Competition and Bank Opacity

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Abstract

Did regulatory reforms that lowered barriers to competition increase or decrease the quality of information that banks disclose to the public? By integrating the gravity model of investment with the state-specific process of bank deregulation that occurred in the United States from the 1980s through the 1990s, we develop a bank-specific, time-varying measure of deregulation-induced competition. We find that an intensification of competition reduced abnormal accruals of loan loss provisions and the frequency with which banks restate financial statements. The results suggest that competition reduces bank opacity, potentially enhancing the ability of markets to monitor banks.

Key words: Earnings management; Financial accounting; Bank deregulation; Corporate Governance
JEL Classification: G21; G28; G34, G38

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1. Introduction

When banks manipulate their financial statements, this can increase bank opacity and interfere with the private governance and official regulation of banks. In particular, Ahmed et al. (1999) and Beatty et al. (2002) show that banks manage their financial statements to smooth earnings, circumvent capital requirements, and reduce taxes. A growing body of research finds that such manipulations reduce bank stability, the market's valuation of banks, and loan quality, e.g., Beatty and Liao (2011), Bushman and Williams (2012), and Huizinga and Laeven (2012). More generally, the findings by Jayaratne and Strahan (1996) imply that any factor—including the management of financial statements—that interferes with the governance and regulation of banks can distort capital allocation and slow growth.

Nonetheless, little is known about the impact of bank regulations and competition on bank opacity. While Campbell and Kracaw (1980), Berlin and Loeys (1988), Morgan (2002), and Flannery et al. (2004) examine the comparative opacity of banks and nonfinancial firms, they do not examine the determinants of bank opacity. While Barth et al. (2004, 2009) and Beck et al. (2006) find that banks allocate capital more efficiently in countries that penalize bank executives more for disclosing erroneous information, they do not examine the impact of competition on the quality of information disclosed by banks. Given the importance of banks for the efficiency of resource allocation, the scarcity of research on the market and regulatory determinants of bank opacity is surprising and potentially consequential.

In this paper, we conduct the first evaluation of the impact of U.S. bank regulatory reforms that altered the competitive pressures facing individual bank subsidiaries and bank holding companies (BHCs) on the quality of information disclosed by those entities. This evaluation provides empirical evidence on differing theoretical perspectives concerning the impact of competition on opacity. Three interrelated strands of research explain how competition can reduce opacity. First, competition can mitigate earnings management by reducing agency problems. Specifically, one reason that corporate insiders might manage earnings is to conceal their extraction of rents, which is facilitated by agency problems between insiders and residual claimants on the firm (Jensen and Meckling, 1976; Leuz et al., 2003; Dechow et al., 2010). As discussed in Shleifer and Vishny (1997), an intensification of product

market competition can spur improvements in corporate governance that reduce agency problems.[1] This enhanced governance can, as suggested by Darrough and Stoughton (1990) and Leuz et al. (2003), mitigate the rent extraction incentives of corporate insiders and, therefore, reduce their incentives to manipulate financial statements to conceal such actions. A second line of research suggests that competition can boost the quality of financial statements by facilitating peer-firm comparisons. If competition encourages more bank entry and more similarity among banks, they become more accurate benchmarks for one another (Holmstrom, 1982; Nalebuff and Stiglitz, 1983). This makes it easier for private investors and official regulators to detect earnings management ex post, which can reduce banks' incentive to manipulate their financial accounts ex ante (Dichev et al., 2013, Office of the Comptroller of the Currency, 1996).[2] Indeed, based on a field survey of 169 CFOs, Dichev et al. (2013) document that peer-firm comparisons are one of the most important tools for detecting earnings management. Third, competition spurs banks to implement strategies for lowering their costs of funds. Extensive research finds that earnings management tends to increase the cost to a firm of raising equity or debt (e.g., Francis et al., 2005; Bharath et al., 2008; Graham et al., 2008). Thus, an intensification of competition might compel banks to improve transparency to lower their funding costs.

In contrast, other research emphasizes that competition will increase opacity. In models by Verrecchia (1983) and Gertner et al. (1988), competition can induce firms to limit or manipulate the flow of information to hinder the entry of potential rivals and gain a strategic advantage over existing competitors. In Shleifer (2004), greater competition spurs executives to engage in unethical behavior, including more aggressive accounting practices. Similarly, a related line of research finds that a decrease in takeover pressures, which can be related to competition more generally, improves disclosure quality as (a) corporate managers voluntarily improve the quality of their financial reports to lower the cost of raising external equity capital (Armstrong et al., 2012) and (b) corporate managers respond to their "quite life" by feeling less

[1] For instance, auditors are required, under generally accepted auditing standards (GAAS), to take into account significant changes in a client's competitive environment. Thus, banking deregulation can potentially prompt auditors to intensify their monitoring, which in turns affects bank disclosure quality.

[2] For example, Office of the Comptroller of the Currency (1996) notes on page 15 that, "Ratios based on historical data from reports of condition and income for peer group banks are frequently used, particularly by financial analysts, to analyze and compare the adequacy of allowance balances among banks."

compelled to conceal poor outcomes by managing earnings (Zhao and Chen, 2008). Thus, research offers differing perspectives on how competition shapes corporate reporting policies.

To evaluate the impact of competition on bank opacity, we begin by exploiting two sources of variation in the competitive environment facing U.S. banks during the last quarter of the 20th century. First, interstate bank deregulation eased regulatory restrictions on bank holding companies (BHCs) headquartered in one state establishing subsidiaries in other states. As emphasized by Goetz et al. (2013), not only did individual states begin interstate deregulation in different years, these reforms progressed in a state-specific process of unilateral and multilateral agreements over two decades. Thus, we use several time-varying measures of the exposure of a state's banking market to competition from BHCs headquartered in other states. Jayaratne and Strahan (1998), Stiroh and Strahan (2003), and Johnson and Rice (2008) show that interstate bank deregulation spurred competition among banks. Second, while the Interstate Banking and Branching Efficiency Act of 1994 (IBBEA) eliminated restrictions on interstate banking, states had leeway in the timing of interstate branch deregulation, which is when BHCs in one state can establish branches in other states. Since the costs of branching are lower than those of establishing subsidiaries, interstate branch deregulation further lowered barriers to competition.

There is, however, a key limitation to these state-time measures of deregulation-induced competition: They are not computed at the bank subsidiary or even the BHC level. Although interstate bank deregulation spurred competition, this does not necessarily imply that these reforms influenced bank opacity by intensifying competition. Perhaps, deregulation triggered, or was associated with, other changes in a state that influenced the quality of information disclosed by banks, and it is these other changes—not increased competition—that influenced bank opacity. For example, a state's bank examiners might intensify their scrutiny of the financial statements of banks after deregulation. To address this concern, we must differentiate among banks within a state and control for state-time fixed effects.

Consequently, we offer a new approach for constructing time-varying, subsidiary-specific and BHC-specific measures of competition. Our approach is based on the "gravity model" view that distance matters for investment and hence for the degree of competition faced by bank subsidiaries and BHCs. For example, after state *j* allows BHCs in

state *i* to enter and establish subsidiaries in state *j*, two subsidiaries in state *j* may face different competitive pressures from state *i*, depending on their distance to state *i*. That is, when California deregulates with Arizona, the banks in southern California may face greater competitive pressures from Arizona than banks in northern California. By integrating the gravity model with interstate bank deregulation, we build time-varying, bank-specific measures of deregulation-induced competition. Our approach is related to, though distinct from Goetz et al. (2013, 2015). They show that BHCs are more likely to enter geographically close banking markets following interstate deregulation. We examine the competitive environment facing individual bank subsidiaries and BHCs regardless of whether the BHC expands into other states.

Specifically, we construct measures of the competitive environment facing each subsidiary as follows. For each subsidiary in each period, we identify those states whose BHCs can enter the subsidiary's state. We then weight each of those states by the inverse of its distance to the subsidiary. This yields an inverse-distance measure of the regulatory-induced competitive environment facing each subsidiary. We also calculate the competitive environment facing a consolidated BHC by weighting these subsidiary level measures of competition by the proportion of each subsidiary's assets in the BHC. We examine the BHC-specific measures, in addition to the subsidiary-level measures, because parent companies may shape the financial disclosure policies of subsidiaries. Our approach also accounts for the fact that a BHC's competitive-environment will change as the states in which it has subsidiaries change their policies. For example, a BHC headquartered in state *j* with subsidiaries in other states will experience changes in competition as those other states deregulate, subjecting the BHC's subsidiaries to greater competition even if state *j* does not open-up to additional states. We also construct and examine variants of the subsidiary and BHC measures of regulatory-induced competition that incorporate information on the economic and financial sizes of different states. That is, when examining the competitive pressures facing a subsidiary in state *j*, we not only weight other states with which state *j* has deregulated by the inverse of its distance to the subsidiary, we also construct regulatory-induced measures of competition that further weight these other states by their gross state product or the number of banks operating in the state. We

then use these time-varying, bank-specific and BHC-specific measures of competition to assess the impact of competition on banks opacity

We employ two strategies for constructing measures of bank opacity. First and foremost, we focus on loan loss provisions (LLPs), which are the most important bank accrual through which banks manage earnings and regulatory capital (Beatty and Liao, 2014). As reviewed by Dechow et al. (2010), an extensive literature constructs proxies of the quality of financial statements by estimating a model of LLPs and using the absolute values of the residuals as indicators of the "abnormal" accrual of LLPs, which are also called *discretionary LLPs*. Interpreting such abnormal accruals as reflecting disclosure quality, relies on the efficacy of the underlying LLP model. Since Beatty and Liao (2014) assess the effectiveness of bank LLP models in predicting bank earnings restatements and comment letters from the SEC, we begin our analyses with their preferred model and extend it to address potential concerns arising from our study of bank deregulation. Specifically, if bank deregulation improves the accuracy of the underlying LLP model and we do not account for this, then we may inappropriately interpret the reduction in the estimated errors as a reduction in the manipulation of bank financial accounts. To reduce this concern, we (1) include measures of deregulation in the preferred LLP model to allow for the possibility that bank deregulation shifts the LLP model, (2) fully interact the bank deregulation indicators with the LLP model regressors to allow for the possibility that deregulation changes the entire LLP model, and (3) use several alternative LLP models. The results are robust across different LLP models. Second, we use the frequency with which banks restate their earnings with the SEC. Restatements imply that banks misstated their financial reports. Though imperfect, more frequent restatements provide a negative signal about disclosure quality. Since limited data on restatements materially reduces the cross-sectional and time-series dimensions of the data, we primarily use them as a robustness test.

We use a difference-in-differences estimation strategy. The dependent variable is either a measure of discretionary LLPs for each BHC in each period or a measure of financial restatements. In our initial assessments, the core independent variables are measures of interstate bank and interstate branch deregulation that vary by state and year. In these analyses, we condition on BHC and time fixed effects, as well as an array of time-varying BHC traits. We

then examine the BHC-specific and subsidiary-specific measures of deregulation-induced competition. In these analyses, we also condition on state-time fixed effects to abstract from all time-varying state characteristics. Past research and our assessments support our econometric strategy. Several studies show that the timing of deregulation does not reflect bank performance (Jayaratne and Strahan, 1998; Goetz et al., 2013) or state economic performance (Jayaratne and Strahan, 1996; Morgan et al., 2004; Demyanyk et al., 2007; Beck et al., 2010). We demonstrate below that discretionary LLPs do not predict the timing of bank deregulation and there are no trends in discretionary LLPs prior to deregulation. Given data availability, we conduct the analyses over the period from 1986 through 2006 using quarterly data.

We discover that deregulation-induced competition materially enhances disclosure quality. When using the state-time measures, we find that regulatory reforms that lowered barriers to bank competition reduced discretionary LLPs and the frequency of financial restatements with the SEC. Moreover, when using the BHC-specific and subsidiary-specific measures of deregulation-induced competition, we find that an intensification of competition reduces discretionary LLPs. In these analyses, identification comes from differentiating between BHCs and subsidiaries within the same state that differ in terms of their distance to other states. These results hold when controlling for state-time fixed effects, as well as an assortment of time-varying BHC and subsidiary traits. Thus, the results are not driven by changes in regulatory policies, inspection or auditing policies, or any other factors at the state-time level; rather, they are driven by the differential impact of interstate banking reforms on BHCs and subsidiaries within a state that arise because of their differential distance to competitors. The findings suggest that deregulation reduced discretionary LLPs by intensifying competition.

The finding that competition improves disclosure quality is robust to several factors. First, we were concerned that positive values of discretionary LLPs could reflect transparency-enhancing accounting discretion rather than earnings management. Although we indirectly address this concern by allowing the LLPs equation to change with deregulation and controlling for state-time effects, we also address this concern directly by constructing a measure of discretionary LLPs that only considers negative residuals from the LLPs estimation. We find that all of the results hold. Second, we were concerned that the results might reflect

changes in the actual quality of loans following bank deregulation rather than earnings management, so also examined the impact of competition-enhancing deregulation on actual loan charge-offs. We find that deregulation does not explain actual loan charge-offs, which is consistent with the view that competition reduces opacity, not simply loan quality. Third, we were also concerned that the results might reflect BHCs expanding into different states and not the effects of competition. Consequently, we redid the analyses while limiting the sample to BHCs that never expand into other states. In this way, we focus only on changes in the competitive pressures facing banks, not the actual expansion of banks. All of the results hold.

Although it is beyond the scope of this paper to test each of the channels suggested by theory through which competition might influence disclosure quality, we push the analyses beyond our core question to explore two channels. First, as discussed above, an extensive body of research suggests that an intensification of product market competition can trigger improvements in corporate governance, with positive ramifications on disclosure quality. To shed some empirical light on this mechanism, we examine whether the impact of competition on bank opacity varies inversely with the pre-existing "toughness" of official state regulators. Intuitively, if competition improves disclosure quality by enhancing governance, then the impact of competition should be smaller in states where official regulators were already effectively governing banks. Using a measure of cross-state differences in regulatory quality developed by Agarwal et al. (2014), we find a less profound impact of bank competition on opacity in states with "tougher" regulators, which is consistent with competition reducing opacity through the governance channel.

Second, we also find suggestive evidence that competition reduces earnings management by facilitating peer-firm comparisons. As noted above, the peer-firm channel assumes that competition makes banks more similar, so that they become more accurate benchmarks. We test whether competition increases similarity, where we measure "similarity" by the degree to which the average LLPs of banks in a state accounts for the LLPs of individual banks. We find that a regulatory-induced intensification of competition increases similarity among banks, which is a key component of the peer-firm channel.

Our work contributes to the debate on the impact of competition on disclosure quality, which has focused on nonfinancial firms (e.g., Datta et al., 2013; Balakrishman and Cohen, 2014; Markarian and Santalo, 2014; Tong and Wei, 2014; Young, 2014)[3]. As stressed by Ali et al. (2009), a key challenge with drawing confident inferences about the impact of competition on disclosure quality is the difficulty in identifying an exogenous source of variation in competition. For example, much of this literature uses cross-industry concentration indicators to proxy for competition differences. But, cross-industry concentrations differences might not reflect differences in competition and some third factor might simultaneously shape industrial structure and disclosure quality, confounding the ability to assess the impact of competition on earnings management. Furthermore, it is not clear whether results based on nonfinancial firms can be directly applied to banks, given the influence of bank regulations and supervisors (Gunther and Moore, 2003). In this paper, we offer and implement a new strategy for measuring exogenous variation in competition at the BHC and subsidiary levels, so that we can better identify the impact of competition-enhancing reforms on disclosure quality.

