign on the size coefficient (TA) is positive and significant in all cases, suggesting that size differentials in assets among banks lead to higher total revenues per dollar of assets for the larger banks. This implies that larger banks are more efficient compared to smaller banks. Another significant variable with positive coefficient is the deposit mix (DDEP), and it suggests that banks with a higher proportion of demand deposits in their total liabilities are able to generate higher interest revenues. The risk coefficient, (EQTY), is significant and has the expected negative sign, indicating that banks with low proportion of equity capital (riskier banks)

are able to generate higher income per dollar of their assets. This finding is also consistent with the observation that capital constitutes the most expensive source of funding in commercial banking. Finally banks revenues are negatively correlated with changes in state GDP levels.

The sign on the coefficients for the three input price proxies (PF, PL, and PK) are always highly statistically significant and positive in all cases, as expected. The coefficients on the price of deposits and labor are found to be somewhat lower for larger banks. The coefficient on the unit price of funds (PF) provides the biggest contribution to the H-Statistic while the coefficient unit price of capital (PK) provides the least contribution.

The point estimate for the test statistic H is significantly positive for the overall sample (0.61) and small (0.70) and large bank (0.48) samples in pooled estimations. The F-statistics for testing the hypotheses H=0 and H=1 indicate that we can reject the null hypotheses at 1% level of significance for all three estimations. These results suggest that the value of the test statistic H is positive and statistically different from 0 and unity, rejecting both the monopoly and perfect competition hypotheses. The economic interpretation of these numbers is that U.S. commercial banks, regardless of their size, have actually operated under monopolistic competition, on average, between 1976 and 2005. The point estimates we found are within the range of estimates that are reported in earlier studies.

Some of the previous studies on bank competition find differences in competitive behavior between types of banks. For example, De Bandt and Davis (2000) reports monopolistic behavior for small banks in France and Germany and monopolistic

competition for small banks in Italy and for the large banks in all three countries in their sample. Their findings suggest that in these countries small banks enjoy greater market power due probably to relationship-based nature of their business in their local markets. In a further analysis, we test for the significance of the differences in H statistics of the small and large banks by using interaction terms and estimating two groups within one regression. The F-value for this test is found to be 9155.79 (significant at the 0.01 level), indicating a higher test statistic for smaller banks. In other terms the results indicates that smaller banks operate in a relatively more competitive environment. Although this finding is in contrast with some of the earlier studies which reports higher H statistics for larger banks (See for example DeBandt and Davis, 2000; Yildirim and Philippatos 2007a), it is in line with the conventional wisdom that larger market shares usually generate greater market power.

5.2 Estimation for the Individual States

Although we do not report and discuss in the previous section, the parameter estimates for majority of the state dummies are statistically significant. Observing the structural differences in local markets calls for the evaluation of competitive conditions at the state level. Table 4 summarizes the calculated market power coefficients and their lower and upper bounds on the 95% confidence interval of the separate analyses for each state over the sample period.[4] The fit for each equation is very good, with adjusted R^2 values ranging from a low of 0.95 for Delaware to above 0.99 for many states.

In virtually all of these estimations, the H-statistic is positive and significantly different from zero and unity at the 1% level. Over the period 1976-2005, Rhode Island

[4] The results of the regressions for individual states are not reported to save space; they are available from authors upon request.

has the lowest competitive index (0.23) and Hawaii has the highest (0.91). According to the above findings, we reject the monopoly and perfect competition hypotheses for individual states and conclude that banks in these states seem to earn their revenues as if under the conditions of monopolistic competition. These results seem to be compatible with contestable markets theory (CMT), if one can assume that incumbent firms set their prices close to the competitive level because of potential competition; otherwise higher prices will attract potential entrants with hit-and-run strategies.

We repeat the same analysis for individual states but with different size groups. From the results presented in Table 5, several interesting observations emerge. Although we still can not reject the monopolistic competition for majority of the cases, the model fails to reject the hypothesis H=0 for large banks in Delaware, Oregon and Rhode Island and hypothesis H=1 for small banks in Arizona and Massachusetts. Therefore, we conclude that for the period 1976-2005, the market structure for large banks in Delaware, Oregon and Rhode Island can be characterized as monopolistic (or cases of perfectly colluding oligopoly or conjectural variations short-run oligopoly) while small banks in Arizona and Massachusetts earned their revenues as if under the conditions of perfect competition (or natural monopoly in a perfectly contestable market). Further, the model can not reject the significance of difference in H values for small and large banks in Connecticut and Vermont at any conventional significance levels, indicating that both small and large banks in these states experience the same degree of competition.

5.3 Estimation for different time periods

Our sample period spans over three decades. The last decade in our sample corresponds to a time period when the deregulation activities such as Riegle Neal Act,

which permits bank branching in almost a nationwide basis, and the Gramm Leach Bliley Act, which allows well-capitalized financial holding companies a certain degree of universal banking powers.

To detect possible changes in competitive behavior over time we split our sample period into 3 decades and compute the competition index separaetely for these sub-sample periods. Results from these estiamations are presented in Table 6. For the overall sample, the estimates of market power coefficient over the three periods 1976-85, 1986-1995, and 1996-2005 are found to be 0.69, 0.58, and 0.44 respectively, and they are statistically significantly different from the bipolar cases of unity and zero. Although these results are consistently in line with monopolistic competition in all three priods, the declining trend in H-statistic from one period to another is significant at the 1% level for the overall sample, as reflected by F-test results.

When we look at the sub-samples of different sized banks, we observe a slight decrease in H statistic from 1976-85 (0.71) to 1986-95 (0.67) for small banks (significant at the 1% level) and no change afterwards. Larger banks, however, experience a continuous and significant decline in competitive behavior throughout our sample period. These results overall suggest that although the U.S. banking industry might have experienced a somewhat less competitive behavior in recent years due to increased market power of larger banks, banks still earn their revenues as if they are operating under the conditions of monopolistic competition.

A closer look at the results at the state level reveals that from 1976-85 to 1986-95 sub-periods the competition index has statistically declined in 27 states, increased in 15 states, and remained the same 9 states. These numbers are 38, 6 and 7 respectively when

comparing 1986-95 period to 1996-2005 period. The results also indicate that banks operated under perfect competition in Alaska, Connecticut, D.C., Massachusetts, New Jersey, and Nevada and under monopoly behavior in Mississippi, Oregon, South Dakota, Utah and Wisconsin during the post-Riegle Neal era (1996-2005).

5.4 The Effect of Interstate Branching Deregulation

Recent deregulation in interstate branching enabled banking organizations to expand geographically and (presumably) helped create a more competitive environment in banking industry. In this section we specifically measure the effect of this deregulation. The first column of Table 7 reports the year in which each state permitted interstate branching along with the estimated H statistics for pre- and post-deregulation periods. Interestingly, based on the full sample estimation, we see a certain level of decline in H statistics following the interstate branching deregulation, although the estimated coefficients indicate that banks were still operating under monopolistic competition during both periods. This decline however seems to be caused by the change in competitive conduct of large banks only as we find the test statistic virtually stayed the same for small banks for pre- and post-deregulation period.

It appears there are two major forces with different effects on competition are in play here. On the one hand, the elimination of regulatory barriers to entry is enhancing competition and subsequently forcing banks to look for bigger size to achieve a higher scale, scope and overall efficiency. However, large scale consolidation in banking markets is leading to a more concentrated industry structure, and crating an opportunity for larger banks to exercise significant market power.

Turning our analyses to individual states, we observe that following the interstate banking deregulation the competition index has statistically declined in 30 states, increased in 10 states, and remained the same 10 states. The results also indicate that banks in Delaware and Rhode Island operated under monopoly behavior before deregulation and under monopolistic competition after the deregulation. And for the Massachusetts, the competition index implies monopolistic competition before deregulation and perfectly competitive conduct following deregulation.

Overall, the relaxation of restrictions on the geographic operations of the U.S banking organizations does not seem to alter the competitive conduct of banks at the state level. The results for the regressions are consistently in line with monopolistic competition both for pre- and post-deregulation period. Several exceptions to this conclusion are Delaware, Rhode Island and Massachusetts where we do observe a significant increase in competition levels following deregulation. To the extent that H-statistic can be interpreted as a continuous measure of competition, we can say that deregulation somewhat increased the degree of competition in 10 states, reduced it in 30 states.

This limited effect of geographic deregulation on competition in consistent with earlier studies that find banking markets were already highly competitive before deregulation. Starting from 1970s technological advances in telecommunications and other innovations such ATMs, telephone banking reduced transportation and communication costs and provided a convenient alternative to local banks. Subsequently, these innovations have reduced the value of geographic restrictions to their traditional beneficiaries. Zardkoohi and Fraser (1998) find that this type of deregulation has had

perceptible but minor effect on the competitive nature of U.S. banking markets over the 1964-1993 period. Dick (2004) reports that deregulation has left the relevant geographic banking market virtually intact, with urban markets having two to three dominant firms before and after the passage of Riegle-Neal Act, with no change in local concentration. It is possible that the potential negative effect of market concentration may have exhausted the competitive benefits of geographic deregulation. Although our results points out that geographic deregulation did not have significant impact on competition, other benefits of geographical diversification such as increased efficiency and reduced risk are well established in the literature.

6. Summary and Conclusions

We estimated the competition index as outlined by Panzar and Rosse (1987) for approximately 20,000 U.S. commercial banks between 1976 and 2005 and used those estimates to assess the impact of geographical deregulation on bank competition at the state level. The results are generally in line with our expectations and suggest consistency with the literature that banks on average operated under monopolistic competition over the sample period, but this conclusion does not hold for every state, when we study different time periods.

We also find significant differences when comparing the competitive behavior based on size. Specifically, we find higher values of H for small banks and lower values for large banks. This finding lends some support to the notion that larger banks with higher market share can exercise certain degree of market power. For the period 1976-2005, the market structure for large banks in Delaware, Oregon and Rhode Island can be characterized as monopolistic (or cases of perfectly colluding oligopoly or conjectural variations short-run

oligopoly) while for small banks in Arizona and Massachusetts as perfectly competitive (or natural monopoly in a perfectly contestable market).

We observe a small decline in competition index for the overall sample although the estimated coefficients indicate that banks were still operating under monopolistic competition over the three sub-periods. When looking at the sub-samples of different sized banks, no major shift in test statistic was detected for small banks. However, we do observe a significant decline in H statistic for larger banks from 0.65 in 1976-1985 period to 0.15 in 1996-2005 period. Similarly, we find a certain level of decline in competition index following the interstate branching deregulation. This decline however seems to be caused by the change in competitive conduct of large banks only as we find the test statistic virtually stayed the same for small banks after deregulation. Overall, the removal of geographic restrictions appears to have very limited and non-uniform effect on state-level competitive conduct.

The results of the empirical analysis reported in this study must be interpreted with one important caveat. The use of individual states to define banking markets may be questioned because it is possible that the geographic boundary of banking markets may be smaller than a single state. The state is used as the geographic boundary because our study focuses on changes in state laws and because local bank-level data for most measures are not available. However, this approach is consistent with prior studies (e.g., Shaffer, 1989; and Zardkoohi and Fraser, 1998) that analyzed the impact of deregulation on bank competition.

REFERENCES

Amel, Dean F., and Liang, J. Nellie, 1992. The Relationship between Entry into Banking Markets and Changes in Legal Restrictions on Entry. *Antitrust Bulletin 37* 631-49

Baer, H., D. Evanoff, D. Fortier, and L. Mote, 1988. Geographic Deregulation in banking and the Public interest. *Issues in bank Regulation* 14, 10-17.

Barajas, A., R. Steiner and N. Salazar. 1999. "Interest Spreads in Banking in Colombia, 1974-1996." *IMF Staff Papers* 46(2): 4-7.

Berger, A.N., and D.B. Humphrey,1991 "The Dominance of Inefficiencies over Scale and Product Mix Economies in Banking." *Journal of Monetary Economics* vol. 28, 117-48.

Berger A., D Hanweck and D. Humphrey. 1987. "Competitive viability in banking: Scale, scope and product mix economies", *Journal of Monetary Economics*, Vol.20: 501-20.

Bikker, J.A. and J.M. Groeneveld. 2000, Competition and Concentration in the EU Banking Industry, *Kredit und Kapital* 33, 62–98.

Bourke, P., 1989. Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance* 13, 65-79.

Bresnahan, T., 1982. The Oligopoly Solution Concept is Identified, *Economics Letters,* 10, 87-92.

Brozen, Yale. 1982. "Concentration, Mergers and Public Policy" New York: MacMillan.

Calem, Paul, 1994. The Impact of Geographical Deregulation on Small Banks. *Business Review: Federal Reserve Bank of Philadelphia,* pp.17-31

Calomiris, Charles, 1993. Regulation, Industrial Structure, and Instability in U.S. Banking: An Historical Perspective. In Michael Klausner and Lawrence White, eds. *Structural Change in Banking*, 19-116. New York University.

Calomiris, C. W., 2000. U. S. Bank Deregulation in Historical Perspective. New York: Cambridge University Press.

Claessens, Stijn, and Luc Laeven, 2001. "What Drives Bank Competition? Some International Evidence . *Journal of Money, Credit, and Banking*, vol. 36, issue 3, pages 563-83

Coccorese, P., 1998. Assessing the competitive conditions in the Italian banking system: Some empirical evidence. *BNL Quarterly Review*, no. 205, 171–191. –l

Daniels, K.N., Tirtiroglu, D., and Tirtiroglu, E., 2005, Deregulation, Intensity of Competition, Industry Evolution and the Productivity Growth of U.S. Commercial Banks. *Journal of Money, Credit and Banking*, vol. 37(2), pages 339-60

Demsetz, Rebecca, and Philip E. Strahan, 1995. Diversification, Size and Risk in Bank Holding Companies. *Federal Reserve Bank of New York*, Working Paper No. 9506.

De Bandt, O., Davis, E.P., 2000. Competition, contestability and market structure in European banking sectors on the eve of EMU. *Journal of Banking and Finance* 24, 1045–1066.