Our work also relates to three recent studies of the IBBEA. Dou et al. (2015) find that LLPs fall after the IBBEA, while Burks et al. (2015) find an increase in the voluntary disclosures of information after the IBBEA. Bushman et al. (2015) find that banks delay the recognition of expected loan losses to future periods when they face strong competition, as measured by a textual analysis of "competition" related words in banks' 10-K filings. In contrast, Burks et al. (2015) find an increase in bank voluntary disclosure via press after the IBBEA. Our focus and methods are different. First, we assess the impact of an intensification of competition on both the abnormal accruals of LLPs and the frequency with which banks restate financial statements. In contrast to Bushman et al. (2015) and Dou et al. (2015), we do not focus on the level of LLPs per se; we focus on disclosure quality. Second, by analyzing disclosure quality, we

[3] Existing studies of competition and earnings management focus on nonfinancial firms and yield mixed results. For example, using Lerner and HHI indexes, Datta et al. (2013) and Markarian and Santalo (2014) find that competition increases earnings management. While Balakrishman and Cohen (2014) find that industries with high HHI index values tend to have more financial restatements, they show that industries that experience tariff reductions and are therefore exposed to greater foreign competition tend to have fewer restatements. Young (2014) finds that increased competition reduces real earnings management, while Tong and Wei (2014) do not find any significant connection between competition and opacity.

address a concern highlighted by Dou et al. (2015) with examining LLPs. Since there is a potential improvement in lending quality after deregulation, as shown by Jayaratne and Strahan (1996), this could account for the drop in LLPs. In our empirical analysis, we address this by focusing on the abnormal accruals of LLPs and by fully interacting the bank deregulation indicators with the LLP model regressors to allow for structural changes in the quality of loans after deregulation. Third, besides interstate branch deregulation, which occurred primarily between the 1995 IBBEA and 1997, we examine what happened to abnormal accruals during the dynamic, state-specific process of interstate bank deregulation from 1986 through 1995. Thus, we use a much longer panel, which includes both interstate bank and interstate branch deregulation. Fourth, in terms of the sample of banks, Dou et al. (2015) focus on privately-held, one-county banks, Bushman et al. (2015) focus on publicly-listed banks, while Burks et al. (2015) focus on the four largest banks in each state. Our sample includes all public and private BHCs and their subsidiaries. Fifth, a major contribution of our paper is the design and implementation of a new approach for constructing time-varying, bank-specific measures of competition so that we can identify the impact of competition on both individual banks and BHCs. We do this by integrating the gravity model's insight that distance matters for investment and thus the degree to which individual bank subsidiaries face competition from other banks with the dynamic, state-specific process of bilateral and multilateral interstate banking agreements that evolved over decades. Moreover, we show that it is statistically and economically important to use these BHC-specific and bank subsidiary-specific measures of deregulation-induced competition and control for state-time fixed effects to draw accurate inferences about the impact of competition on bank opacity.

The paper proceeds as follows. Section 2 discusses the data and empirical methods. Section 3 presents initial results using state-time measures of competition, while Section 4 presents the main results using bank-time measures of competition. Section 5 provides robustness tests and Section 6 concludes.

2. Data, Methodology, and the Validity of the Identification Strategy

In this section, we (1) define the data, including measures of the competitive pressures facing state's banks and proxies of bank disclosure quality, (2) describe the basic strategy for identifying the impact of bank deregulation on bank opacity using data at the state-time level, and (3) provide a series of tests of the validity of this strategy. After presenting the results from this basic strategy in the next section, we refine our strategy and construct and evaluate measures of the competitive pressures facing each bank subsidiary and BHC in each time period. Appendix Table 1 provides definitions of all of the variables used in the paper.

2.1 Data on BHCs, subsidiaries, and states

The Federal Reserve provides consolidated balance sheets and income statements for BHCs on a quarterly basis starting in June 1986. We examine the ultimate parent BHC that owns, but is not owned by, other banking institutions, where we define ownership as 50% or more of the financial institutions equity. More specifically, we follow Goetz et al. (2013) and use code RSSD9364 in the Y-9C reports to link bank subsidiaries to the parent BHCs and code RSSD9365 to assign a subsidiary bank to the parent BHC if the latter owns at least 50% of the subsidiary's equity stake.

Our BHC sample contains 27,137 BHC-quarter observations on 911 BHCs headquartered in one of 48 states or the District of Columbia. Consistent with the literature on US bank deregulation, we exclude Delaware and South Dakota from our sample because they changed their laws to encourage the entry and formation of credit card banks.

We also separately examine the subsidiary banks of these BHCs. We exclude banks that do not belong to any BHCs. This yields a sample of 68,320 bank-quarter observations. However, there is insufficient balance sheet information and capitalization information on some banks, so our subsidiary level sample contains 55,015 observations, on 2,879 banks, belonging to 881 BHCs, over the period from the third quarter of 1986 through 2006.

For financial restatements and state characteristics, we use several additional datasets. We manually construct a dataset on financial restatements from 10-K, 10Q, and 8-K files from EDGAR, which gathers information from the Securities and Exchange Commission (SEC)

filings of public firms. The Bureau of Economic Analysis provides state-level data on social and economic demographics.

2.2 The dates of bank deregulation

We use the lowering of regulatory barriers to interstate banking as exogenous sources of variation in the competitiveness of the banking market in each U.S. state. During the last quarter of the twentieth century, federal and state authorities reduced restrictions on interstate banking—the ability of banks to establish subsidiary banks across states, and interstate branching—the ability of banks to establish branches across states. These policy changes increased the contestability of banking markets, as it allowed a broader array of banks to sell banking services in a state. Reflecting this competition, deregulation reduced interest rates on loans, increased interest rates on deposits, and did so without boosting loan delinquency rates (Jayaratne and Strahan, 1996, 1998). Johnson and Rice (2008) summarize the history of U.S. deregulation of geographic restrictions on banking.

From 1978 through 1995, states engaged in a process of interstate bank deregulation, in which a state allowed banks from other states to acquire or establish subsidiary banks in its borders. Over this period, states removed restrictions on interstate banking in a dynamic, state-specific process either by unilaterally opening their state borders and allowing out-of-state banks to enter or by signing reciprocal bilateral and multilateral agreements with other states. Thus, states initiated interstate bank deregulation in different years and then followed different paths as they signed agreements with other states. The process of interstate bank deregulation ended with the passage of the Riegle-Neal Act of 1994 that eliminated restrictions on BHCs establishing subsidiary bank networks across state boundaries.

There are several ways to date interstate bank deregulation. Most researchers simply define a state as "deregulated" after it first lowers barriers to interstate banking with at least one other state. In our analyses, *INTER* equals one for BHCs headquartered in a state in the years after that state first allows interstate banking and zero otherwise. To be compatible with the quarterly level BHC-characteristic data, we assume that the deregulation happens in the last quarter of the year in which the state deregulated, so that *INTER* equals one starting from the

first quarter of next year. More recently, Goetz et al. (2013) exploit the dynamic process of each state's removal of impediments to out-of-state banks to date interstate bank deregulation. Based on this work, we construct three measures of interstate bank deregulation. $Ln(\#\ of\ States)_{jt}$ equals the natural logarithm of one plus the number of states whose banks can enter state *j* in year *t*. $Ln(\#\ of\ States\text{-}Distance\ Weighted)_{jt}$ equals the natural logarithm of one plus the number of other states whose banks can enter state *j* in year *t*, where each of these other states is weighted by the inverse of their distance from the state. We construct and use $Ln(\#\ of\ States\text{-}Distance\ Weighted)_{jt}$ because BHCs might find it more beneficial and less costly to enter close states rather than distant ones, with corresponding ramifications on the competitiveness of banking markets. The third measure is $Ln(\#\ of\ BHCs\ from\ Other\ States)_{jt}$, and it equals the natural logarithm of one plus the number of BHCs in states that can enter state *j* in year *t*. This measure allows for the possibility that a state's BHCs will face more competition when there is an increase in the number of BHCs from other states that can enter its market.

In addition to these three state-time measures of the regulatory-induced competitive pressures facing all BHCs in states, we also construct measures of the competitive pressures facing each bank subsidiary and BHC. In this way, we construct bank-time measures of competition that differentiate among banks within each state. We describe how we construct these measures below.

States also relaxed restrictions on interstate bank branching. While the Riegle-Neal Act of 1994 effectively removed restrictions on interstate banking, it allowed states some discretion on the timing of the lowering of barriers to the establishment of branch networks by BHCs in other states. So, BHCs from state *j* were able to establish a subsidiary in state *i* after 1994, but they were not necessarily able to establish branches in state *i*. The year in which states allowed interstate branching varies between 1994 and 1997. In the analyses below, *INTER-BRANCH* equals one if a BHC is headquartered in a state that allows the BHCs from other states to establish branch networks and zero otherwise. Appendix Table 3 provides the dates of *INTER* and *INTER-BRANCH* for each state.

2.3 Estimating disclosure quality

We use two approaches for measuring the quality of bank financial statements. One approach measures the frequency with which banks restate their financial statements with the SEC. Due to data limitations, we can only conduct these for a subset of the data. We define financial restatements more fully and implement this approach below.

The second approach examines loan loss provisions (LLPs), which are the major mechanism through which banks manage both earnings and regulatory capital. This approach measures disclosure quality by estimating a model of LLPs and using the absolute values of the residuals to construct indicators of the "abnormal" accrual of LLPs. Interpreting such abnormal accruals as "disclosure quality" relies on the efficacy of the underlying model of LLPs. Beatty and Liao (2014) assess nine different LLP models proposed by the banking literature. They find that one model performs particularly well in predicting earning restatements and comment letters from the SEC. We primarily use Beatty and Liao's (2014) "preferred" model and then show that the results are robust to using alternative LLP models.

Specifically, we construct measures of disclosure quality for each BHC in each period using the following two-step procedure. We first run a regression using Beatty and Liao's (2014) preferred LLP model to separate the systemic component of LLPs, i.e., the component of LLPs accounted for by bank and state determinants, from that part of LLPs unaccounted for by these fundamentals. In this model, we also include the bank deregulation indicator and fully interact the bank deregulation indicator with all of the regressors in the LLP model. That is, we allow for bank deregulation to change the entire LLP model after deregulation. This reduces the possibility that we are simply measuring a change in the accuracy of the LLP model, rather than a change in discretionary LLPs. In other words, excluding those interaction terms might lead us to inappropriately infer that deregulation lowered the manipulation of bank financial accounts if bank deregulation simply improved the accuracy of the underlying LLP model.

The first-step regression is as follows:

$$
\begin{aligned}
LLP_{bjt} = {} & \alpha_1 dNPA_{b,j,t+1} + \alpha_2 dNPA_{bjt} + \alpha_3 dNPA_{b,j,t-1} + \alpha_4 SIZE_{b,j,t-1} \\
& + \alpha_5 dLOAN_{bjt} + \alpha_6 CSRET_{jt} + \alpha_7 dGSP_{jt} + \alpha_8 dUNEMP_{jt} \\
& + \alpha_9 D_{jt} + \alpha_{10} D_{jt} * dNPA_{b,j,t+1} + \alpha_{11} D_{jt} * dNPA_{bjt} + \alpha_{12} D_{jt} \\
& * dNPA_{b,j,t-1} + \alpha_{13} D_{jt} * SIZE_{b,j,t-1} + \alpha_{14} D_{jt} * dLOAN_{bjt} \\
& + \alpha_{15} D_{jt} * CSRET_{jt} + \alpha_{16} D_{jt} * dGSP_{jt} + \alpha_{17} D_{jt} * dUNEMP_{jt} + \delta_j \\
& + \varepsilon_{bjt}.
\end{aligned} \tag{1}
$$

In this model, $dNPA_{bjt}$ represents the change in non-performing assets between quarter *t* and *t-1* divided by total loans in quarter *t-1* for BHC *b* in state *j*. Following Bushman and Williams (2012), this model includes current period $dNPA_{bjt}$ and next period $dNPA_{b,j,t+1}$ because banks might use current and forward-looking information on non-performing assets in selecting LLPs. The model includes $dNPA_{b,j,t-1}$ since banks might use historical changes in non-performing assets in setting LLPs.[4] $SIZE_{b,j,t-1}$ is the natural logarithm of total assets in quarter *t-1* and is included because official supervisory oversight and private sector monitoring might vary with banks size. $dLOAN_{b,j,t}$ is the change in total loans over the quarter divided by lagged total loans. This is included to allow for the possibility that an increase in loans is associated with a decrease in loan quality. D_{jt} is the value of one of the five deregulation measures in state *j* in period *t*. D_{jt} is fully interacted with the other variables included in Beatty and Liao's (2014) preferred model. Equation (1) also includes measures of three state characteristics that might influence LLP: the Case-Shiller Real Estate Index ($CSRET_{jt}$), the change in gross state product ($dGSP_{jt}$), *GSP*, and the change in the state's unemployment rate ($dUNEMP_{jt}$). We also include state fixed effects, δ_j, to account for any time-invariant state characteristics that shape loan loss provisioning. Equation (1) is estimated separately for each deregulation measure.

[4] We do not include the two period lag of *dNPA* as in Beatty and Liao (2014) in the reported analyses because it eliminates many observations. However, including the two period lag of *dNPA* does not affect the results.

In the second step, we construct a proxy for the discretionary LLPs of each BHC in each quarter as the natural logarithm of the absolute values of the errors from estimating equation (1). The errors represent the "abnormal" accrual of LLPs—the component of LLPs unexplained by the regression's fundamental determinants. We use the absolute value of the residuals because both positive and negative residuals may reflect discretionary manipulation of LLPs above and beyond that accounted for by the regressors in equation (1). An extensive literature uses errors from such models to proxy for earnings management, as discussed in Beatty and Liao (2014), Dechow et al. (2010), Yu, (2008), and Jiang et al. (2010). We interpret the results reported below under the maintained hypothesis that this proxy reflects the discretionary management of LLPs.

Appendix Table 2 reports summary statistics for the sample obtained after dropping observations in which the core explanatory variables have missing values. In our sample, the median BHC has $1.1 billion in total assets (*SIZE*), while the average BHC has $11.0 billion of assets. Given the skewed distribution of bank size, we take the logarithm of total assets (*logSIZE*) in the regression analyses. Both the mean and the median of non-performing assets (*NPA*) in our sample is $10,000 per quarter. The median and mean of total loans (*LOAN*) are $680 million and $5.9 billion, respectively. In terms of the change in loans scaled by total loans (*dLOAN*), the mean and median are 0.03 and 0.02, respectively.

2.4 Empirical methodology

We examine the relations between disclosure quality and bank deregulation using a difference-in-differences methodology. Here, we present the methodology based on the basic state-time measures of the regulatory-induced competitive pressures facing BHCs in a state: *INTER, Ln(# of states), Ln(# of states-Distance Weighted), Ln(# of BHCs from Other States), INTER-BRANCH*. Below we describe the method for examining the bank-time measures of competition, i.e., the measures of the competitive pressures facing each bank subsidiary and BHC in each time period. A key advantage of using the bank-time measures of competition is that we can control for state-time and bank fixed effects. When using the basic state-time measures of competition, we can only use time and bank fixed effects.

For the basic state-time measures of the regulatory-induced competitive pressures facing BHCs, the difference-in-differences methodology controls for all time-invariant BHC and state characteristics as well as all time effects. Furthermore, we condition on a wide array of time-varying BHC characteristics. Thus, we evaluate the effect of deregulation on disclosure quality by estimating the following model:

$$Disclosure\ Quality_{bjt} = \beta' \cdot D_{jt} + \gamma' \cdot X_{bjt} + \delta_b + \delta_t + \varepsilon_{ijt}, \quad (2)$$

where $Disclosure\ Quality_{bjt}$ is the measure of the manipulation of loan loss provisions by BHC *b*, headquartered in state *j*, in quarter *t*, and equals the logarithm of the absolute value of the residuals from equation (1). D_{jt} is bank deregulation in state *j* and in quarter *t*. For bank deregulation, we use the measures of interstate bank and interstate branch deregulation defined above. We also include quarter fixed effects (δ_t) (so that there is a separate dummy variable for each time period), BHC fixed effects (δ_b), and a vector, $X_{bjt,}$ of time-varying BHC traits that might explain the management of LLPs. Specifically, following the literature on the quality of banks earnings statements (e.g., Kanagaretnam et al., 2010), X_{bjt} includes the logarithm of bank assets (*logSIZE*), one year lag of loan loss provision scaled by beginning total loans (*LLP_lag*), negative net income indicator variable (*LOSS*), and bank capital ratio (*CAP*). The results hold when including all of these X_{bjt}variables in the equation (1) model for LLPs. In robustness tests, we control for earnings before tax and provisions (*EBTP*) and obtain the same results. We provide the estimates without *EBTP* since competition may influence discretionary LLPs through its effect on earnings. Similarly, the results are robust to controlling for the particular features of each BHC's loan portfolio, such as the proportion of real estate, commercial and industrial, agriculture, individual, and foreign loans. Including these loan types does not alter the findings. We use quarterly data on BHCs and confirm the findings when aggregating to an annual frequency.

2.5 On the validity of our approach

Drawing valid inferences from these regressions requires that the change in discretionary LLPs in deregulated and regulated states would have been the same in the absence of deregulation. If the trend in abnormal accruals of LLPs differed in deregulating versus non-deregulating states, then our estimation strategy could yield erroneous inferences.

To assess the validity of our identification strategy, we conducted two types of analyses. First, we present graphs regarding the relation between disclosure quality and the timing of interstate bank deregulation that illustrate (1) abnormal accruals of LLPs do not predict the timing of deregulation and (2) the reduction in abnormal accruals occurs after a state started the process of interstate bank deregulation.

Figure 1 illustrates the evolution of disclosure quality before and after interstate bank deregulation. We start by making year zero the year when a state started interstate bank deregulation. Then, time for each state is centered at year zero, such that one quarter before deregulation is -1 and one quarter after deregulation is +1. We then run the following regression:

$$Disclosure\ Quality_{bjt} = \beta_1 D_{jt}^{-10} + \beta_2 D_{jt}^{-9} + \cdots + \beta_{20} D_{jt}^{+10} + \delta_b + \delta_t + \varepsilon_{bjt}, \qquad (3)$$

where the deregulation dummy variable D_{jt}^{+n} equals one for banks in the *n*th quarter after deregulation, and the deregulation dummy variable D_{jt}^{-n} equals one for banks in the *n*th quarter before deregulation, and δ_t and δ_b are time and BHC fixed effects, respectively. We consider a 20-quarter window, spanning from ten quarters before until ten quarters after deregulation. We then plot the estimated coefficients on the deregulation dummies and provide 5% confidence intervals.

Figure 1 indicates that (1) there is a distinct drop in the time-series of abnormal accruals of LLPs when states start interstate bank deregulation and (2) there no evidence of trends in discretionary LLPs before interstate bank deregulation. While this figure does not control for time-varying state and BHC specific information, the sharp break in discretionary LLPs is consistent with deregulation changing disclosure quality.[5]

[5] Although Figure 1 depicts a notable drop in discretionary LLPs in the first quarter after deregulation, this timing is partially an artifact of the frequency of the data. We assume that deregulation occurs in the last quarter of the year in which the state deregulated to make the deregulation data compatible with the quarterly level data on banks. This

Furthermore, we plot the trend of the median value of disclosure quality scaled by *EBTP* (*D-LLP/EBTP*) of each BHC in a state during the period of interstate deregulation, where *EBTP* equals income before taxes and provisions in million U.S. dollars. Disclosure quality is measured as the natural logarithm of the absolute value of discretionary LLPs estimated from equation (1) multiplied by the value of the lag of total loans, which is also measured in millions of U.S. dollars. We continue to consider a 20-quarter window, spanning from ten quarters before until ten quarters after deregulation. The median *EBTP* of our sample of BHCs is $3.02 million, and the median D-LLP is $0.43 million. Figure 2 shows that *D-LLP/EBTP* has a median value of 28% during the pre-deregulation period with considerable variability but drops to about 13% after deregulation and also becomes much more stable. We do not find a statistically significant increase in *EBTP* following deregulation. This is consistent with the earlier findings by Jayaratne and Strahan (1996) and Rice and Strahan (2010) that deregulation did not increase overall credit demand and that cost reductions following deregulation were passed along to bank customers in the form of lower loan rates. The results illustrated in Figure 2 not only reinforce the findings from Figure 1 that there is a statistically significant drop in abnormal LLPs after interstate deregulation, but also show that this drop is economically large relative to BHC earnings.

For the second type of validity test, we examined whether LLPs in a state predict the timing of bank regulatory reforms. Although we control for BHC, and hence state fixed effects, the management of LLPs by a state's banks might influence the timing of interstate bank and interstate branch deregulation. Thus, following the method developed in Kroszner and Strahan (1999), we examine whether the degree of information disclosure by a state's BHCs predicts the timing of each type of bank regulatory reform. For each state and year, we aggregate discretionary LLPs by BHCs operating in that state. To compute an index of discretionary LLPs in state *j* during year *t*, we weight each BHC's discretionary LLPs by its proportion of assets in

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explains the drop in the first quarter in Figure 1. If we instead assume that INTER equals one from the first quarter of the year of deregulation, then we find that discretionary LLPs drop later in the year. Regardless of the precise timing within the year, the evidence clearly indicates a sharp drop in discretionary LLPs after interstate bank deregulation. There is no evidence that BHCs anticipated a change in deregulation-induced competition and started to build a reputation for disclosure quality in anticipation of that change (e.g., Baginski and Rakow 2012).
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state *j*'s banking system during year *t*. We then incorporate lagged values of this index into the Kroszner and Strahan (1999) econometric model for predicting bank regulatory reforms and assess if discretionary LLPs account for the timing of bank regulatory reforms. The Kroszner and Strahan (1999) framework includes the following control variables: GSP per capita, state level unemployment rate, small bank share of all banking assets, capital ratio of small banks relative to large ones, relative size of insurance in states where banks may sell insurance (zero otherwise), relative size of insurance in states where banks may not sell insurance (zero otherwise), an indicator variable that equal to one if banks may sell insurance (zero otherwise), the small firm (fewer than 20 employees) share of the number of firms in the state, an indicator variable that equals one if the state has a unit banking law (zero otherwise), share of state government controlled by Democrats, and an indicator that takes a value of one if the state is controlled by one party (zero otherwise).

Table 1 presents the results of the determinants of banking deregulations. The sample consists of state-year observations from 1986 to 2006, and we therefore exclude states that deregulated before 1986. While all states deregulated interstate branching restrictions after 1986, only 22 states started removing restrictions on interstate banking in or after 1986. The dependent variables used in Table 1 are *INTER*, *Ln(# of Out-Of-States)*, *Ln(# of Out-Of-States – Distance Weighted)*, *Ln(# of BHCs from Out-Of-States)*, and *INTER-BRANCH*, respectively.

As shown, disclosure quality does not predict the timing of regulatory reforms. There is no evidence that the degree to which BHCs manipulate the information that they disclose to the public or regulators altered the decision of officials to ease regulatory impediments to interstate banking or interstate branching.

3. Empirical Results

This section first evaluates the impact of bank deregulation on disclosure quality using the basic state-time measures of regulatory-induced competition discussed above. We then describe and use a strategy for constructing bank subsidiary and BHC measures of competition. This allows us to control for state-time and bank fixed effects, enhancing the ability to draw sharper inferences about the impact of regulatory-induced competition on bank opacity.

3.1 Results: State-time level analyses

In Table 2, we present regression results on the relation between disclosure quality and state-time indicators of bank regulatory reforms. We study the four interstate bank deregulation indicators—*INTER*, *Ln(# States)*, *Ln(#States—Distance Weighted)*, and *Ln(# BHCs from Other States)*—and the deregulation of interstate branching—*INTER-BRANCH*. All five regressions control for time-varying BHC characteristics (*logSIZE*, *LLP_lag*, *LOSS*, and *CAP*), time fixed effects, and BHC fixed effects. In parentheses, we report heteroskedasticity consistent standard errors (as defined in MacKinnon and White (1985)) that are clustered at the state level. These regressions assess the impact of bank deregulation on disclosure quality. As noted above, we estimate equation (1) to construct measures of disclosure quality. Appendix Table 4 provides results from these estimates of equation (1).

The results presented in Table 2 indicate that deregulation reduced bank opacity. Each of the five indicators of regulatory reform enters negatively and statistically significantly. Thus, after a state started allowing BHCs from other states to enter its borders and establish subsidiaries (*INTER*), disclosure quality improved (column 1). Furthermore, as reported in columns 2-4 of Table 2, each of the three dynamic measures of the evolution of interstate bank deregulation enters negatively and significantly: as states allowed BHCs from more states to enter, discretionary LLPs fell. As indicated by the results on *INTER-BRANCH*, after states allowed BHCs from other states to enter via the establishment of branches (not just via separately capitalized subsidiaries), the quality of information disclosure improved. Finally, it is worth emphasizing that these results are robust to excluding the time-varying BHC traits from the analyses. Including endogenous BHC-level controls could interfere with drawing sharp

inferences about the impact of competition on disclosure quality, as shown in Appendix Table 5A, however, all of the findings hold when excluding these regressors.

The estimated coefficients reported in Table 2 suggest that the economic impact of bank deregulation on disclosure quality is economically large. To help interpret the economic magnitude for those continuous deregulation measures, Table 2 presents the percentage change in disclosure quality for a one standard deviation change in the deregulation measure. For example, the point estimate for *Ln(# States)* on discretionary LLPs is -0.0452 (column 2), which implies an 8% =(0.0452 * 1.8) decrease in abnormal LLPs with a one standard deviation increase in *Ln(# States)*. Similarly, for the other two state-specific deregulations measures (i.e. *Ln(#States—Distance Weighted)*, and *Ln(# BHCs from Other States)*), a one standard deviation change is also associated with an 8% decrease in abnormal LLPs. The results suggest an economically large, negative relation between removing barriers to competition and the management of LLPs.

With respect to the control variables, Table 2 indicates the following. Large BHCs tend to engage in more LLP management. This is consistent with the findings in Huizinga and Laeven (2012) showing that larger banks have more discretion over asset valuation because they tend to have a larger fraction of hard-to-value assets; therefore, these banks tend to benefit more from the enhanced capability to do asset revaluation. We also find that discretionary LLPs are positively related to *LOSS* (i.e. an indicator variable takes the value of one if net income is negative and zero otherwise). These results suggest that when the bank makes a loss, there is an uptick in the management of LLPs. This result is consistent with findings in the earnings smoothing literature that banks manage income by either delaying or accelerating provisions for losses (Liu and Ryan, 2006).

3.2. Creating bank subsidiary and BHC measures of competition

There are potentially important limitations to the state-time regulatory reform measures analyzed thus far: They are not computed at the BHC or bank subsidiary level. Although Jayaratne and Strahan (1998) and Stiroh and Strahan (2003) find competition among banks within a state intensified when that state eased regulatory restrictions on the geographic

expansion of banks, this does not necessarily imply that these regulatory reforms improved disclosure quality by intensifying competition. Perhaps, when a state deregulated interstate banking restrictions, this induced other policy reforms or was accompanied by changes in other factors that enhanced disclosure quality among banks within the state. Perhaps, these other changes, not increased competition among banks, account for the improvement in disclosure quality following interstate bank deregulation. To address this limitation, one must differentiate among banks within a state and separately identify shocks to competition at the bank subsidiary and BHC levels.

In light of this concern, we develop a new strategy for constructing bank subsidiary and BHC specific measures of competition that vary over time. This strategy builds on the "gravity model," which predicts that the costs to a business of opening a new site are positively associated with the distance between the business's headquarters and the site. For example, after state *j* allows BHCs in state *i* to enter and establish subsidiaries in state *j*, two subsidiaries in state *j* may face different competitive pressures from state *i*, depending on their distance to state *i*. More concretely, when California deregulates with Arizona, the banks in southern California may face greater competitive pressures from BHCs in Arizona than banks in northern California. A large body of evidence validates the "gravity model" by showing that distance influences such investment decisions, including the decision of BHCs to open subsidiaries in other states (Goetz et al., 2013, 2015). We build a BHC-specific-time measure of deregulation-induced competition by integrating this gravity model into the process of interstate bank deregulation.

More formally, we first construct measures of the competitive environment associated with interstate banking facing each subsidiary. For each subsidiary in each period, we identify those states whose BHCs can enter the subsidiary's state. We then weight each of those states by the inverse of its distance to the subsidiary. That is, we calculate the interstate bank competitive pressures facing a subsidiary, *s*, located in state *j* in period *t* as:

$$SUB\_DIS_{s,j,t} = Ln \sum_i [{}^{I_{j,i,t}}\!/_{DIS_{s,i}}], \tag{4}$$

where $I_{j,i,t}$ equals one if BHCs from state *i* are allowed to establish subsidiaries in state *j* in period *t*, and zero otherwise; and, $DIS_{s,i}$ equals the distance between subsidiary *s* and state *i*.[6]

Second, we aggregate the subsidiary measures of competition to the BHC level and calculate the interstate bank competitive pressures facing BHC, *b*, located in state *k* in period *t*. We do this by identifying all of the subsidiaries in each BHC, i.e., all *s* within each *b*, and performing the following calculation:

$$BHC\_DIS_{b,k,t} = \sum_{s \in b} \left[SUB\_DIS_{s,j,t} \right] * P_{s,b,t}, \tag{5}$$

where $P_{s,b,t}$ is the proportion of assets of each subsidiary, *s*, within BHC, *b*, in period *t*, relative to the total assets of all of BHC *b*'s subsidiaries. Thus, for each BHC in each period:

$$1 = \sum_{s \in b} P_{s,b,t}, \tag{6}$$

To address any concerns that changes in $P_{s,b,t}$, rather than changes in competition, shape the results below, we implement three sensitivity checks. First, we construct *BHC_DIS* using lagged $P_{s,b,t-1}$, where we lag the measure of the proportion of a BHC's assets in each subsidiary by one quarter. All of the results hold. Second, we conduct all of the analyses at the subsidiary level, which does not involve the use of $P_{s,b,t}$. As shown below, we get very similar results when using either the BHC-level or bank subsidiary measures. Third, we examine the results when limiting the sample to "non-expanders:" BHCs that never establish subsidiary banks in other states. All of the results hold. This indicates that it is the intensification of competition that influences bank disclosure decisions, not their expansion into other states.

We also create two additional bank subsidiary and BHC-specific measures of competition that weight $SUB\_DIS_{s,j,t}$ by either the economic sizes of or the number of banks in states that are allowed to establish subsidiaries in state *j*. We measure the economic size of states by their Gross State Product (*GSP*). For example, for the economic size weighted measure of the

[6] In those cases where $\sum_i [I_{j,i,t} / DIS_{s,i}] = 0$, we set the value to 0.000001.

interstate bank competitive pressures facing a subsidiary, *s*, located in state *j* in period *t*, we compute the following:

$$SUB\_DIS\_GSP_{s,j,t} = Ln\sum_i [GSP_i * {I_{j,i,t}}/{DIS_{s,j}}], \quad (7)$$

where GSP_i is the Gross State Product of state *i* and all of the other terms are defined above.