DeYoung, Robert, Iftekhar Hasan and Bruce Kirchhoff. "The Impact Of Out-Of-State Entry On The Cost Efficiency Of Local Commercial Banks," *Journal of Economics and Business*, 1998, v50(2,Mar/Apr), 191-203

Dick, A.A., 2004. Nationwide Branching and its Impact on Market Structure, Quality and Bank Performance. *Journal of Business*, vol. 79(2), pages 567-592

Evanoff, Doulas D., and Fortier, Diana L., 1988. Reevaluation of the Structure-Conduct-Performance Paradigm in Banking. *Journal of Financial Research 1*, 277-94

Flannery, Mark J., 1984. The social costs of unit banking restrictions, *Journal of Monetary Economics*, vol. 13(2), pages 237-249

Gelos, G., and J. Roldós. 2002. "Consolidation and Market Structure in Emerging Market Banking Systems." *IMF Working Paper* 02/186.

Gilbert R. Alton, 1984 Bank Market Structure and Competition.*Journal of Money Credit and Banking*, Vol. 16, November, pp. 617–645.

Hannan, Timothy H., and Robin A. Prager. 1998. "Do Substantial Horizontal Mergers Generate Significant Price? Effects Evidence from the Banking Industry." *Journal of Industrial Economics* 46: 433-452.

Hondroyiannis, G., Sarantis L. and E. Papapetrou, 1999. Assessing competitive conditions in the Greek banking system, *Journal of International Financial Markets, Institutions and Money* 9, 377–391

Hubbard, R. Glenn, and Darius Palia, 1995. Executive Pay and Performance: Evidence from the U.S. Banking Industry. *Journal of Financial Economics,* XXXIX, 105-30

Jayaratne, J. and P.E. Stranhan, 1998. Entry Restrictions, Industry Evolution, and Dynamic Efficiency: Evidence from Commercial Banking. *Journal of Law and Economics*, vol. XLI, pp. 239-273

Kane, E., 1996. De Jure Interstate Banking: Why Only Now? *Journal of Money, Credit and Banking*, vol 28, pp. 141-161

Kroszner, R. S. and P. E. Strahan, 1999. What Drives Deregulation? Economics and Politics of the Relaxation of Bank Branching Restrictions. *Quarterly Journal of Economics*, 114:1437-67

Kroszner, R., 2001, The Motivations Behind Banking Reform. *Regulation*, 24 (2), pp 36-41.

Kwast, Myron, Martha Starr-McCluer, and John D.Wolken. 1997. "Market Definition and the Analysis of Antitrust in Banking." *Antitrust Bulletin* 42 (Winter): 973–95.

Lau, L.J. "On Identifying the Degree of Competitiveness from Industry Price and Output Data" *Economic Letters.*10 (1982) 93-99.

Molyneux, P., and J. Thornton., 1992. "Determinants of European bank Profitability: A Note." *Journal of Banking and Finance* 16: 1173-1178.

Molyneux, Phil and J.L. Teppet, 1993. "Structure - Conduct - Performance in EFTA Banking Markets", Bank- en Financiewezen 3, 133-137.

Molyneux, P., Lloyd-Williams, D.M., Thornton, J., 1994. Competitive conditions in European banking. *Journal of Banking and Finance* 18, 445–459.

Nathan, A., Neave, E.H., 1989. Competition and contestability in Canada's financial system: Empirical results. *Canadian Journal of Economics* 22, 576–594.

Neven Damien, and Lars-Hendrick Roller, 1995. "An aggregate structural model of competition in the European banking industry", *International Journal of Industrial Organizatio*n, 17, (1999) 1059 - 1074.

Panzar, J.C. and Rosse, J.N., 1982. Structure, Conduct and Comparative Statistics, *Bell Laboratories Economic discussion paper* No. 248.

Panzar, J.C., Rosse, J.N., 1987. Testing for monopoly equilibrium. *Journal of Industrial Economics* 35, 443–456.

Rhoades, Stephen, 1982. Welfare Loss, Redistribution Effects and Restriction of Output due to Monopoly in Banking. *Journal of Monetary Economics 9*, 375-87

Rhoades, S. A., 1985. "Market Share as a Source of Market Power: Implications and Some Evidence", *Journal of Economics and Business* 37, 343-363.

Schranz, Mary S., 1993 Takeovers Improve Firm Performance: Evidence from the Banking Industry. *Journal of Political Economy 101*. 299-326

Shaffer, S.,1982. Competition conduct and demand elasticity. Economic Letters 10, 167–171.

Shaffer, S., 1983. "The Rosse-Panzar Statistic and the Lerner Index in the Short Run," *Economics Letters* 11, 175-178.

Shaffer, S., 1989. "Competition in the U.S. Banking Industry," *Economics Letters* 17, 321-323.

Shaffer, S. 1993. "A Test of Competition in Canadian Banking." *Journal of Money, Credit and Banking* 25: 49-61.

Shepherd, W. G. , 1986. "Tobin's q and the structure performance relationship: Comment". *American Economic Review* 76 (December), 1211-1213

Smirlock, M.,1985. "Evidence on the (Non) Relationship Between Concentration and Profitability in Banking." *Journal of Money, Credit and Banking*, Vol. 17, pp. 69-83.

Smirlock, M. and D. Brown, 1986. "Collusion, Efficiency and Pricing Behavior: Evidence From the Banking Industry." Economic Inquiry, Vol. 24, pp. 85-96.

Spiller, P. And E. Favaro, 1984, "The Effects Of Entry Regulation On Oligopolistic Interactions: The Uruguayan Banking Sector", *The Rand Journal Of Economics*, 9, 305-327.

Stiroh, K. J. and Strahan, P.E., 2003. Competitive Dynamics of Deregulation: Evidence from U. S. Banking. Journal of Money, Credit and Banking, vol. 35(5), pages 801-28

Strahan, P.E., 2003. The Real Effects of U.S. Banking Deregulation. The Federal Reserve Bank of St. Louis Review (July/August), pp. 111-128.

Vesala, J., 1995. Testing competition in banking: Behavioral evidence from Finland, *Bank of Finland Studies*, E:1, Helsinki.

Yildirim, H. S. and G. C. Philippatos (2007a) "Competition and Contestability in Central and Eastern European Banking Industry", *Managerial Finance*, 33 (3) pp. 195-209

Yildirim, H. S. and G. C. Philippatos (2007b) "Restructuring, Consolidation, and Competition in Latin American Banking Markets", *Journal of Banking and Finance*, 31 (3), pp. 629-639

Zardkoohi, A. and D. Fraser, 1998. Geographic Deregulation and Competition in U.S. Banking Markets, *Financial Review*, 33, 85-98.