We create the time-varying BHC-specific measures of these two additional measures from the subsidiary level measures using the same method used to construct *BHC_DIS* from *SUB_DIS*. Thus, when computing the economic size weighted measure of the interstate bank competitive pressures facing BHC, *b*, located in state *j* in period *t*, we compute the following:

$$BHC\_DIS\_GSP_{b,k,t} = \sum_{s \in b} [SUB\_DIS\_GSP_{s,j,t}] * P_{s,b,t}. \quad (8)$$

We use a similar method to construct *SUB_DIS_NUM* (and *BHC_DIS_NUM*), which measures the interstate bank competitive pressures facing a bank subsidiary (and BHC) weighted by the number of banks in the other states rather than weighted by *GSP*.

A novel component of this approach is that it measures the changing competitive environment facing a BHC as the BHC's subsidiaries in other states face different competitive pressures. For example, a BHC headquartered in state *i* with subsidiaries in other states will experience changes in competition as those other states deregulate, subjecting the BHC to greater competition.

3.3 Results: BHC level analyses

With these BHC specific measures, we reexamine the regulatory determinants of bank opacity. In particular, we modify equation (2), so that it now includes these new BHC-specific-time measures of the competitive environment facing BHCs and state-time fixed effects:

$$Disclosure\ Quality_{bjt} = \beta' \cdot BHC\_DIS_{bjt} + \gamma' \cdot X_{bjt} + \delta_{jt} + \delta_b + \varepsilon_{bjt}, \quad (9)$$

where δ_{jt} and δ_b represents state-time and BHC fixed effects, respectively. If (a) the earlier results were driven by competition and (b) the distance of a potential competitor to a market

influences the competitiveness of that market, then β should enter negatively and significantly. If, however, the earlier results were driven by a change in some state-time factor occurring when two states lower barriers to interstate banking, then the BHC-specific-time measure of competition should enter insignificantly.

It is worth noting and addressing a potential concern with including time-varying bank-level controls in equation (9). If bank-level controls are directly affected by deregulation, then the inclusion of such endogenous controls could contaminate the difference-in-differences estimate. So in columns 1-3 of Table 3, we first provide estimates without including any of the bank-level controls. In columns 4-6, we include these controls and show that the coefficient estimates on bank deregulation are virtually identical when excluding and including these bank-level traits.

As shown in Table 3, each of these three measures of the competitive environment facing individual BHCs enters negatively and significantly—and with an economically large coefficient. To illustrate the economic magnitude, we provide a row in Table 3 that reports the estimated percentage change in disclosure quality for a one standard deviation change in each deregulation measure based on the coefficient estimates in each regression. For example, the point estimate in column (1) in *BHC_DIS* is 0.0538, which suggests that a one standard deviation increase (1.76) of *BHC_DIS* reduces discretionary loan loss provisions by about 9% (=0.0538 * 1.76).

The evidence is consistent with the view that regulatory reforms that intensify competition reduce bank opacity. By controlling for state-time fixed effects, these findings cannot be attributed to the effects of interstate bank deregulation on all BHCs in a state, nor can the findings be attributed to other policy changes that occurred at the same time as interstate bank deregulation and that influenced BHCs in a state. Rather, the results differentiate among BHCs within a state-quarter and indicate that those BHCs that become more exposed to competition reduce discretionary LLPs more than other BHCs.

Furthermore, the results are robust to restricting the sample along two key dimensions. First, we were concerned that the analyses might capture the effects of BHCs expanding into different states and not the effects of competition on BHCs. Consequently, we re-did all of the

analyses while liming the sample to BHCs that never expand into other states. Even when restricting the analyses to these "non-expanders," all of the results hold. Second, we were concerned about selection into and out of banking, since there was considerable exit and entry during this deregulatory period. Consequently, re-did the analyses while limiting the sample to BHCs that exist for the entire period. All of the results hold.

We also assess the value added of developing and using BHC-time measures of regulatory-induced competition relative to using state-time measures. We created the BHC-time measures to better identify the impact of competition on bank opacity. In particular, with these measures, we can control for state-time fixed effects and thereby condition out all state factors that might have changed at the same time that a state removed regulatory impediments to bank competition. We can test the importance of moving to this more granular measure of regulatory-induced competition by testing the importance of including state-time effects. That is, we evaluate the null hypothesis that the Table 3 regression results with state-time fixed effects (unrestricted model) are the same as those when estimating it in a restricted form that only allows for state and time fixed effects. We report these F-test results in Table 3. We reject the null hypothesis at the 1% level in all cases. The F-test results reinforce the importance of moving to the BHC-specific measures of regulatory-induced competition and including state-time effects in our analysis.

3.4 Results: Bank subsidiary level analyses

We also examine disclosure quality at the bank subsidiary level. There are pros and cons to moving from BHC to subsidiary level analyses. On the disadvantages, a BHC's subsidiaries are often subject to the same accounting policies as the parent organization, so disaggregating may provide little value added. An advantage of conducting the analyses at the subsidiary level is that we can identify exactly which bank subsidiary is influenced by the interstate banking deregulation.

To assess the relation between disclosure quality and measures of the regulatory-induced competitive pressures facing individual bank subsidiaries, we proceed as follows. We compute discretionary LLPs at the bank subsidiary level using the same procedures discussed above in

the context of BHCs and use the three bank subsidiary competition measures, *SUB_DIS*, *SUB_DIS_GSP*, and *SUB_DIS_NUM*, defined above. We then reexamine the relation between disclosure quality and bank competition using these time-varying, measures of the competitive environment facing each subsidiary. That is, for the case of *SUB-DIS*, we estimate the following modified version of equation (2):

$$Disclosure\ Quality_{sjt} = \beta' \cdot SUB\_DIS_{sjt} + \gamma' \cdot X_{sjt} + \delta_{jt} + \delta_s + \varepsilon_{sjt}, \quad (10)$$

where δ_{jt} and δ_s represents state-time and subsidiary fixed effects, respectively.

As shown in Table 4, there is a strong negative relation between disclosure quality and measures of the competitive pressures facing individual bank subsidiaries. These findings hold across each of the three measures of the regulatory-induced competitive pressures facing bank subsidiaries. Moreover, these results hold when conditioning on bank subsidiary and state-quarter fixed effects. As a robustness check, in Appendix Table 5B, we show that the results hold when excluding the bank-level controls. The results are consistent with the view that changes in the competitive environment facing a bank encourages the bank to reduce discretionary loan loss provisioning. The economic size of the estimated effect for subsidiaries is large. For example, in column 1 of Table 4, the point estimate of *SUB_DIS* is 0.0569, which suggests that a one standard deviation increase (1.79) of *SUB_DIS* reduces discretionary loan loss provisions by about 10% (=1.79 * 0.0569), which is virtually identical to those using the consolidated BHC.

4. Extensions and Robustness Tests

4.1 Restatements with the SEC

Rather than inferring the degree to which banks manipulate information disclosed to the public by using the residuals of an empirical model of LLPs, we now examine the frequency with which banks restate their earnings. Banks restate earnings when they have either intentionally or unintentionally misstated earnings. Such restatements could reflect a change in accounting standards or a mistake. Few reflect criminally fraudulent actions. Nevertheless, restatements do represent a violation of appropriate accounting practices by managers and represent an alternative proxy of the management of information disclosed to the public.

Following Beatty and Liao (2014), we manually search restatement information in 8-K, 10-K, and 10-Q files from EDGAR directly.[7] We create an indicator variable (*RESTATEMENT*) that equals one if a BHC restated its earnings in a year and zero otherwise. Consequently, we conduct these analyses using annual data. Even though EDGAR's electronic files start in year 1996, our search through EDGAR's paper records go back to 1988. However, the comprehensiveness and quality of the data increased markedly since 1993. The restatement sample, therefore, starts in 1993 and runs through 2006. This sample period prevents us from conducting the analyses on interstate banking deregulation. In this section, we therefore only examine the relation between interstate branch deregulation and bank restatements.

In Table 5, we estimate the relation between interstate branch deregulation and bank restatements using both probit and OLS models. Specifically, given the binary distribution of the dependent variable, we first use a probit regression model and report the marginal effects. We

[7] We primarily follow Audit Analytics in classifying both fraud and some technical and nonsubstantive restatements as financial restatement cases in our hand-collection procedure. These technical or nonsubstantive restatements are related to company reorganizations and restructurings. In addition, we also consider issues related to accounting rules change or reclassification as earnings restatement. More specifically, we count the following non-fraud cases as financial restatement reported in EDGAR: adjustment due to mergers and acquisitions; adjustment due to new accounting principles; adjustment in income statement, balance sheet, or cash flow statement; adjustment due to reclassification or characterization; adjustment due to internal management policies, methodology change, segment revision, allocation between lines of business, measurement change; adjustment due to tax impacts; Adjustment due to error / correction; adjustment due to operation combination / operation closed / operation sales; adjustment due to loans, assets, credit changes, investment; adjustment due to warrants, securities, equity changes; adjustment in cash dividends; adjustment in share outstanding, stock value, stock dividends, or stock distribution; earnings per share or dividends adjustment because of stock split; earnings per share adjustment or other adjustment because of dividends payment.

confirm the results using OLS. In the analyses, we control for year and BHC fixed effects. Table 6 presents the dynamic effects of the interstate branch deregulation on the odds of financial restatement. To trace out the dynamics, the regressors include separate dummy variables for one year before interstate branch deregulation through five years after a state removed restrictions on interstate branching. The reference period is the year that the state deregulated restrictions on interstate branching.

As reported in column 1 of Table 5, interstate branch deregulation is associated with a sharp reduction in the probability that a BHC restates its earnings. The coefficient estimates indicate that interstate branch deregulation reduced the likelihood that a BHC restates its earnings by 14.5 percentage points starting two years after the deregulation. Given that the mean value of *RESTATEMENT* during the pre-interstate branch deregulation period is 0.15, the estimated impact of deregulation on restatement is economically large. Due to the lack of within-group variation after including the year and BHC fixed effects, many observations are automatically dropped from the probit regression. We therefore include OLS regressions to check the robustness of the results and report these estimates in column 2 of Table 5. As shown, the OLS results strongly confirm the findings from the probit analyses.

One concern with using standard measures of financial restatements in these analyses is that they include restatements due to clerical errors (Hennes et al., 2008). Since clerical errors may not reflect opacity or attempts by banks to manipulate the flow of information, including these unintentional restatements might bias the results. To address this concern, we exclude restatements due to clerical errors and redo the analyses. Eliminating clerical errors reduces the mean value of *RESTATEMENT* falling from 0.14 to 0.13. We re-run the dynamic effect model and provide the results in columns 3-4 of Table 5. As shown, excluding unintentional misstatements does not alter the estimates from columns 1-2.

Taken together, these analyses show that (1) changes in financial restatements do not occur before deregulation, (2) financial restatements fall sharply about two years after interstate branch deregulation, and (3) restatements continue to fall after that. The post-deregulation coefficients are negative and statistically significant from second year onward.

4.2 Alternative measures of discretionary loan loss provisions

We considered alternative measures of the degree to which banks manipulate information disclosed to the public and regulators. In this subsection, we use different models of loan loss provisioning, collect the residuals from these models, and compute the logarithm of the absolute value of the residuals as alternative proxies of discretionary LLPs. Specifically, we use three additional models described in Beatty and Liao (2014). The first two models are simple modifications of their preferred model of LLPs:

Model (a) in Beatty and Liao (2014):

$$\begin{aligned} LLP_{bjt} = {} & \alpha_1 dNPA_{b,j,t+1} + \alpha_2 dNPA_{bjt} + \alpha_3 dNPA_{b,j,t-1} + \alpha_4 dNPA_{b,j,t-2} \\ & + \alpha_5 SIZE_{b,j,t-1} + \alpha_6 dLOAN_{bjt} + \alpha_7 CSRET_{jt} + \alpha_8 dGSP_{jt} \\ & + \alpha_9 dUNEMP_{jt} + \alpha_{10} D_{jt} + \alpha_{11} D_{jt} * X_{bjt} + \delta_j + \varepsilon_{bjt}, \end{aligned} \tag{11}$$

Model (b) in Beatty and Liao (2014):

$$\begin{aligned} LLP_{bjt} = {} & \alpha_1 dNPA_{b,j,t+1} + \alpha_2 dNPA_{bjt} + \alpha_3 dNPA_{b,j,t-1} + \alpha_4 dNPA_{b,j,t-2} \\ & + \alpha_5 SIZE_{b,j,t-1} + \alpha_6 dLOAN_{bjt} + \alpha_7 CSRET_{jt} + \alpha_8 dGSP_{jt} \\ & + \alpha_9 dUNEMP_{jt} + \alpha_{10} ALW_{b,j,t-1} + \alpha_{11} D_{jt} + \alpha_{12} D_{jt} * X_{bjt} + \delta_j + \varepsilon_{bjt}, \end{aligned} \tag{12}$$

The final model is from Bushman and Williams (2012):

$$\begin{aligned} LLP_{bjt} = {} & \alpha_1 dNPA_{b,j,t+1} + \alpha_2 dNPA_{bjt} + \alpha_3 dNPA_{b,j,t-1} + \alpha_4 dNPA_{b,j,t-2} \\ & + \alpha_5 SIZE_{b,j,t-1} + \alpha_6 dGSP_{jt} + \alpha_7 D_{jt} + \alpha_8 D_{jt} * X_{bjt} + \delta_j + \varepsilon_{bjt}. \end{aligned} \tag{13}$$

All of these models include bank-specific deregulation (D_{jt}), deregulation-fully-interacted with the preceding explanatory variables listed in the equation ($D_{jt} * X_{bjt}$), and state fixed effects (δ_j). Across all the models, we also control for BHC fixed effects and state-quarter fixed effects. The results are reported in Table 6.

These alternative measures of discretionary LLPs yield the same conclusions: Regulatory reforms that spurred competition among banks tended to reduce discretionary LLPs.[8] For example, the point estimate for the effect of bank-specific deregulation *BHC_DIS* ranges from -0.038 to -0.056 (columns 1-3), which implies that a one standard deviation increase (1.8)

[8] The number of observations is slightly lower in these alternative discretionary LLP analyses relative to the sample in Table 2 because one of the new models uses $NPA_{i,j,t-2}$.With the two-period lag, there is a loss of observations and we keep the number of observations constant across the specifications.

reduces discretionary loan loss provisions by about 7% to 10%. These estimates are comparable to those from preferred measure of abnormal accruals of LLPs discussed above.

As an additional approach for constructing of discretionary loan loss provisions, we modify equation (1) while allowing for the parameter estimates to differ across the eight different economic regions. We use the Bureau of Economic Analysis definition of regions: England, Mideast, Great Lakes, Plains, Southeast, Southwest, Rocky Mountain, and Far West. Using this approach, allows the coefficients on the bank fundamentals to be estimated more flexibly rather than imposing the same coefficient for all banks in all states. As shown in Appendix Table 6, the results hold both in terms of statistical significance and in terms of the sizes of the estimated coefficients.