Table 1. Year of State-Level Deregulation of Restriction on Geographical Expansion

State	Intrastate branching via M&A	Unrestricted intrastate branching permitted	Interstate banking permitted
Alabama	1981	1990	1987
Alaska	<1970	<1970	1982
Arizona	<1970	<1970	1986
Arkansas	1994	**	1989
California	<1970	<1970	1987
Colorado	1991	**	1988
Connecticut	1980	1988	1983
Delaware	<1970	<1970	1988
DC	<1970	<1970	1985
Florida	1988	1988	1985
Georgia	1983	**	1985
Hawaii	1986	1986	**
Idaho	<1970	<1970	1985
Illinois	1988	1993	1986
Indiana	1989	1991	1986
Iowa	**	**	1991
Kansas	1987	1990	1992
Kentucky	1990	**	1984
Louisiana	1988	1988	1987
Maine	1975	1975	1978
Maryland	<1970	<1970	1985
Massachusetts	1984	1984	1983
Michigan	1987	1988	1986
Minnesota	1993	**	1986
Mississippi	1986	1989	1988
Missouri	1990	1990	1986
Montana	1990	**	1993
Nebraska	1985	**	1990
Nevada	<1970	<1970	1985
New Hampshire	1987	1987	1987
New Jersey	1977	**	1986
New Mexico	1991	1991	1989
New York	1976	1976	1982
North Carolina	<1970	<1970	1985
North Dakota	1987	**	1991
Ohio	1979	1989	1985
Oklahoma	1988	**	1987
Oregon	1985	1985	1986
Pennsylvania	1982	1990	1986
Rhode Island	<1970	<1970	1984
South Carolina	<1970	<1970	1986
South Dakota	<1970	<1970	1988
Tennessee	1985	1990	1985
Texas	1988	1988	1987
Utah	1981	1981	1984
Vermont	1970	1970	1988
Virginia	1978	1987	1985
Washington	1985	1985	1987
West Virginia	1987	1987	1988
Wisconsin	1990	1990	1987
Wyoming	1988	**	1987

**States not yet fully deregulated by 1996. Sources: Amel (1993) and Kroszner and Strahan (1999).

Table 2 Descriptive Statistics

STATE	Annual Revenue ($000)		Deposit Rate		Wage Rate ($ 000)		Price of Physical capital		Total Assets ($000)		No. of Banks	No. of Obs.
Alaska (AK)	43130	(49951)	0.039	(0.02)	36.53	(6.44)	0.40	(0.33)	466333	(571872)	18	278
Alabama (AL)	23685	(164604)	0.047	(0.02)	25.33	(7.04)	0.30	(0.44)	293620	(2218262)	398	6669
Arkansas (AR)	7760	(14093)	0.045	(0.02)	25.02	(5.39)	0.37	(0.84)	92777	(172573)	314	6933
Arizona (AZ)	88107	(340352)	0.037	(0.02)	32.54	(12.13)	0.52	(0.89)	841318	(2725188)	119	1080
California (CA)	89963	(782202)	0.037	(0.03)	35.41	(11.91)	0.67	(1.56)	977569	(8310102)	739	9943
Colorado (CO)	8654	(34000)	0.040	(0.02)	28.08	(7.61)	0.49	(1.07)	95246	(393445)	546	8784
Connecticut (CT)	42347	(139288)	0.042	(0.02)	31.02	(10.97)	0.49	(0.46)	478436	(1584271)	133	1382
Dist. of Col (DC)	66230	(132546)	0.039	(0.02)	35.72	(10.63)	0.73	(0.62)	766310	(1491054)	30	405
Delaware (DE)	388734	(1021122)	0.085	(0.87)	33.99	(25.69)	0.92	(4.39)	2537932	(7339046)	68	813
Florida (FL)	20861	(96602)	0.039	(0.02)	27.30	(74.07)	0.37	(0.83)	241494	(1104568)	1202	11770
Georgia (GA)	17630	(156063)	0.045	(0.08)	27.69	(7.25)	0.40	(10.80)	201447	(2259916)	710	11272
Hawaii (HI)	155970	(230693)	0.041	(0.02)	30.73	(8.09)	0.48	(0.30)	1855457	(2740145)	10	233
Iowa (IA)	5539	(18918)	0.049	(0.02)	31.03	(8.07)	0.67	(6.46)	64631	(185436)	727	16074
Idaho (ID)	29752	(67212)	0.044	(0.02)	27.08	(5.98)	0.39	(0.43)	318318	(714064)	48	627
Illinois (IL)	18746	(197664)	0.047	(0.07)	28.30	(7.77)	0.37	(0.78)	229089	(2521411)	1433	29895
Indiana (IN)	18366	(82792)	0.050	(0.02)	25.48	(6.84)	0.31	(0.26)	209256	(889186)	449	8379
Kansas (KS)	4718	(12275)	0.047	(0.02)	29.58	(7.31)	0.51	(0.99)	54714	(144530)	697	15212
Kentucky (KY)	10735	(36330)	0.046	(0.10)	25.37	(5.77)	0.34	(0.81)	126241	(435662)	423	8871
Louisiana (LA)	15735	(55040)	0.046	(0.02)	26.69	(5.86)	0.36	(0.51)	180441	(705091)	350	6448
Massachusetts (MA)	107043	(487864)	0.041	(0.02)	31.60	(13.85)	0.52	(0.98)	1088250	(4781361)	175	2457
Maryland (MD)	37197	(121574)	0.041	(0.02)	27.66	(7.28)	0.37	(0.39)	431889	(1445143)	175	2684
Maine (ME)	29500	(90307)	0.045	(0.02)	25.21	(5.55)	0.30	(0.22)	361233	(1496153)	51	721
Michigan (MI)	32542	(164027)	0.048	(0.02)	26.57	(6.64)	0.31	(0.26)	378345	(2037734)	459	7740
Minnesota (MN)	9461	(108272)	0.047	(0.02)	30.79	(7.88)	0.42	(0.55)	107195	(1204875)	852	18339
Missouri (MO)	9241	(39720)	0.047	(0.02)	25.60	(6.48)	0.36	(0.64)	111252	(486165)	853	16056
Mississippi (MS)	14728	(44569)	0.046	(0.02)	27.24	(6.19)	0.33	(0.43)	171082	(545549)	213	3893
Montana (MT)	5624	(11730)	0.045	(0.02)	28.37	(5.99)	0.36	(0.42)	64200	(148473)	194	3898
North Carolina (NC)	277186	(2215087)	0.040	(0.02)	27.77	(8.57)	0.26	(0.21)	3774571	(32546909)	198	2147
North Dakota (ND)	5349	(17703)	0.048	(0.02)	31.54	(7.66)	0.51	(1.34)	59543	(171361)	186	4268
Nebraska (NE)	5284	(22656)	0.047	(0.02)	31.27	(8.75)	0.61	(1.18)	55673	(186847)	508	10994
New Hampshire (NH)	33881	(224626)	0.048	(0.02)	25.74	(7.62)	0.39	(1.54)	222859	(837752)	96	1179
New Jersey (NJ)	50222	(138349)	0.040	(0.03)	29.00	(10.84)	0.40	(0.45)	621220	(1750549)	296	3397
New Mexico (NM)	12799	(26026)	0.044	(0.02)	25.18	(5.85)	0.31	(0.28)	144624	(306358)	119	2269
Nevada (NV)	107567	(329081)	0.032	(0.03)	33.56	(13.81)	0.45	(0.40)	797056	(1751795)	51	546
New York (NY)	404913	(2250817)	0.042	(0.04)	35.58	(21.29)	0.58	(1.02)	4474276	(25069042)	319	5260
Ohio (OH)	58267	(621064)	0.048	(0.12)	25.64	(23.29)	0.53	(13.67)	735926	(11059491)	562	8731
Oklahoma (OK)	7098	(22680)	0.048	(0.27)	27.27	(6.34)	0.43	(1.46)	81458	(282545)	596	11975
Oregon (OR)	31732	(126119)	0.043	(0.02)	27.41	(6.52)	0.29	(0.40)	338201	(1318907)	131	1553
Pennsylvania (PA)	51042	(253854)	0.047	(0.02)	26.09	(6.63)	0.35	(0.26)	586660	(2868112)	476	8115
Rhode Island (RI)	420542	(1670106)	0.036	(0.02)	29.77	(10.11)	1.26	(5.69)	4958780	(20311998)	23	245
South Carolina (SC)	20935	(66668)	0.038	(0.02)	27.53	(7.32)	0.30	(0.24)	245985	(782867)	159	2343
South Dakota (SD)	41682	(531338)	0.049	(0.02)	30.76	(8.29)	0.48	(0.60)	327152	(6263752)	180	3692
Tennessee (TN)	18450	(100690)	0.048	(0.02)	25.31	(5.77)	0.30	(1.14)	203427	(1118848)	476	7896
Texas (TX)	12521	(82825)	0.044	(0.02)	27.73	(6.90)	0.43	(3.79)	145437	(957552)	2192	35248
Utah (UT)	30383	(106650)	0.042	(0.02)	28.17	(11.42)	0.61	(2.27)	335667	(1300153)	110	1309
Virginia (VA)	33653	(200570)	0.044	(0.02)	25.25	(7.78)	0.27	(0.30)	337535	(1564873)	414	5318
Vermont (VT)	19697	(27822)	0.046	(0.02)	27.24	(5.72)	0.35	(0.18)	216846	(314874)	35	689
Washington (WA)	33630	(148158)	0.039	(0.02)	31.86	(10.02)	0.42	(1.01)	352386	(1441855)	192	2642
Wisconsin (WI)	9324	(41969)	0.049	(0.02)	28.26	(6.63)	0.35	(4.19)	111012	(572847)	700	13936
West Virginia (WV)	8863	(17088)	0.049	(0.02)	23.33	(4.30)	0.24	(0.18)	104168	(212895)	271	4779
Wyoming (WY)	6227	(13499)	0.044	(0.02)	27.84	(6.45)	0.49	(1.36)	72817	(169868)	132	2197
U.S.	28867	(400785)	0.046	(0.08)	28.221	(16.44)	0.42	(3.67)	324964	(4950229)	19808	341584

All stock variables are stated in 1990 $U.S. in 000s. Standard deviations are in parenthesis.

Table 3 Regression Results for Competitive Conditions for U.S. Banks over 1976-2005

	Overall Sample		Small Banks		Large Banks	
Variable	Estimate	t value	Estimate	t value	Estimate	t value
Constant	-1.788	-252.44 *	-1.569	-136.23 *	-1.680	-164.1 *
PF	0.395	607.67 *	0.458	486.51 *	0.330	381.37 *
PL	0.174	135.22 *	0.202	116.71 *	0.103	54.64 *
PK	0.040	84.91 *	0.035	57.71 *	0.042	58.71 *
TA	1.004	3295.35 *	0.999	1087.22 *	1.005	2170.97 *
DDEP	0.055	85.81 *	0.099	102.02 *	0.027	33.49 *
EQTY	-0.069	-67.98 *	-0.090	-66.82 *	-0.001	-0.94
GDP	-0.243	-28.72 *	-0.301	-24.65 *	-0.243	-22.07 *
H Statistic	**0.61**	429 *	**0.70**	374.99 *	**0.48**	222.01 *
F Value (H=0)	184039*		140618*		49287.2*	
F Value (H=1)	75625.8*		26989.9*		60047.4*	
F-value ($H_{small}=H_{large}$)					9155.79*	
White's test	2884.23*					
Adj R^2	0.98		0.94		0.98	
Observations	341582		170427		171155	

Model Estimated: $\ln (REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_{it}$; H=h1+h2+h3

State dummy variables are also included but not reported for brevity. Large and small banks are classified based on whether TAs are above and below the median asset size in the sample for a given year and state. The Wald test is used to test H=0 and H=1