4.3 Using discretionary LLPs as a proxy for disclosure quality: Additional tests

We were concerned that several factors might interfere with using discretionary LLPs to draw inferences about the impact of competition on disclosure quality. First, discretionary LLPs could proxy for loan quality rather than for disclosure quality. To assess whether the intensification of competition affected disclosure quality per se and not loan quality, we examined actual loan charge-offs. If the regulatory-induced intensification of competition only influenced the manipulation of BHC financial accounts but did not alter the actual quality of loan portfolios, then we should find no relation between bank deregulation and subsequent charge-offs. This is what we find. In Appendix Table 7, we conduct similar analyses to those reported above except that we examine net loan charge-offs as the dependent variable and control for standard regressors used in the literature on loan charge-offs (e.g. Kanagaretnam et al., 2014). We discover that deregulation did not have a significant effect on charge-offs, further highlighting the independent link between competition and opacity.

Second, there might be conceptual differences with positive and negative LLPs. So far, we have used the natural logarithm of the absolute value of residuals from the LLP prediction model to measure “abnormal” accruals of loan loss provisions. We use the absolute values because positive and negative values might reflect the discretionary manipulations of loan loss provisioning. However, one concern with including positive abnormal provisions of loan losses

is that positive values could reflect transparency-enhancing accounting discretion rather than earnings management. For example, if bank examiners conclude that a bank's allowances for loan losses are too low, they might require the bank to make adjustments, including by making additional ("abnormally" high) provisions for loan losses (Office of the Comptroller of the Currency, 1996).[9] Under these conditions, such positive abnormal provisions—positive residuals from the LLP econometric model—would reflect corrections to address inadequate loan loss allowances rather than earnings management. By comparison, negative abnormal provisions are more likely to reflect earnings management when mangers try to minimize loan loss recognition to increase reported performance.

Therefore, as a robustness check, we construct an alternative measure for disclosure quality that only considers the negative residuals emerging from LLP econometric model. Specifically, we collect the residuals from the LLP model and (1) drop all positive residuals and (2) take the natural logarithm of the absolute value of the remaining residuals. We then redo the analyses to assess whether the results hold after eliminating the positive residuals from the LLP model in constructing measures of bank opacity. We conduct the analyses both at the BHC and at the bank subsidiary levels.

As shown in Table 7, we confirm the earlier findings: An intensification of competition tends to reduce bank opacity. As shown in Table 7, regulatory-induced intensifications of competition at either the BHC-level (columns 1-3) or the subsidiary-level (columns 4-6) are associated with reductions in the abnormal accruals of LLPs, where abnormal is only defined using negative residuals from the LLP model. These results mitigate concerns that using the absolute value of biased the earlier results and suggest that regulatory-induced competition reduces earnings management.

[9] Provisions for loan losses are an expense on a bank's income statement. In contrast, allowances for loan losses enter as an asset on the bank's balance sheet. These allowances equal the accumulated loan loss provisions from income statements minus write offs from recognized losses on loans.

4.4 The underlying sources of variation

We also examine whether the results are driven only by the geographic dispersion of banks within a state, such that each bank is differentially exposed to the competitive pressures emanating from another state after interstate bank deregulation or whether the cross-state geographic dispersion of a BHC's subsidiaries across states, regardless of dispersion of those subsidiaries within states, also helps account for changes in disclosure quality.

Our analyses suggest that both sources of variation influence disclosure quality. First, the subsidiary level analyses presented in Table 4 demonstrate that the geographic dispersion of banks within a state helps account for the change in their disclosure quality when regulatory reforms allow banks from another state to enter. These analyses focus on individual bank subsidiaries, which do not have networks of banks in other states. The Table 4 findings indicate that the regulatory-induced competitive pressures facing individual bank subsidiaries—as measured by the geographic distance of the bank to the deregulating state—reduces discretionary LLPs.

To assess the second source of variation, we eliminate the influence of the geographic dispersion of banks within a state when calculating the regulatory-induced competitive environment facing each BHC. Specifically, we (1) recalculate our measure of the interstate bank competitive pressures facing a subsidiary, *s*, located in state *j* in period t without differentiating subsidiaries by their distance to deregulating states, i.e., we recalculate equation (4) without dividing by $DIS_{s,t}$, (2) based on this measure, we compute the regulatory-induced competitive pressures facing each BHC, and (3) redo the analyses in Table 3.[10]

[10] Specifically, we modify equation (4) and calculate the interstate bank competitive pressures facing a subsidiary, *s*, located in state *j* in period *t* as:

$$SUB_{s,j,t} = Ln \sum_i [\, I_{j,i,t}]. \quad (4)$$

We then aggregate the subsidiary measures of competition to the BHC level and calculate the interstate bank competitive pressures facing BHC, *b*, located in state *k* in period *t*. We do this by identifying all of the subsidiaries in each BHC, i.e., all *s* within each *b*, and calculate:

$$BHC\_STATES_{b,k,t} = \sum_{s \in b} [SUB_{s,j,t}] * P_{s,b,t}.$$

We also do this aggregation while weighting by the number of BHCs in state *j* that can enter state *k* (*BHC_BHC*) and the distance between state *j* and state *k* (*BHC_DIS*).

As shown in Appendix Table 8, we find that an intensification of regulatory-induced competitive pressures facing BHCs—when not differentiating by the geographic dispersion of the BHC's subsidiaries within individual states—is associated with a sharp reduction in discretionary LLPs. Taken together, Table 4 and Appendix Table 8 indicate that both the geographic dispersion of banks within a state and the cross-state geographic dispersion of a BHC's subsidiaries across states, regardless of dispersion of those subsidiaries within states, help account for increases in bank disclosure quality as deregulation exposes banks to greater competition.

5. Channels

Our goal in this paper is to address the question: Did regulatory reforms that lowered barriers to competition increase or decrease the quality of information disclosed by banks? Toward this end, we integrated the gravity model of investment with the state-specific process of bank deregulation to construct measures of the competitive pressures facing each individual bank. We then use these measures to identify the impact of competition on disclosure quality. The results suggest that competition reduces bank opacity, which is consistent with the predictions from particular theoretical models and inconsistent with the predictions from others.

In this section, we push the analyses beyond our core question and provide an exploratory examination of two channels through which competition might affect disclosure quality. As discussed in the Introduction, theory does not only provide differing predictions about the sign of the impact of competition on disclosure quality; it also provides differing views on how competition affects disclosure quality. Although it is beyond the scope of this paper to examine all possible channels through which competition might shape disclosure quality, we explore two potential mechanisms: corporate governance and peer-firm comparisons. As reviewed by Shleifer and Vishny (1997), an extensive body of research suggests that an intensification of product market competition can spur upgrades in corporate governance that might include improvements in disclosure quality. Other work suggests that competition might encourage more firms to enter a market, potentially enhancing peer-firm comparisons and the

detection of earnings management, e.g., Holmstrom (1982), Nalebuff and Stiglitz (1983), and Dichev et al. (2013).

5.1 Competition and corporate governance

To explore whether competition improves disclosure quality by enhancing corporate governance, we adopt the following strategy. We hypothesize that if competition spurs improvements in disclosure quality by enhancing the governance of banks, then the impact of competition on disclosure quality should be smaller if official regulators are already effectively governing banks. We then test whether the positive impact of competition on disclosure quality is smaller in states with more effective regulators using a measure of cross-state differences in regulatory quality developed by Agarwal et al. (2014). They measure the "toughness" of regulators by how readily they downgrade a bank's CAMEL ratings when negative information becomes available about the bank's quality. We use their composite index of the toughness of state regulators in downgrading supervisory ratings, which we call *TOUGH REGULATOR*. We normalize this index to be between 1 and 10, with greater values implying a tougher state bank regulator.

We then re-do the analyses assessing the impact of competition on the discretionary LLPs of banks while adding an interaction term to the regression specification. We interact the BHC-specific measure of the competitive environment facing each BHC with *TOUGH REGULATOR*. We do this for each measure of the competitive pressures facing BHCs, i.e., *BHC_DIS*, *BHC_DIS_NUM*, and *BHC_DIS_GSP*. In this way, we evaluate whether the impact of an intensification of competition on disclosure quality is smaller in states with tougher bank regulators.

The results reported in Table 8 indicate that the positive impact of competition on disclosure quality is smaller in states with tougher bank regulators, as measured by Agarwal et al. (2014). As in the Table 4 results, the BHC-specific measures of competition all enter negatively and significantly in the discretionary LLP regressions: An intensification of competition is associated with an improvement in disclosure quality. The interaction term between BHC competition and *TOUGH REGULATOR* enters negative and significantly. An

intensification of competition is associated with a smaller improvement in disclosure quality in states with tougher bank regulators.

These results provide suggestive evidence that an intensification of the competitive pressures facing banks induces them to reduce discretionary LLPs by enhancing governance. If one interprets *TOUGH REGULATOR* as positively associated with the effectiveness of state bank regulators in governing banks, then Table 8 results imply that an intensification of competition improves disclosure quality by less when official regulators were already effectively governing banks.[11]

5.2 Competition and peer-firm comparison

Another potential channel through which competition may influence earnings management is by affecting peer-firm comparisons. For instance, if competition increases the number of similar banks operating in a state, this could make it easier for investors to compare banks and detect earnings management, which would reduce banks' incentives to manipulate their financial accounts. This potential mechanism, however, assumes that competition increases the similarity of banks in states, so that they become better benchmarks for each other.

We assess whether an intensification of bank competition in a state induces greater similarity among banks in terms of their LLPs. To gauge "similarity," we measure the relation between the LLPs of individual banks and the average LLPs of banks in state after controlling for the array of bank traits used throughout the analyses. We test whether the relation between bank LLPs and the average LLPs of banks in a state changes when the state's banking system is exposed to more competition. Specifically, the dependent variable is loan loss provisions scaled by total loans for each bank *i* in state *j* at the beginning of period *t* and multiplied by 100. The explanatory variable *STATE_AVG_LLP* is the average of loan loss provisions scaled by beginning total loans for each state *j* at time *t* and multiplied by 100. We create interaction terms

[11] The importance of state regulator toughness on the response of DLLP to competition is material. Recall from Table 4 that a one standard deviation increase (1.76) in *BHC_DIS* reduces DLLP by about 9% (=0.0538 * 1.76). From Table 8, compare the average state, which as a mean value of *TOUGH REGULATOR* of 4.07, with "tough" bank regulator state, which has one standard deviation greater value of 5.18. The estimates suggest that a one standard deviation increase in one standard deviation increase (1.76) in *BHC_DIS* reduces DLLP by about 9.7% (=(-0.2755 * 1.76) +(0.0541*4.07*1.76) in the average state, while it decreases by only 8.3% (=(-0.2755 * 1.76) +(0.0541*5.18*1.76) in the tough bank regulator state.

for each of the state-specific deregulation measures (i.e. *INTER, Ln (# of States), Ln (# of States-Distance Weighted), Ln (# of BHCs from Other States),* and *INTER-BRANCH*) with *STATE_AVG_LLP*. If banks become more similar with competition, then the coefficient on the average LLP should increase toward one with greater competition. Thus, we now examine competition at the state-time level, not at the individual bank level because we are examining whether banks within a state became more similar after the regulatory-induced intensification of competition. Furthermore, since BHCs can span several states, we focus on the similarity of bank subsidiaries within states. Table 9 reports the results on how bank-specific LLPs are associated with state average LLPs after the interstate deregulation. We also confirm that all of the results hold when using NPAs rather LLPs (Appendix Table 9).

The evidence in Table 9 suggests that banks become more similar when exposed to greater competition. The estimated regression coefficients on the interaction terms of deregulation and *STATE_AVG_LLP* are positive and statistically significant. The result indicates that state average LLPs have more predictive power on bank-specific LLPs following intensified banking competition. Specifically, the point estimate for the interaction term in column 2 of Table 9 shows that for *Ln(# of States)* at the mean (3.43), one unit increase in *STATE_AVG_LLP* will be associated with 0.50 (=3.43 x 0.1471) unit increase in a bank's LLPs, holding everything else constant.

6. Conclusion

This paper contributes to our understanding of how regulations influence the private governance and regulatory oversight of banks. Theory provides conflicting predictions about the impact of regulatory reforms that intensify competition on bank opacity. Some models predict that competition will induce the executives of banks to manipulate information either to hinder the entry of potential competitors or to extract as much private rents as possible in the short-run because competition makes the long-run viability of banks uncertain. Other models stress that competition will enhance efficiency, reduce managerial slack, and force banks to disclose more accurate information. We provide the first evaluation of the net impact of competition on disclosure quality.

In this paper, we find that bank regulatory reforms that eased impediments to competition among U.S. BHCs reduced bank opacity. There is no evidence that intensifying competition makes it more difficult for private investors to discipline banks or regulators to supervise them. The findings are consistent with the view that exposing BHCs to greater competition will facilitate the monitoring of banks, with potentially beneficial repercussion on the governance and regulation of banks.

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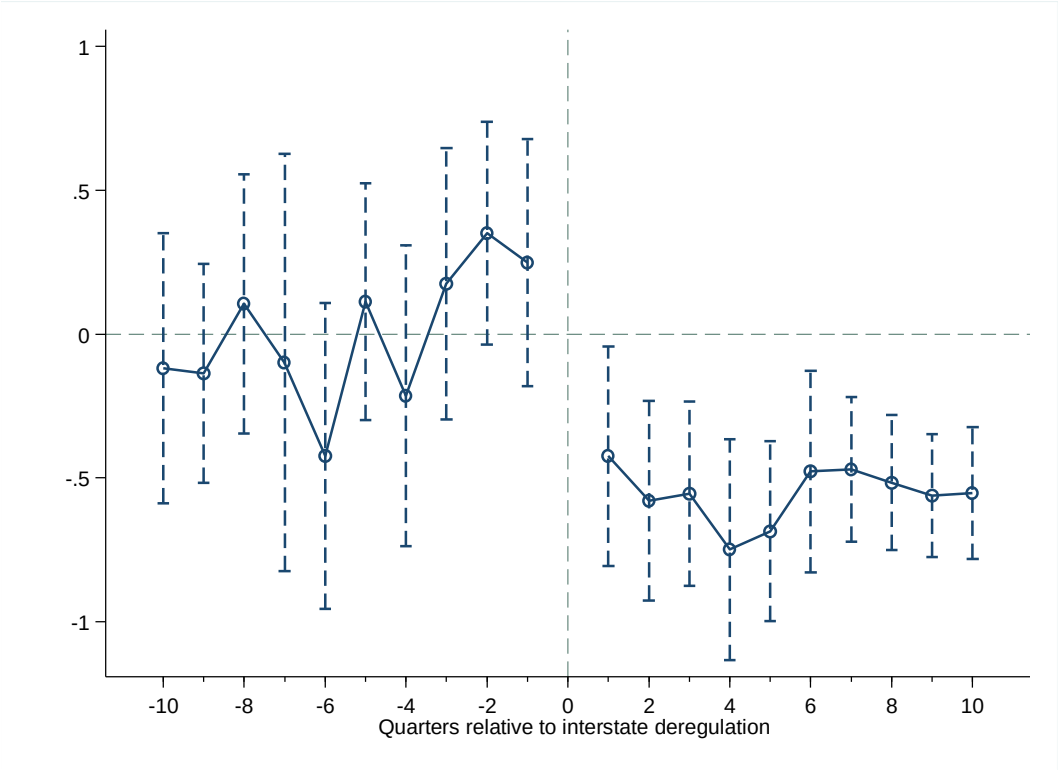
Figure 1: Evolution of Disclosure Quality around Interstate Bank Deregulation