* Level of Significance at 1 %

Table 4 H-Statistics for Individual states

STATE	H	(Std. Err.)	F Value for H=0	F Value for H=1	H_{lo}	H_{hi}	Adj. R^2	# of Banks	# of Obs.
Alaska (AK)	0.89	(0.04)	576.05 *	8.69 *	0.82	0.96	0.99	18	278
Alabama (AL)	0.62	(0.01)	5257.54 *	1976.82 *	0.60	0.64	0.99	398	6669
Arkansas (AR)	0.71	(0.01)	7308.08 *	1277.79 *	0.69	0.72	0.98	314	6933
Arizona (AZ)	0.85	(0.03)	791.62 *	23.76 *	0.79	0.91	0.98	119	1080
California (CA)	0.75	(0.01)	7649.22 *	834.77 *	0.73	0.77	0.97	739	9943
Colorado (CO)	0.78	(0.01)	9054.64 *	731.49 *	0.76	0.79	0.97	546	8784
Connecticut (CT)	0.76	(0.03)	813.44 *	78.01 *	0.71	0.82	0.98	133	1382
Dist. of Colombia (DC)	0.67	(0.03)	413.38 *	99.1 *	0.61	0.74	0.99	30	405
Delaware (DE)	0.32	(0.04)	62.83 *	283.83 *	0.24	0.40	0.95	68	813
Florida (FL)	0.68	(0.01)	6140.14 *	1328.74 *	0.67	0.70	0.97	1202	11770
Georgia (GA)	0.57	(0.01)	4666.19 *	2568.15 *	0.56	0.59	0.97	710	11272
Hawaii (HI)	0.91	(0.03)	868.93 *	8.74 *	0.85	0.97	0.99	10	233
Iowa (IA)	0.60	(0.00)	16913.9 *	7772.67 *	0.59	0.60	0.98	727	16074
Idaho (ID)	0.70	(0.03)	428.88 *	75.17 *	0.64	0.77	0.99	48	627
Illinois (IL)	0.59	(0.00)	22751 *	10673.6 *	0.59	0.60	0.98	1433	29894
Indiana (IN)	0.55	(0.01)	5159.01 *	3515.38 *	0.53	0.56	0.99	449	8379
Kansas (KS)	0.57	(0.01)	10194.5 *	5719.03 *	0.56	0.58	0.98	697	15212
Kentucky (KY)	0.59	(0.01)	4017.93 *	1900.89 *	0.57	0.61	0.97	423	8870
Louisiana (LA)	0.59	(0.01)	3219.84 *	1603.6 *	0.57	0.61	0.98	350	6448
Massachusetts (MA)	0.90	(0.03)	1217.03 *	16.19 *	0.85	0.95	0.97	175	2457
Maryland (MD)	0.61	(0.02)	1282.34 *	541.31 *	0.57	0.64	0.98	175	2684
Maine (ME)	0.81	(0.03)	713.43 *	40.16 *	0.75	0.87	0.99	51	721
Michigan (MI)	0.61	(0.01)	6729.36 *	2662 *	0.60	0.63	0.99	459	7740
Minnesota (MN)	0.60	(0.01)	14104.8 *	6448.19 *	0.59	0.61	0.98	852	18339
Missouri (MO)	0.58	(0.01)	10564.4 *	5534.8 *	0.57	0.59	0.98	853	16056
Mississippi (MS)	0.51	(0.01)	1535.27 *	1456.06 *	0.48	0.53	0.99	213	3893
Montana (MT)	0.56	(0.01)	2515.94 *	1492.41 *	0.54	0.59	0.98	194	3898
North Carolina (NC)	0.70	(0.02)	1544.31 *	278.4 *	0.67	0.74	0.99	198	2147
North Dakota (ND)	0.55	(0.01)	4337.82 *	2942.05 *	0.53	0.56	0.98	186	4268
Nebraska (NE)	0.49	(0.01)	5575.32 *	6067.17 *	0.48	0.50	0.98	508	10994
New Hampshire (NH)	0.48	(0.03)	201.25 *	233.43 *	0.41	0.55	0.97	96	1179
New Jersey (NJ)	0.88	(0.02)	2891.46 *	58.75 *	0.84	0.91	0.98	296	3397
New Mexico (NM)	0.72	(0.02)	2246.79 *	325.75 *	0.69	0.75	0.98	119	2269
Nevada (NV)	0.58	(0.05)	117.47 *	60.82 *	0.48	0.69	0.97	51	546
New York (NY)	0.55	(0.01)	1673.24 *	1091.29 *	0.53	0.58	0.98	319	5260
Ohio (OH)	0.46	(0.01)	1956.77 *	2664.91 *	0.44	0.48	0.98	562	8731
Oklahoma (OK)	0.65	(0.01)	9087.63 *	2679.49 *	0.63	0.66	0.97	596	11975
Oregon (OR)	0.50	(0.03)	274.48 *	266.53 *	0.44	0.56	0.97	131	1553
Pennsylvania (PA)	0.63	(0.01)	3933.76 *	1415.74 *	0.61	0.64	0.99	476	8115
Rhode Island (RI)	0.23	(0.05)	17.85 *	204.67 *	0.12	0.33	0.98	23	245
South Carolina (SC)	0.70	(0.02)	1845.92 *	333.84 *	0.67	0.73	0.98	159	2343
South Dakota (SD)	0.41	(0.02)	460.16 *	926.11 *	0.38	0.45	0.96	180	3692
Tennessee (TN)	0.63	(0.01)	2339.68 *	841.21 *	0.60	0.65	0.97	476	7896
Texas (TX)	0.70	(0.00)	29098.7 *	5244.38 *	0.69	0.71	0.97	2192	35248
Utah (UT)	0.73	(0.03)	510.45 *	72.8 *	0.66	0.79	0.96	110	1309
Virginia (VA)	0.49	(0.01)	2051.5 *	2210 *	0.47	0.51	0.98	414	5318
Vermont (VT)	0.52	(0.03)	254.64 *	223.23 *	0.45	0.58	0.99	35	689
Washington (WA)	0.71	(0.01)	2357.4 *	410.06 *	0.68	0.73	0.99	192	2642
Wisconsin (WI)	0.48	(0.01)	3756.11 *	4246.72 *	0.47	0.50	0.97	700	13936
West Virginia (WV)	0.69	(0.01)	4502.85 *	921.63 *	0.67	0.71	0.98	271	4779
Wyoming (WY)	0.67	(0.02)	1828.59 *	435.8 *	0.64	0.70	0.97	132	2197

Model Estimated: $\ln (REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_i$; $H=h1+h2+h3$.
Standard deviation for H values are given in parentheses, The Wald test is used to test H=0 and H =1 * Level of Significance at 1 %
H_{lo} and H_{hi}: lower and upper bounds on the 95% confidence interval for H.

Table 5 H-Statistics for Small and Large Banks in Individual States

STATE	H Small	H Large	F-Value for Test $H_s=H_l$	Adj. R^2	Obs	STATE	H Small	H Large	F-Value for Test Hs=Hl	Adj. R^2	Obs.
Alaska (AK)	0.90	0.65	16.17 *	0.99	278	Montana (MT)	0.63	0.49	68.23 *	0.98	3898
Alabama (AL)	0.70	0.44	314.32 *	0.99	6669	North Carolina (NC)	0.78	0.48	68.19 *	0.99	2147
Arkansas (AR)	0.78	0.58	226.71 *	0.98	6933	North Dakota (ND)	0.59	0.49	53.38 *	0.98	4268
Arizona (AZ)	0.98 PC	0.59	52.55 *	0.98	1080	Nebraska (NE)	0.48	0.51	8.51 *	0.98	10994
California (CA)	0.85	0.52	522.15 *	0.97	9943	New Hampshire (NH)	0.38	0.62	26.73 *	0.97	1179
Colorado (CO)	0.87	0.55	576.32 *	0.97	8784	New Jersey (NJ)	0.93	0.76	33.31 *	0.98	3397
Connecticut (CT)	0.80	0.76	1.04	0.98	1382	New Mexico (NM)	0.80	0.54	118.13 *	0.98	2269
Dist. of Col. (DC)	0.77	0.52	23.67 *	0.99	405	Nevada (NV)	0.80	0.33	25.21 *	0.97	546
Delaware (DE)	0.57	0.07 MP	58.96 *	0.96	813	New York (NY)	0.63	0.48	39.73 *	0.98	5260
Florida (FL)	0.85	0.38	1185.57 *	0.97	11770	Ohio (OH)	0.50	0.45	8.51 *	0.98	8731
Georgia (GA)	0.76	0.34	1014.73 *	0.98	11272	Oklahoma (OK)	0.71	0.54	227.76 *	0.97	11975
Hawaii (HI)	0.79	0.92	3.86 ***	1.00	233	Oregon (OR)	0.81	0.01 MP	398.74 *	0.98	1553
Iowa (IA)	0.64	0.53	185.05 *	0.98	16074	Pennsylvania (PA)	0.71	0.46	224.14 *	0.99	8115
Idaho (ID)	0.78	0.60	13.55 *	0.99	627	Rhode Island (RI)	0.43	-0.09 MP	27.45 *	0.98	245
Illinois (IL)	0.66	0.48	688.65 *	0.99	29894	South Carolina (SC)	0.78	0.43	131.35 *	0.99	2343
Indiana (IN)	0.59	0.46	104.86 *	0.99	8379	South Dakota (SD)	0.54	0.27	66.88 *	0.96	3692
Kansas (KS)	0.61	0.52	81.23 *	0.98	15212	Tennessee (TN)	0.81	0.27	799.14 *	0.97	7896
Kentucky (KY)	0.58	0.61	3.84 ***	0.97	8870	Texas (TX)	0.75	0.62	398.28 *	0.97	35248
Louisiana (LA)	0.66	0.50	102.49 *	0.98	6448	Utah (UT)	0.80	0.52	24.6 *	0.97	1309
Massachusetts (MA)	1.04 PC	0.68	86.15 *	0.97	2457	Virginia (VA)	0.61	0.33	187.34 *	0.98	5318
Maryland (MD)	0.74	0.45	122.77 *	0.98	2684	Vermont (VT)	0.48	0.55	1.93	0.99	689
Maine (ME)	0.86	0.68	12.62 *	0.99	721	Washington (WA)	0.79	0.56	93.55 *	0.99	2642
Michigan (MI)	0.69	0.44	346.87 *	0.99	7740	Wisconsin (WI)	0.63	0.29	785.18 *	0.97	13936
Minnesota (MN)	0.67	0.48	532.03 *	0.98	18339	West Virginia (WV)	0.74	0.65	29.99 *	0.98	4779
Missouri (MO)	0.60	0.55	21.17 *	0.98	16056	Wyoming (WY)	0.76	0.51	88 *	0.98	2197
Mississippi (MS)	0.61	0.34	182.17 *	0.99	3893						

Model Estimated: $\ln(REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_{it}$; H=h1+h2+h3 MP: Monopoly PC: Perfect Competition The Wald test is used to test $H_{small}=H_{large}$ * Level of Significance at 1 %, ; *** Level of Significance at 10 %

Table 6 H-Statistics for Sub-sample Periods

STATE	H1 1976-85	H2 1986-95	H3 1996-05	F-test H1=H2	Prob. Of F-Test	F-test H2=H3	Prob. of F-Test	Adj. R^2	obs
Oveall Sample	0.69	0.58	0.44	1260.48	(0.00)	2360.4	(0.00)	0.98	341582
Small Banks	0.71	0.67	0.67	132.6	(0.00)	0.05	(0.82)	0.94	170427
Large Banks	0.65	0.47	0.15	1756.69	(0.00)	5482.6	(0.00)	0.98	171155
Alaska (AK)	0.92 PC	0.97	0.84 PC	0.39	(0.53)	3.86	(0.05)	0.99	278
Alabama (AL)	0.72	0.62	0.44	32.81	(0.00)	113.43	(0.00)	0.99	6669
Arkansas (AR)	0.77	0.80	0.58	2.61	(0.11)	127.21	(0.00)	0.98	6933
Arizona (AZ)	0.96 PC	0.74	0.65	12.46	(0.00)	2.52	(0.11)	0.98	1080
California (CA)	0.80	0.64	0.58	70.04	(0.00)	14.99	(0.00)	0.97	9943
Colorado (CO)	0.90	0.72	0.52	145.43	(0.00)	142.55	(0.00)	0.97	8784
Connecticut (CT)	0.68	0.82	0.91 PC	8.26	(0.00)	2.03	(0.15)	0.98	1382
Dist. of Col.(DC)	0.54	0.71	1.00 PC	7.12	(0.01)	17	(0.00)	0.99	405
Delaware (DE)	0.10 MP	-0.01	0.37	1.13	(0.29)	13.06	(0.00)	0.96	813
Florida (FL)	0.76	0.58	0.53	111.48	(0.00)	8.8	(0.00)	0.97	11770
Georgia (GA)	0.60	0.56	0.57	4.03	(0.04)	0.53	(0.47)	0.97	11272
Hawaii (HI)	1.40	0.80	0.33	28.15	(0.00)	31.33	(0.00)	0.99	233
Iowa (IA)	0.73	0.53	0.37	317.14	(0.00)	214.41	(0.00)	0.98	16074
Idaho (ID)	0.78	0.60	0.54	7.36	(0.01)	1.25	(0.26)	0.99	627
Illinois (IL)	0.60	0.68	0.59	99.53	(0.00)	127.24	(0.00)	0.99	29894
Indiana (IN)	0.56	0.63	0.58	19.73	(0.00)	10.21	(0.00)	0.99	8379
Kansas (KS)	0.77	0.55	0.20	303.36	(0.00)	876.68	(0.00)	0.98	15212
Kentucky (KY)	0.61	0.72	0.49	44.2	(0.00)	188.68	(0.00)	0.97	8870
Louisiana (LA)	0.81	0.49	0.11	337.39	(0.00)	343.55	(0.00)	0.98	6448
Massachusetts (MA)	0.73	0.95	1.28 PC	22.01	(0.00)	37.37	(0.00)	0.97	2457
Maryland (MD)	0.68	0.68	0.50	0.01	(0.91)	33.17	(0.00)	0.98	2684
Maine (ME)	0.84	0.97	0.42	6.58	(0.01)	65.24	(0.00)	0.99	721
Michigan (MI)	0.70	0.55	0.46	71.88	(0.00)	35.72	(0.00)	0.99	7740
Minnesota (MN)	0.77	0.48	0.27	617.13	(0.00)	369.63	(0.00)	0.98	18339
Missouri (MO)	0.58	0.60	0.54	1.6	(0.21)	23.65	(0.00)	0.98	16056
Mississippi (MS)	0.71	0.39	0.01 MP	151.33	(0.00)	275.84	(0.00)	0.99	3893
Montana (MT)	0.76	0.47	0.28	144.97	(0.00)	66.83	(0.00)	0.98	3898
North Carolina (NC)	0.70	0.73	0.73	0.66	(0.41)	0.01	(0.92)	0.99	2147
North Dakota (ND)	0.73	0.57	0.22	78.67	(0.00)	324.24	(0.00)	0.98	4268
Nebraska (NE)	0.50	0.55	0.41	9.89	(0.00)	83.49	(0.00)	0.98	10994
New Hamp. (NH)	0.22	0.77	1.15	116.37	(0.00)	38.1	(0.00)	0.98	1179
New Jersey (NJ)	0.84	0.90	0.94 PC	2.61	(0.11)	1.21	(0.27)	0.98	3397
New Mexico (NM)	0.90	0.52	0.25	147.97	(0.00)	103.3	(0.00)	0.98	2269
Nevada (NV)	0.31	0.74	1.06 PC	10.63	(0.00)	6.49	(0.01)	0.97	546
New York (NY)	0.58	0.59	0.52	0.2	(0.66)	5.71	(0.02)	0.98	5260
Ohio (OH)	0.54	0.45	0.18	21.14	(0.00)	166.35	(0.00)	0.99	8731
Oklahoma (OK)	0.83	0.57	0.27	337.06	(0.00)	491.72	(0.00)	0.97	11975
Oregon (OR)	0.72	0.06	-0.14 MP	124	(0.00)	15.86	(0.00)	0.97	1553
Pennsylvania (PA)	0.72	0.68	0.48	4.3	(0.04)	83.47	(0.00)	0.99	8115
Rhode Island (RI)	0.13 MP	0.10	0.55	0.04	(0.84)	19.23	(0.00)	0.99	245
South Carolina (SC)	0.64	0.82	0.81	25.19	(0.00)	0.12	(0.73)	0.99	2343
South Dakota (SD)	0.55	0.47	0.00 MP	3.12	(0.08)	109.32	(0.00)	0.96	3692
Tennessee (TN)	0.75	0.65	0.43	14.49	(0.00)	82.29	(0.00)	0.97	7896
Texas (TX)	0.82	0.61	0.42	719.59	(0.00)	491.27	(0.00)	0.98	35248
Utah (UT)	0.89	0.61	0.01 MP	17.18	(0.00)	102.6	(0.00)	0.97	1309
Virginia (VA)	0.53	0.60	0.48	7.54	(0.01)	23.23	(0.00)	0.98	5318
Vermont (VT)	0.50	0.66	0.36	8.56	(0.00)	30.98	(0.00)	0.99	689
Washington (WA)	0.73	0.80	0.71	4.77	(0.03)	11.17	(0.00)	0.99	2642
Wisconsin (WI)	0.63	0.30	0.04 MP	447.88	(0.00)	246.27	(0.00)	0.97	13936
West Virginia (WV)	0.69	0.79	0.63	30.55	(0.00)	39.63	(0.00)	0.98	4779
Wyoming (WY)	0.79	0.43	0.12	137.7	(0.00)	75.57	(0.00)	0.98	2197