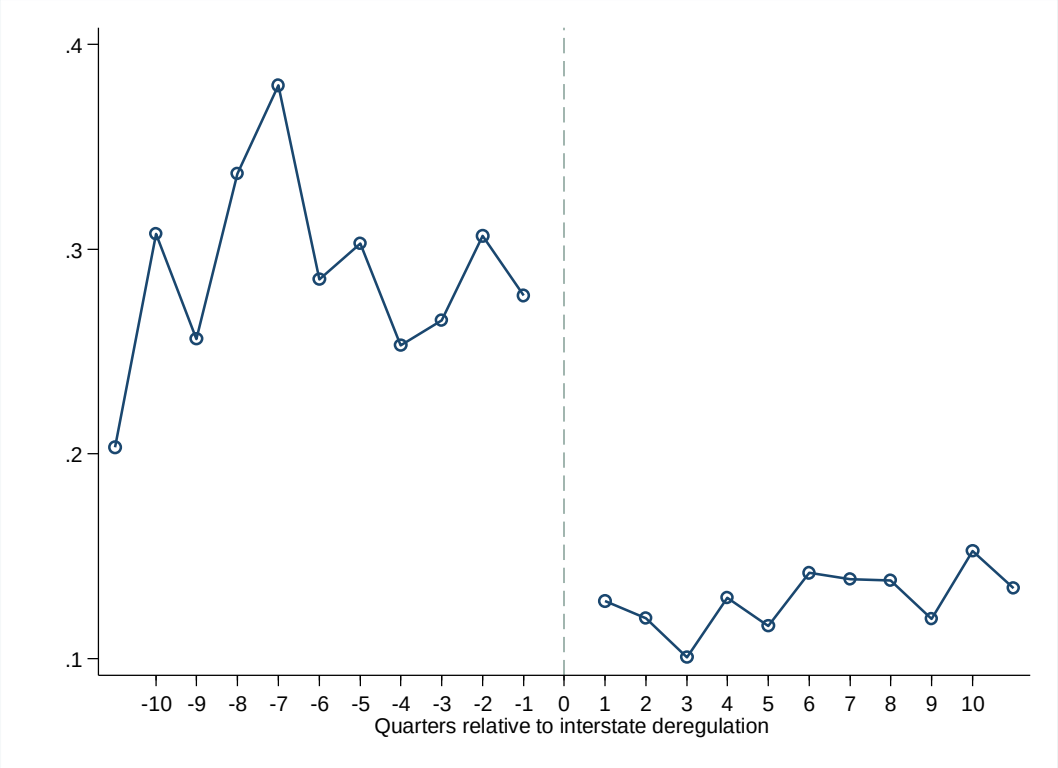
Note: This figure plots the impact of interstate bank deregulation on disclosure quality by banks in a state. Disclosure quality is measured as the natural logarithm of the absolute value of residuals predicted from equation (1a). The deregulation term D_{jt} represents the interstate deregulation *INTER* in the equation, which is defined as a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. For the definitions of the other variables in the equation, please see Appendix Table 1.

For each state, zero is the last quarter of the interstate deregulation year, such that one quarter before deregulation is -1 and one quarter after deregulation is +1. We consider a 20-quarter window, spanning from ten quarters before until ten quarters after deregulation. The figure reports estimated coefficients from the following regression:

$$Disclosure\ Quality_{bjt} = \beta_1 D_{jt}^{-10} + \beta_2 D_{jt}^{-9} + \cdots + \beta_{20} D_{jt}^{+10} + \delta_b + \delta_t + \varepsilon_{bjt},$$

where the deregulation dummy variable D_{jt}^{+n} equals one for banks in the *n*th quarter after deregulation, and the deregulation dummy variable D_{jt}^{-n} equals one for banks in the *n*th quarter before deregulation, and δ_t and δ_b are time and BHC fixed effects, respectively. The solid line denotes the estimated coefficients ($\beta_1, \beta_2, \ldots$), while the dashed lines represent 95% confidence intervals. The graph is normalized by the pre-deregulation (period -10 through -1) mean.

Figure 2: Disclosure Quality over EBTP around Interstate Bank Deregulation



Note: This figure plots the impact of interstate bank deregulation on disclosure quality (scaled by EBTP) by BHCs in a state. For each state, year zero is the year the state started interstate bank deregulation, such that one quarter before deregulation is -1 and one quarter after deregulation is +1. We consider a 20-quarter window, spanning from ten quarters before until ten quarters after deregulation. The figure reports the median of the absolute value of disclosure quality measures divided by EBTP. EBTP is defined as income before taxes, provisions recognized in income (in million $), and disclosure quality is measured as the natural logarithm of the absolute value of residuals predicted from equation (1a) (with D_{jt} represents the interstate deregulation dummy *INTER* in the equation) multiplied by the value of the lag of total loans (in million $).

Table 1. Banking Deregulations and Lagged Disclosure Quality

This table presents OLS regressions of bank regulatory reforms on lagged values of disclosure quality and other potential predictors of regulatory reforms. Panel A presents five regressions, where the dependent variables are as follows. *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. In Panel B, the dependent variable is *INTER-BRANCH*, which is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. Since the sample consists of state-year observations from 1986 to 2006 and these analyses assess whether discretionary loan loss provisions predict future deregulations, this table only includes states that deregulated after 1986: 22 states started interstate bank deregulation, and all states completed interstate branch deregulation after 1986. The variable *state weighted residuals* is calculated by the natural logarithm of the absolute value of residuals predicted from equation (1), aggregated to the state level and weighted by the proportion of the BHC's total assets held by its subsidiaries and branches in that state. Following Kroszner and Strahan (1999), the following control variables are included: GSP per capita, state level unemployment rate, small bank share of all banking assets, and capital ratio of small banks relative to large ones, relative size of insurance in states where banks may sell insurance (zero otherwise), relative size of insurance in states where banks may not sell insurance (zero otherwise), an indicator variable that equal to one if banks may sell insurance (zero otherwise), small firm (fewer than 20 employees) share of the number of firms in the state, unit banking law, share of state government controlled by Democrats, and an indicator that takes a value of one if the state is controlled by one party. We also include state dummy variables. Standard errors are adjusted for state-level clustering and appear in parentheses. *, **, and *** indicate significant at 1%, 5%, and 10%.

Panel A. Interstate Deregulation

	(1)	(2)	(3)	(4)	(5)
Dep Var	*INTER*		*Ln(# of States)*	*Ln(# of States – Distance Weighted)*	*Ln(# of BHCs from Other States)*
State Weighted Residuals one year before interstate deregulation	0.0094	0.0105	0.0820	0.0734	0.0955
	(0.0081)	(0.0104)	(0.0580)	(0.0507)	(0.0675)
State Weighted Residuals two years before interstate deregulation		0.0022	0.0976	0.0848	0.1163
		(0.0077)	(0.0773)	(0.0658)	(0.0914)
State Weighted Residuals three years before interstate deregulation		0.0020	0.0365	0.0346	0.0423
		(0.0072)	(0.0256)	(0.0235)	(0.0298)
Controls	Yes	Yes	Yes	Yes	Yes
N. of observations	310	275	275	275	275

Panel B. Interstate Branch Deregulation

	(1)	(2)
Dep Var	*INTER-BRANCH*	
State Weighted Residuals one year before Branching deregulation	-0.0049	-0.0030
	(0.0087)	(0.0094)
State Weighted Residuals two years before Branching deregulation		-0.0119
		(0.0109)
State Weighted Residuals three years before Branching deregulation		-0.0066
		(0.0075)
Controls	Yes	Yes
N. of observations	773	682

Table 2. Disclosure Quality and Deregulation: Fully Interacted

This table presents OLS regressions of disclosure quality on indicators of interstate bank deregulation. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} is one of the five deregulation measures (*INTER, Ln (# of States), Ln (# of States-Distance Weighted), Ln (# of BHCs from Other States)*, and *INTER-BRANCH)* corresponding to each of the deregulation measures used in columns 1-5 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. *INTER-BRANCH* is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. We take the natural logarithm of the sum of the weighted distance measures. Appendix Table 1 defines the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
INTER	-0.5123***				
	(0.1482)				
Ln(# of States)		-0.0452***			
		(0.0058)			
Ln(# of States-Distance Weighted)			-0.0532***		
			(0.0081)		
Ln(# of BHCs from Other States)				-0.0368***	
				(0.0051)	
INTER-BRANCH					-0.5604***
					(0.0963)
logSIZE	0.0554	0.0649	0.0602	0.0665	0.0278
	(0.0391)	(0.0401)	(0.0413)	(0.0404)	(0.0450)
CAP	1.7315**	1.6491**	1.6274**	1.5950**	1.3900*
	(0.7055)	(0.6769)	(0.6736)	(0.6830)	(0.6984)
% change in *y* with one standard deviation change in continuous deregulation measures	-	0.08	0.08	0.08	-
Other BHC traits	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes
N	27137	27137	27137	27137	27137
R-sq	0.3078	0.3112	0.3116	0.3116	0.3233

Table 3. Disclosure Quality and BHC-Specific Deregulation Measures

This table presents OLS regressions of disclosure quality on measures of the regulatory-induced competitive pressures facing individual BHCs. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-6 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). Columns 1-3 report estimation results without bank-level controls. Columns 4-6 report estimation results with bank-level controls. *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k* = *j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). Appendix Table 1 defines all the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
BHC_DIS	-0.0538***			-0.0524**		
	(0.0198)			(0.0198)		
BHC_DIS_NUM		-0.0482***			-0.0470***	
		(0.0150)			(0.0153)	
BHC_DIS_GSP			-0.0553***			-0.0540***
			(0.0171)			(0.0174)
logSIZE				0.0108	0.0096	0.0072
				(0.0389)	(0.0360)	(0.0357)
CAP				1.9631***	1.9796***	1.9897***
				(0.7300)	(0.7209)	(0.7052)
% change in *y* with one standard deviation change in continuous deregulation measures	0.09	0.10	0.11	0.09	0.10	0.10
Other BHC traits	no	no	no	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes	yes
State-quarter fixed effects	yes	yes	yes	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes	yes	yes	yes
F-Test:	H_0: state and quarter fixed effects model = state-quarter fixed effects model					
F-Test (p value)	0.00	0.00	0.00	0.00	0.00	0.00
N	25803	25803	25803	25803	25803	25803
R-sq	0.2422	0.2432	0.2427	0.2848	0.2864	0.2856

Table 4. Disclosure Quality and Subsidiary-Level Deregulation Measures

This table presents OLS regressions of disclosure quality on measures of the regulatory-induced competitive pressures facing individual bank subsidiaries. The sample consists of subsidiary-bank-quarter observations from the third quarter of 1986 to 2006. These banks are subsidiary commercial banks of BHCs examined in our main regression. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-6 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). To calculate the regulatory environment facing each subsidiary in each year, we first compute *SUB_DIS* by measuring the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k* = *j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We further weight this regulatory environment index by (a) the number of banks in the other state (*SUB_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*SUB_DIS_GSP*). We take the natural logarithm of the sum of the weighted distance measures. Appendix Table 1 defines all the other regressors, where *other subsidiary bank traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
SUB_DIS	-0.0569***			-0.0562***		
	(0.0142)			(0.0056)		
SUB _DIS_NUM		-0.0585***			-0.0540***	
		(0.0118)			(0.0050)	
SUB _DIS_GSP			-0.0692***			-0.0644***
			(0.0141)			(0.0062)
logSIZE	0.0307	0.0335	0.0245	-0.0767***	-0.0759***	-0.0773***
	(0.0464)	(0.0480)	(0.0471)	(0.0101)	(0.0103)	(0.0103)
CAP	-0.2825	-0.2491	-0.2723	0.5421*	0.5695**	0.5501*
	(0.3931)	(0.3917)	(0.4007)	(0.2743)	(0.2736)	(0.2912)
% change in *y* with one standard deviation change in continuous deregulation measures	0.10	0.13	0.13	0.10	0.12	0.13
Other subsidiary bank traits	yes	yes	yes	yes	yes	yes
State-quarter fixed effects	yes	yes	yes	yes	yes	yes
Subsidiary bank fixed effects	yes	yes	yes	no	no	no
BHC fixed effects	no	no	no	yes	yes	yes
First stage using deregulation interactive terms	yes	yes	yes	yes	yes	yes
F-Test:	H_0: state and quarter fixed effects model = state-quarter fixed effects model					
F-Test (p value)	0.00	0.00	0.00	0.00	0.00	0.00
N	55015	55015	55015	55015	55015	55015
R-sq	0.1466	0.1479	0.1472	0.1646	0.1662	0.1655

Table 5. Financial Restatement After the Banking Deregulation

This table presents regression results of the dynamic effects of interstate branching deregulation on the incidence of financial restatements. Financial restatement is modeled by leads and lags from one year before to five years or more after the interstate branch deregulation. The reference group is the interstate branch deregulation year. The sample consists of BHC-year observations from year 1993 through 2006. The dependent variable *RESTATEMENT* in columns 1 and 2 represents the incidence of financial restatement, which equals one if the BHC restates its financial restatements in year t and zero otherwise. The dependent variable *NONERROR RESTATEMENT* in columns 3 and 4 excludes incidence of restatement due to clerical error. Columns 1 and 3 use probit regression models, and present estimated marginal effects (dy/dx). The marginal effect of a dummy variable is calculated as the discrete change in the expected value of the dependent variable from 0 to 1. Columns 2 and 4 use OLS. Appendix Table 1 defines the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
MODEL	Probit	OLS	Probit	OLS
Dep Var	RESTATEMENT		NONERROR RESTATEMENT	
Years 1 before INTER-BRANCH	0.0084	0.0053	0.0160	0.0092
	(0.0477)	(0.0269)	(0.0544)	(0.0298)
Year 1 after INTER-BRANCH	-0.0727	-0.0489	-0.0608	-0.0423
	(0.0454)	(0.0375)	(0.0445)	(0.0372)
Year 2 after INTER-BRANCH	-0.1451***	-0.1087***	-0.1164**	-0.0856*
	(0.0339)	(0.0397)	(0.0434)	(0.0460)
Year 3 after INTER-BRANCH	-0.1549**	-0.1176**	-0.1320**	-0.0992*
	(0.0438)	(0.0534)	(0.0508)	(0.0550)
Year 4 after INTER-BRANCH	-0.2054***	-0.1749***	-0.1833***	-0.1512***
	(0.0324)	(0.0581)	(0.0350)	(0.0558)
Year 5+ after INTER-BRANCH	-0.2548**	-0.1578**	-0.1917*	-0.1227*
	(0.0909)	(0.0667)	(0.0929)	(0.0659)
logSIZE	-0.0057	0.0030	0.0014	0.0089
	(0.0333)	(0.0223)	(0.0428)	(0.0271)
CAP	1.2351**	0.4488	1.5572**	0.4990
	(0.5860)	(0.3082)	(0.7683)	(0.3520)
Other BHC traits	yes	yes	yes	yes
Year fixed effects	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes
N	2875	5520	2819	5520
R-sq	0.1620	0.3065	0.1558	0.2984

Table 6. Robustness Checks - Using Alternative Disclosure Quality Measures

This table presents regression results of disclosure quality on measures of the regulatory-induced competitive pressures facing individual BHCs. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from model (11)-(13), respectively. The deregulation term D_{jt} used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-9 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (11)-(13), respectively. *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k* = *j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). Appendix Table 1 defines all the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state- quarter level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
BHC_DIS	-0.0543***	-0.0382***	-0.0562***						
	(0.0190)	(0.0131)	(0.0206)						
BHC_DIS_NUM				-0.0444***	-0.0309***	-0.0437***			
				(0.0149)	(0.0104)	(0.0161)			
BHC_DIS_GSP							-0.0554***	-0.0343**	-0.0520**
							(0.0184)	(0.0135)	(0.0195)
logSIZE	0.0060	-0.1317***	-0.0021	0.0132	-0.1277***	-0.0039	-0.0011	-0.1409***	-0.0045
	(0.0338)	(0.0348)	(0.0488)	(0.0338)	(0.0349)	(0.0465)	(0.0336)	(0.0339)	(0.0473)
CAP	1.9137**	2.0225**	0.9887	1.9090**	2.0609**	1.1326	1.8847**	1.9781**	1.0402
	(0.7160)	(0.8088)	(0.7428)	(0.7113)	(0.8021)	(0.7500)	(0.7263)	(0.8004)	(0.7347)
Other BHC traits	yes	yes	yes	yes	yes	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
State-quarter fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes	yes	yes	yes	yes	yes	yes
N	24887	24887	24887	24887	24887	24887	24887	24887	24887
R-sq	0.4330	0.4225	0.4258	0.4341	0.4258	0.4297	0.4300	0.4208	0.4269

Table 7. Disclosure Quality and BHC-Specific Deregulation Measures: Using Negative Residuals Only

This table presents OLS regressions of disclosure quality on measures of the regulatory-induced competitive pressures facing individual BHCs (columns 1-3) and individual bank subsidiaries (columns 4-6), using negative residuals predicted from the DLLP model as proxy for disclosure quality. The sample consists of BHC-quarter or subsidiary-bank-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of negative residuals predicted from equation (1). Observations with positive residuals predicted from equation (1) are not included in the sample. The deregulation term D_{jt} used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-6 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). To calculate the regulatory environment facing each subsidiary in each time period, we first compute *SUB_DIS* by measuring the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We further weight this regulatory environment index by (a) the number of banks in the other state (*SUB_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*SUB_DIS_GSP*). Appendix Table 1 defines all the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)		(4)	(5)	(6)
BHC_DIS	-0.0748***			SUB_DIS	-0.0678***		
	(0.0166)				(0.0090)		
BHC_DIS_NUM		-0.0712***		SUB _DIS_NUM		-0.0635***	
		(0.0156)				(0.0072)	
BHC_DIS_GSP			-0.0586***	SUB _DIS_GSP			-0.0728***
			(0.0139)				(0.0097)
logSIZE	0.0374	0.0245	0.0039	logSIZE	-0.1210***	-0.1253***	-0.1258***
	(0.0700)	(0.0670)	(0.0636)		(0.0117)	(0.0120)	(0.0118)
CAP	3.9422***	3.8895***	3.8258***	CAP	0.7243*	0.6734*	0.5845
	(0.7871)	(0.7070)	(0.7454)		(0.3781)	(0.3702)	(0.3834)

Other BHC traits	yes	yes	yes	Other subsidiary bank traits	yes	yes	yes
BHC fixed effects	yes	yes	yes	BHC fixed effects	yes	yes	yes
State-quarter fixed effects	yes	yes	yes	State-quarter fixed effects	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes	First stage using deregulation interactive terms	yes	yes	yes
N	17000	17014	17004	N	33447	33533	33541
R-sq	0.4290	0.4258	0.4228	R-sq	0.2085	0.2076	0.2089

Table 8. Tough State Regulators, Competition and Bank Opacity: BHC Level Analysis

This table presents results of state regulators impact on the relation between interstate bank deregulation and disclosure quality, where the interstate bank deregulation measures include information on the regulatory environment facing each subsidiary in a BHC. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals from equation (1): $LLP_{ijt} = \alpha_0 + \alpha_1 dNPA_{i,j,t+1} + \alpha_2 dNPA_{ijt} + \alpha_3 dNPA_{i,j,t-1} + \alpha_4 SIZE_{i,j,t-1} + \alpha_5 dLOAN_{ijt} + \alpha_6 CSRET_{jt} + \alpha_7 dGSP_{jt} + \alpha_8 dUNEMP_{jt} + \alpha_9 \delta_j + \alpha_{10} D_{jt} + \varepsilon_{ijt}$, where in columns 1-3, D_{jt} include one of the deregulation measures (*BHC_DIS, BHC_DIS_NUM, BHC_DIS_GDP*) corresponding to the deregulation measures used in columns 1-3 of this table. The deregulation measures *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k* = *j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). We take the natural logarithm of the sum of the weighted distance measures. *TOUGH REGULATOR* is a composite index measuring the toughness of state regulators in downgrading supervisory ratings (CAMEL), with greater value representing tougher regulator. This index is normalized between 1 and 10 and with more details on the construction of the index in Agarwal et al. (2014). Appendix Table 1 defines all the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
BHC_DIS * TOUGH REGULATOR	0.0541***		
	(0.0164)		
BHC_DIS_NUM * TOUGH REGULATOR		0.0431***	
		(0.0118)	
BHC_DIS_GSP * TOUGH REGULATOR			0.0505***
			(0.0143)
BHC_DIS	-0.2755***		
	(0.0577)		
BHC_DIS_NUM		-0.2256***	
		(0.0426)	
BHC_DIS_GSP			-0.2629***
			(0.0516)
logSIZE	0.0115	0.0068	0.0081
	(0.0391)	(0.0355)	(0.0359)
CAP	1.8691**	1.8516**	1.8765**
	(0.7447)	(0.7347)	(0.7148)

Other BHC traits	yes	yes	yes
BHC fixed effects	yes	yes	yes
State-quarter fixed effects	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes
N	24752	24752	24752
R-sq	0.4230	0.4255	0.4259

Table 9. Accounting Comparability -LLP: Commercial Bank Level Analysis

This table presents OLS regressions of accounting comparability on measures of the regulatory-induced competitive pressures facing individual bank subsidiaries. The sample consists of subsidiary-bank-quarter observations from the third quarter of 1986 to 2006. The dependent variable is loan loss provisions scaled by beginning total loans for each bank *i* in state *j* at time *t* and multiplied by 100. The explanatory variable STATE_AVG_LLP is the average of loan loss provisions scaled by beginning total loans for each state *j* at time *t* and multiplied by 100. *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. *INTER-BRANCH* is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. Appendix Table 1 defines all the other regressors, where *other subsidiary bank traits* include *logSIZE, CAP, Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Dep Var			LLP		
INTER	0.3792***				
* STATE_AVG_LLP	(0.1146)				
Ln(# of States)		0.1471***			
* STATE_AVG_LLP		(0.0271)			
Ln(# of States – Distance Weighted)			0.1530***		
* STATE_AVG_LLP			(0.0284)		
Ln(# of BHCs from Other States)				0.0887***	
* STATE_AVG_LLP				(0.0270)	
Inter-BRANCH					0.2649***
* STATE_AVG_LLP					(0.0285)
INTER	-0.0736***				
	(0.0245)				
Ln(# of States)		-0.0389***			
		(0.0137)			
Ln(# of States – Distance Weighted)			-0.0407***		
			(0.0144)		
Ln(# of BHCs from Other States)				-0.0302**	
				(0.0146)	
INTER-BRANCH					-0.0395
					(0.0286)
STATE_AVG_LLP	0.6191***	0.4261***	0.8086***	0.3473*	0.7400***
	(0.1146)	(0.1046)	(0.0346)	(0.1984)	(0.0285)
Other subsidiary bank traits	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
N	55015	54377	54377	54377	54411
R-sq	0.2136	0.2125	0.2125	0.2125	0.2127

Appendix Table 1. Variable Definition

Panel A. Definitions of Variables Used in Disclosure Quality Regressions

Variable Name	Definition
Deregulation Measures	
INTER	A dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise.
INTER-BRANCH	A dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches.
Ln(# of States)	The natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*.
Ln(# of States – Distance Weighted)	The natural logarithm of one plus the number of other states whose can enter the home state in period *t*, where each of those other states is weighted by the inverse of its distance to the home state.
Ln(# of BHCs from Other States)	The natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*.
BHC_DIS	Computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance (in kilometers) from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k*, weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state.
BHC _DIS_NUM	Computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k*, weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state, and further weight by the number of BHCs in the other state.
BHC_DIS_GSP	Computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k*, weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state, and further weight by the economic size (GSP per capita in $10,000) of each of the other state.

Panel A. Definitions of Variables Used in Disclosure Quality Regressions (cont'd)

Variable Name	Definition
SUB _DIS	To calculate the regulatory environment facing each subsidiary in each period, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's distance to the other state. We take the natural logarithm of the sum of the weighted distance measures.
SUB _DIS_NUM	To calculate the regulatory environment facing each subsidiary in each period, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's distance to the other state. We further weight this regulatory environment index by the number of banks in the other state. We take the natural logarithm of the sum of the weighted distance measures.
SUB _DIS_GSP	To calculate the regulatory environment facing each subsidiary in each period, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's distance to the other state. We further weight this regulatory environment index by the economic size (GSP per capita in $10,000) of the other state. We take the natural logarithm of the sum of the weighted distance measures.
Firm Level Variables	
logSIZE	The natural logarithm of total assets in million $
LLP_lag	One year lag of loan loss provision scaled by beginning total loans
LOSS	A dummy variable that equals one if net income is negative, and zero
CAP	Book value of equity over total assets
EBTP	Income before taxes, provisions recognized in income in million U.S.

Panel B. Definitions of Other Variables

Variable Name	Definition
LLP	Loan loss provision over the quarter scaled by beginning total loans
NPA	Non-performing assets over the quarter scaled by beginning total loans
dNPA	Change in NPA over the quarter divided by beginning total loans
LOAN	Total loans over the quarter in million $
dLOAN	Change in total loans over the quarter divided by beginning total loans
LOAN_ASSETS	Total loans over the quarter divided by total assets
CO	Net charge offs over the quarter divided by beginning total loans
ALW	Loan loss allowance over the quarter divided by total loans
CSRET	The return on the Case-Shiller Real Estate Index over the quarter

dUNEMP	Change in unemployment rates over the quarter
dGSP	Change in GSP (gross state product) per capita over the quarter/100
TOUGH REGULATOR	*A* composite index measuring the toughness of state regulators in downgrading supervisory ratings (CAMEL), with greater value representing tougher regulator. This index is normalized between 1 and 10 and with more details on the construction of the index in Agarwal et al. (2014).
STATE_AVG_NPA	The average of non-performing assets over total assets for each state *j* at time *t*.
STATE_AVG_LLP	The average of loan loss provision scaled by beginning total loans for each state *j* at time *t* and multiplied by 100.
RESTATEMENT	An indicator variable that represents the incidence of financial restatement, which equals one if the BHC restates its financial restatements in year t and zero otherwise.
NONERROR RESTATEMENT	An indicator variable that represents the incidence of financial restatement, which equals one if the BHC restates its financial restatements but not due to clerical error in year t and zero otherwise.
NCO_{t+1}	Net loan charge-offs over total loans for a BHC *i* in state *j* in time *t+1*.
LOAN_YIELD	The ratio of tax-equivalent interest income divided by total loans at the end of time *t*;
HOME_LOAN	Homogeneous loans (consumer loans) at time *t* as a percentage of total loans at the end of time t.

Appendix Table 2. Summary Statistics

This table presents summary statistics on the main variables used in the paper. The sample consists of BHC-quarter observations from the third quarter of 1986 to 2006. See Table 1 for variable definitions.

Variable	N	Mean	Std	P25	Median	P75
INTER	27137	0.98	0.14	1	1	1
INTER-BRANCH	27137	0.56	0.50	0	1	1
Ln(# of States)	27137	3.43	1.80	3.5	3.91	3.91
Ln(# of States – Distance	27137	0.8	1.55	0.85	1.25	1.26
Ln(# of BHCs from Other States)	27137	6.76	2.16	6.93	7.32	7.36
BHC_DIS	25803	0.70	1.76	0.85	1.25	1.26
BHC_DIS_NUM	25803	4.08	2.19	4.25	4.74	4.81
BHC_DIS_GSP	25803	1.99	1.92	2.01	2.57	2.66
SUB _DIS	55015	0.61	1.79	0.65	1.23	1.26
SUB _DIS_NUM	55015	3.96	2.23	3.92	4.71	4.81
SUB _DIS_GSP	55015	1.87	1.95	1.82	2.53	2.65
SIZE	27137	11,014	64318	477	1,067	3,569
logSIZE	27137	7.34	1.59	6.17	6.97	8.18
LLP_lag (%)	27137	0.14	0.27	0.04	0.08	0.15
LOSS	27137	0.04	0.21	0	0	0
CAP	27137	0.09	0.04	0.07	0.08	0.1
LLP (%)	27137	0.14	0.27	0.04	0.08	0.15
NPA	27137	0.01	0.02	0	0.01	0.02
dNPA (%)	27137	-0.01	1.18	-0.15	-0.02	0.11
LOAN	27137	5880	28,660	300	680	2180
dLOAN	27137	0.03	0.09	0	0.02	0.05
LOAN_ASSETS	27137	0.64	0.12	0.58	0.65	0.72
CO (%)	27137	0.15	0.24	0.03	0.08	0.16
ALW	27137	0.02	0.01	0.01	0.01	0.02
CSRET	27137	0.01	0.01	0.01	0.02	0.02
dUNEMP	27137	-0.02	0.03	-0.2	-0.1	0.1
dGSP	27137	1.72	2.00	0.57	1.63	2.78
EBTP	27137	31.89	171.54	1.18	3.02	9.89
TOUGH REGULATOR	24752	4.07	1.11	3.28	3.98	4.80
STATE_AVG_NPA	55015	0.01	0.01	0.01	0.01	0.01
STATE_AVG_LLP (%)	55015	0.14	0.68	0.07	0.10	0.16
RESTATEMENT	5520	0.14	0.34	0.00	0.00	0.00
NONERROR RESTATEMENT	5520	0.13	0.34	0.00	0.00	0.00
NCO (%)	25505	0.26	0.48	0.03	0.11	0.28
LOAN_YIELD	25505	0.04	0.03	0.02	0.04	0.05
HOME_LOAN	25505	0.16	0.13	0.06	0.13	0.24

Appendix Table 3. Years of Deregulation By State

State	Interstate banking permitted	Interstate Banking and Branching Efficiency Act
AL	1987	1997
AK	1982	1994
AZ	1986	1996
AR	1989	1997
CA	1987	1995
CO	1988	1997
CT	1983	1995
DE	1988	1995
DC	1985	1996
FL	1985	1997
GA	1985	1997
HI	-	1997
ID	1985	1995
IL	1986	1997
IN	1986	1996
IA	1991	1996
KS	1992	1997
KY	1984	1997
LA	1987	1997
ME	1978	1997
MD	1985	1995
MA	1983	1996
MI	1986	1995
MN	1986	1997
MS	1988	1997
MO	1986	1997
MT	1993	1997
NE	1990	1997
NV	1985	1995
NH	1987	1997
NJ	1986	1996
NM	1989	1996
NY	1982	1996
NC	1985	1995
ND	1991	1997
OH	1985	1997
OK	1987	1997
OR	1986	1995
PA	1986	1995
RI	1984	1995
SC	1986	1996
SD	1988	1996
TN	1985	1997
TX	1987	1995
UT	1984	1995
VT	1988	1996
VA	1985	1995