Model Estimated: $\ln(REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_{it}$; H=h1+h2+h3 ; MP: Monopoly PC: Perfect Competition
The Wald test is used to test H1=H2 and H2=H3 Probabilities at which null hypothesis can be rejected are given in parenthesis.

Table 7 The Effect of Deregulation on Bank Competition

STATE	Year Dereg.	H1 (Pre-Der.)	H2 (Post-Der.)	Ftest H1=H2	Prob. Of F-Test	Adj.R^2	obs
Full Sample		0.66	0.56	1514.01	(0.00)	0.98	341348
Small Banks		0.69	0.69	2.49	(0.11)	0.93	170315
Large Banks		0.62	0.40	3364.04	(0.00)	0.98	171033
Alaska (AK)	1982	0.88	0.89	0.03	(0.87)	0.99	278
Alabama (AL)	1987	0.74	0.52	242.12	(0.00)	0.99	6669
Arkansas (AR)	1989	0.74	0.70	6.49	(0.01)	0.98	6933
Arizona (AZ)	1986	0.92	0.81	5.3	(0.02)	0.98	1080
California (CA)	1987	0.79	0.71	30.73	(0.00)	0.97	9943
Colorado (CO)	1988	0.88	0.71	156.73	(0.00)	0.97	8784
Connecticut (CT)	1983	0.68	0.81	5.84	(0.02)	0.98	1382
Dist. of Col. (DC)	1985	0.58	0.74	7.74	(0.01)	0.99	405
Delaware (DE)	1988	0.14 MP	0.34	6.24	(0.01)	0.95	813
Florida (FL)	1985	0.74	0.65	39.66	(0.00)	0.97	11770
Georgia (GA)	1985	0.59	0.58	0.34	(0.56)	0.97	11272
Iowa (IA)	1991	0.66	0.58	84.56	(0.00)	0.98	16073
Idaho (ID)	1985	0.77	0.72	1.04	(0.31)	0.99	627
Illinois (IL)	1986	0.60	0.60	0.22	(0.64)	0.98	29894
Indiana (IN)	1986	0.55	0.56	0.82	(0.36)	0.99	8379
Kansas (KS)	1992	0.71	0.44	645.06	(0.00)	0.98	15212
Kentucky (KY)	1984	0.62	0.58	8.07	(0.00)	0.97	8870
Louisiana (LA)	1987	0.79	0.46	452.54	(0.00)	0.98	6448
Massachusetts (MA)	1983	0.67	1.00 PC	55.19	(0.00)	0.97	2457
Maryland (MD)	1985	0.70	0.55	26.77	(0.00)	0.98	2684
Maine (ME)	1978	0.57	0.80	3.96	(0.05)	0.99	721
Michigan (MI)	1986	0.69	0.58	70.33	(0.00)	0.99	7740
Minnesota (MN)	1986	0.75	0.54	498.49	(0.00)	0.98	18339
Missouri (MO)	1986	0.58	0.57	0.54	(0.46)	0.98	16056
Mississippi (MS)	1988	0.69	0.35	289.17	(0.00)	0.99	3893
Montana (MT)	1993	0.58	0.61	2.94	(0.09)	0.98	3898
North Carolina (NC)	1985	0.69	0.71	0.34	(0.56)	0.99	2147
North Dakota (ND)	1991	0.68	0.48	142.17	(0.00)	0.98	4268
Nebraska (NE)	1990	0.50	0.44	20.42	(0.00)	0.98	10994
New Hampshire (NH)	1987	0.30	0.69	75.49	(0.00)	0.97	1179
New Jersey (NJ)	1986	0.85	0.88	1.17	(0.28)	0.98	3397
New Mexico (NM)	1989	0.87	0.60	126.7	(0.00)	0.98	2269
Nevada (NV)	1985	0.27	0.63	8.93	(0.00)	0.97	546
New York (NY)	1982	0.51	0.56	3.26	(0.07)	0.98	5260
Ohio (OH)	1985	0.54	0.39	70.73	(0.00)	0.98	8731
Oklahoma (OK)	1987	0.80	0.56	434.49	(0.00)	0.97	11975
Oregon (OR)	1986	0.69	0.31	69.55	(0.00)	0.97	1553
Pennsylvania (PA)	1986	0.73	0.59	55.42	(0.00)	0.99	8115
Rhode Island (RI)	1984	0.06 MP	0.30	4.33	(0.04)	0.98	245
South Carolina (SC)	1986	0.69	0.70	0.11	(0.74)	0.98	2343
South Dakota (SD)	1988	0.62	0.13	187.64	(0.00)	0.96	3692
Tennessee (TN)	1985	0.75	0.58	61.68	(0.00)	0.97	7896
Texas (TX)	1987	0.81	0.61	903.3	(0.00)	0.98	35248
Utah (UT)	1984	0.91	0.45	80.01	(0.00)	0.97	1309
Virginia (VA)	1985	0.52	0.48	3.15	(0.08)	0.98	5318
Vermont (VT)	1988	0.55	0.45	4.21	(0.04)	0.99	689
Washington (WA)	1987	0.76	0.68	11.44	(0.00)	0.99	2642
Wisconsin (WI)	1987	0.60	0.37	276.01	(0.00)	0.97	13936
West Virginia (WV)	1988	0.71	0.73	2.12	(0.15)	0.98	4779
Wyoming (WY)	1987	0.76	0.48	122.07	(0.00)	0.98	2197

Model Estimated: $\ln (REV_{it}) = h_1 \ln(PF_{it}) + h_2 \ln(PL_{it}) + h_3 \ln(PK_{it}) + \beta_k \ln(BSF_{kit}) + \alpha_{it} \ln(GDP_{it}) + \varepsilon_{it}$; H=h1+h2+h3; Wald test is used to test H1=H2
MP: Monopoly PC: Perfect Competition. Probabilities at which null hypothesis can be rejected are given in parenthesis.