WA	1987	1996
WV	1988	1997
WI	1987	1997
WY	1987	1997

Appendix Table 4. First Stage Estimates of the LLP Results Based On Table 2

This table presents the first-stage regression results using equation (1) on estimating disclosure quality. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} represents one of the five deregulation measures (*INTER, Ln (# of States), Ln (# of States-Distance Weighted), Ln (# of BHCs from Other States), and INTER-BRANCH)* corresponding to each of the deregulation measures used in columns 1-5 of this table, plus each corresponding deregulation measures full interacted with all the other independent variables used in equation (1). For presentation purpose, we also use $\boldsymbol{DEREG_{jt}}$ to represent one of the five deregulation measures (*INTER, Ln (# of States), Ln (# of States-Distance Weighted), Ln (# of BHCs from Other States), and INTER-BRANCH)* corresponding to each of the deregulation measures used in columns 1-5 of this table. *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. *INTER-BRANCH* is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. δ_j represents state dummy variables. Appendix Table 1 defines the other regressors. Standard errors are heteroskedasticity-consistent and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
	DEREG *=INTER*	***DEREG*** *=Ln (# of States)*	***DEREG****= Ln(# of States – Distance Weighted)*	***DEREG****= Ln(# of BHCs from Other States)*	***DEREG*** *=INTER -BRANCH*
INTER	0.0038*				
	(0.0020)				
Ln(# of States)		0.0004***			
		(0.0001)			
Ln(# of States – Distance Weighted)			0.0005***		
			(0.0002)		
Ln(# of BHCs from Other States)				0.0004***	
				(0.0001)	
INTER-BRANCH					-0.0004
					(0.0003)
$DEREG_{it}$ x $dNPA_{t-1}$	-0.0653**	-0.0109**	-0.0142**	-0.0102**	-0.0586***
	(0.0294)	(0.0047)	(0.0058)	(0.0045)	(0.0121)
$DEREG_{it}$ x dNPA	-0.0094	-0.0081**	-0.0104**	-0.0070**	-0.0503***
	(0.0356)	(0.0039)	(0.0047)	(0.0033)	(0.0128)

$DEREG_{it}$ x $dNPA_{t+1}$	0.0093	-0.0010	-0.0012	-0.0006	-0.0137
	(0.0254)	(0.0031)	(0.0038)	(0.0026)	(0.0093)
$DEREG_{it}$ x $logSIZE_{t-1}$	-0.0004*	-0.0001***	-0.0001***	-0.0001***	-0.0001***
	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$DEREG_{it}$ x dLOAN	-0.0000	0.0001	0.0001	0.0001	0.0033***
	(0.0022)	(0.0002)	(0.0002)	(0.0002)	(0.0010)
$DEREG_{it}$ x dUNEMP	0.0017**	0.0000	0.0000	0.0000	-0.0002
	(0.0007)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
$DEREG_{it}$ x dGSP	-0.0002***	-0.0000	-0.0000	-0.0000	0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
$DEREG_{it}$ x CSRET	-0.0782***	-0.0050***	-0.0057***	-0.0043***	-0.0071
	(0.0170)	(0.0016)	(0.0020)	(0.0015)	(0.0070)
$dNPA_{t-1}$	0.0891***	0.0649***	0.0394***	0.0962***	0.0662***
	(0.0272)	(0.0168)	(0.0099)	(0.0311)	(0.0111)
dNPA	0.0360	0.0563***	0.0371***	0.0759***	0.0593***
	(0.0345)	(0.0150)	(0.0086)	(0.0233)	(0.0119)
$dNPA_{t+1}$	0.0047	0.0169*	0.0145**	0.0176	0.0189**
	(0.0240)	(0.0101)	(0.0066)	(0.0159)	(0.0082)
$logSIZE_{t-1}$	0.0006**	0.0004***	0.0002***	0.0005***	0.0002***
	(0.0003)	(0.0001)	(0.0000)	(0.0001)	(0.0000)
dLOAN	0.0001	-0.0002	-0.0000	-0.0004	-0.0018*
	(0.0022)	(0.0008)	(0.0005)	(0.0012)	(0.0009)
dUNEMP	-0.0014**	0.0002	0.0003**	0.0000	0.0005***
	(0.0007)	(0.0003)	(0.0001)	(0.0004)	(0.0002)
dGSP	-0.0000	-0.0002***	-0.0002***	-0.0002***	-0.0003***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
CSRET	0.0557***	-0.0020	-0.0143***	0.0099	0.0065
	(0.0169)	(0.0064)	(0.0030)	(0.0109)	(0.0067)
N	27137	27137	27137	27137	27137
R-sq	0.0872	0.0887	0.0901	0.0903	0.1197

Appendix Table 5A. Disclosure Quality and Deregulation Without Bank Level Controls

This table presents OLS regressions of disclosure quality on indicators of interstate bank deregulation. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} is one of the five deregulation measures (*INTER, Ln (# of States), Ln (# of States-Distance Weighted), Ln (# of BHCs from Other States)*, and *INTER-BRANCH)* corresponding to each of the deregulation measures used in columns 1-5 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. *INTER-BRANCH* is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. We take the natural logarithm of the sum of the weighted distance measures. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
INTER	-0.5610***				
	(0.1609)				
Ln(# of States)		-0.0417***			
		(0.0069)			
Ln(# of States – Distance Weighted)			-0.0485***		
			(0.0093)		
Ln(# of BHCs from Other States)				-0.0334***	
				(0.0068)	
INTER-BRANCH					-0.5562***
					(0.0553)
Quarter fixed effects	yes	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes
N	27137	27137	27137	27137	27137
R-sq	0.2638	0.2673	0.2672	0.2675	0.2858

Appendix Table 5B. Disclosure Quality and Subsidiary-Level Deregulation Measures: Without Bank Level Controls

This table presents OLS regressions of disclosure quality on measures of the regulatory-induced competitive pressures facing individual bank subsidiaries. The sample consists of subsidiary-bank-quarter observations from the third quarter of 1986 to 2006. These banks are subsidiary commercial banks of BHCs examined in our main regression. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-6 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). To calculate the regulatory environment facing each subsidiary in each year, we first compute *SUB_DIS* by measuring the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k* = *j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We further weight this regulatory environment index by (a) the number of banks in the other state (*SUB_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*SUB_DIS_GSP*). We take the natural logarithm of the sum of the weighted distance measures. Standard errors are heteroskedasticity-consistent, clustered at the quarter level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
SUB_DIS	-0.0585***			-0.0600***		
	(0.0173)			(0.0068)		
SUB _DIS_NUM		-0.0600***			-0.0569***	
		(0.0140)			(0.0063)	
SUB _DIS_GSP			-0.0705***			-0.0678***
			(0.0169)			(0.0074)
State-quarter fixed effects	yes	yes	yes	yes	yes	yes
Subsidiary bank fixed	yes	yes	yes	no	no	no
BHC fixed effects	no	no	no	yes	yes	yes
First stage using deregulation interactive terms	yes	yes	yes	yes	yes	yes
N	55015	55015	55015	55015	55015	55015
R-sq	0.1285	0.1296	0.1288	0.1403	0.1419	0.1412

Appendix Table 6. Disclosure Quality and BHC-Specific Deregulation Measures: Estimating DLLP by Eight Regions

This table presents OLS regressions of disclosure quality on measures of the regulatory-induced competitive pressures facing individual BHCs. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-3 of this table and are estimated by 8 economic regions separately. We use the Bureau of Economic Analysis definition on 8 economic region, which includes 1) New England (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont); 2) Mideast (Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania); 3) Great Lakes (Illinois, Indiana, Michigan, Ohio, and Wisconsin); 4) Plains (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota, and South Dakota); 5) Southeast (Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, South Carolina, Tennessee, Virginia, and West Virginia); 6) Southwest (Arizona, New Mexico, Oklahoma, and Texas); 7) Rocky Mountain (Colorado, Idaho, Montana, Utah, and Wyoming); and 8) Far West (Alaska, California, Hawaii, Nevada, Oregon, and Washington). *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). Appendix Table 1 defines all the other regressors, where *other BHC traits* include *Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. Reductions in disclosure quality with one standard deviation increase in the BHC-specific deregulation measures are reported in the brackets. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
BHC_DIS	-0.0647***		
	(0.0183)		
BHC_DIS_NUM		-0.0525***	
		(0.0149)	
BHC_DIS_GSP			-0.0624***
			(0.0175)
logSIZE	0.0308	0.0356	0.0397
	(0.0517)	(0.0511)	(0.0521)
CAP	1.5660**	1.6397**	1.6448**
	(0.7130)	(0.7152)	(0.7051)
Other BHC traits	yes	yes	yes
BHC fixed effects	yes	yes	yes
State-quarter fixed effects	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes
N	25803	25803	25803
R-sq	0.2662	0.2675	0.2681

Appendix Table 7. Net Loan Charge-Offs and Bank-Level Interstate Deregulation

This table presents results of the effects of banking deregulations on net loan charge-offs. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable NCO_{t+1} represents net loan charge-offs over total loans for a BHC *i* in state *j* in time *t+1*. *BHC_DIS* is computed as follows: For each BHC in each period, weight its assets across all subsidiaries by the regulatory environment facing each subsidiary (including the subsidiaries in the state of the BHC's headquarters). To calculate the regulatory environment facing each subsidiary in each year, we measure the distance from each subsidiary bank to the capital of every other state by computing the road distance between two zip codes using Google maps api, and for each subsidiary in a state *k* (*k = j* if headquarter state), weight the interstate deregulation between state *k* and every other state in period *t* by that subsidiary's natural logarithm distance to the other state. We use *BHC_DIS* to represent this bank-specific regulatory environment index. We further weight this regulatory environment index by (a) the number of BHCs in the other state (*BHC_DIS_NUM)* or (b) the economic size (GSP per capita in $10,000) of the other state (*BHC_DIS_GSP*). Appendix Table 1 defines the other regressors. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
Dept Var	NCO_{t+1}	NCO_{t+1}	NCO_{t+1}
BHC_DIS	-0.00004		
	(0.00005)		
BHC_DIS_NUM		-0.00004	
		(0.00005)	
BHC_DIS_GSP			-0.00003
			(0.00004)
NCO_t	0.46425***	0.46424***	0.46425***
	(0.02684)	(0.02683)	(0.02683)
logSIZE	0.00035*	0.00035*	0.00035*
	(0.00020)	(0.00020)	(0.00020)
dNPA	-0.02683***	-0.02683***	-0.02683***
	(0.00892)	(0.00892)	(0.00892)
NPA	0.06234**	0.06234**	0.06234**
	(0.02400)	(0.02400)	(0.02400)
dLOAN	-0.00245***	-0.00245***	-0.00245***
	(0.00044)	(0.00044)	(0.00044)
LOAN_YIELD	0.00242	0.00242	0.00241
	(0.00184)	(0.00184)	(0.00183)
CAP	-0.00932**	-0.00932**	-0.00932**
	(0.00359)	(0.00359)	(0.00359)
HOM_LOAN	0.00020	0.00020	0.00020
	(0.00096)	(0.00096)	(0.00096)
BHC fixed effects	yes	yes	yes
State-quarter fixed effects	yes	yes	yes
N	25505	25505	25505
R-sq	0.69563	0.69563	0.69563

Appendix Table 8. Disclosure Quality and Alternative BHC-Specific Asset-Weighted Deregulation Measures

This table presents OLS regressions of disclosure quality on measures of alternative asset-weighted regulatory-induced competitive pressures facing individual BHCs. The sample consists of BHC-quarter observations from the third quarter of 1986 through 2006. The dependent variable, disclosure quality, is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} used in equation (1) is one of the deregulation measures corresponding to each of the deregulation measures used in columns 1-3 of this table plus each corresponding deregulation measures fully interacted with all the other independent variables used in equation (1). *BHC_STATES* is computed as follows: For each BHC in each period, weight its assets across all domestic (foreign) subsidiaries by the regulatory environment facing each subsidiary. To calculate the regulatory environment facing each subsidiary in each year, we use the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *BHC_DIS_STATES* is computed as follows: For each BHC in each period, weight its assets across all domestic (foreign) subsidiaries by the regulatory environment facing each subsidiary. To calculate the regulatory environment facing each subsidiary in each year, we use the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *BHC_BHCS* is computed as follows: For each BHC in each period, weight its assets across all domestic (foreign) subsidiaries by the regulatory environment facing each subsidiary. To calculate the regulatory environment facing each subsidiary in each year, we use the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)
BHC_STATES	-0.0482**		
	(0.0060)		
BHC_DIS_STATES		-0.0556***	
		(0.0087)	
BHC_BHCS			-0.0411***
			(0.0046)
logSIZE	0.0229	0.0235	0.0295
	(0.0350)	(0.0353)	(0.0352)
CAP	1.9051***	1.7712**	1.9346**
	(0.7039)	(0.7127)	(0.7231)
Other subsidiary bank traits	yes	yes	yes
BHC fixed effects	yes	yes	yes
Quarter fixed effects	yes	yes	yes
First-stage using deregulation interactive terms	yes	yes	yes
N	25964	25964	25964
R-sq	0.3170	0.3180	0.3160

Appendix Table 9. Accounting Comparability -NPA: Commercial Bank Level Analysis

This table presents OLS regressions of accounting comparability on measures of the regulatory-induced competitive pressures facing individual bank subsidiaries. The sample consists of subsidiary-bank-quarter observations from the third quarter of 1986 to 2006. These banks are subsidiary commercial banks of BHCs examined in our main regression. The dependent variable is non-performing assets over total assets for each bank *i* in state *j* at time *t*. The explanatory variable STATE_AVG_NPA is the average of non-performing assets over total assets for each state *j* at time *t*. *INTER* is a dummy variable equal to one if a BHC is headquartered in a state that has passed an interstate bank deregulation, and zero otherwise. *Ln (# of States)* is the natural logarithm of one plus the number of states whose BHCs can enter into the home state in period *t*. *Ln (# of States-Distance Weighted)* is the natural logarithm of one plus the number of other states whose can enter the home state in period t, where each of those other states is weighted by the inverse of its distance to the home state. *Ln (# of BHCs from Other States)* is the natural logarithm of one plus the number of BHCs from other states that can enter the home state in period *t*. *INTER-BRANCH* is a dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on BHCs in others from establishing bank branches. Appendix Table 1 defines all the other regressors, where *other subsidiary bank traits* include *logSIZE, CAP, Loss* and *LLP_lag*. Standard errors are heteroskedasticity-consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)
Dep Var	Non-performing Assets/Total Assets				
INTER	0.0913***				
* STATE_AVG_NPA	(0.0324)				
Ln(# of States)		0.0559***			
* STATE_AVG_NPA		(0.0189)			
Ln(# of States – Distance Weighted)			0.0595***		
* STATE_AVG_NPA			(0.0192)		
Ln(# of BHCs from Other States)				0.0460***	
* STATE_AVG_NPA				(0.0142)	
Inter-BRANCH					0.1050***
* STATE_AVG_NPA					(0.0357)
INTER	-0.0022**				
	(0.0008)				
Ln(# of States)		-0.0010**			
		(0.0004)			
Ln(# of States – Distance Weighted)			-0.0010***		
			(0.0004)		
Ln(# of BHCs from Other States)				-0.0007**	
				(0.0003)	
INTER-BRANCH					-0.0001
					(0.0005)
STATE_AVG_NPA	0.8717***	0.7552***	0.8997***	0.6359***	0.8932***
	(0.0450)	(0.0579)	(0.0199)	(0.0956)	(0.0357)
Other subsidiary bank traits	yes	yes	yes	yes	yes
Quarter fixed effects	yes	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes
N	55015	54377	54377	54377	54411
R-sq	0.4262	0.4247	0.4247	0.4247	0.4250