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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.

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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, Takeda, and Thomas (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, for example, Beatty and Liao (2011), Bushman and Williams (2012), and Huizinga and Laeven (2012), finds that these manipulations reduce bank stability, the market's valuation of banks, and loan quality. 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, Kwan, and Nimalendran (2004) examine the comparative opacity of banks and nonfinancial firms, they do not examine the determinants of bank opacity. While Barth et al. (2009), Barth. Caprio, and Levine (2004), and Beck, Demirguc-Kunt, and Levine (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, corporate insiders might manage earnings 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, Nanda, and Wysocki 2003; Dechow, Ge, and Schrand 2010). As discussed by Shleifer and Vishny (1997), an intensification of product market competition can spur improvements in corporate governance that reduce these agency

problems.[1] This enhanced governance can, as suggested by Darrough and Stoughton (1990) and Leuz, Nanda, and Wysocki (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, banks 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 or poor accounting credibility tends to increase the cost to a firm of raising equity or debt (e.g., Francis et al. 2005; Bharath, Sunder, and Sunder 2008; Graham, Li, and Qiu 2008; Lo 2015). 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, Gibbons, and Scharfstein (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 an intensification of takeover pressures, which can accompany an increase in competition more generally, hurts disclosure quality as (1) corporate managers increase earnings management to protect themselves from being acquired even if this manipulation raises the cost of capital (Armstrong, Balakrishnan, and Cohen 2012) and (2) corporate managers respond to a less "quiet life" by managing earnings to conceal poor outcomes (Zhao and Chen 2008). Or, put another way, greater competition manifested by greater takeover pressure could deteriorate financial reports

[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, the 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."

quality. 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, Laeven, and Levine (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 do 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, Laeven, and Levine (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 but 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 mechanism by which banks manage earnings and regulatory capital (Beatty and Liao 2014). As reviewed by Dechow, Ge, and Schrand (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 these 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 reduce 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 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, Laeven, and Levine 2013) or state economic performance (Jayaratne and Strahan 1996; Morgan et al. 2004; Demyanyk, Ostergaard, and Sørensen 2007; Beck, Levine, and Levkov 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 measures of deregulation-induced competition, we find that an intensification of competition reduces discretionary LLPs. In these analyses, identification comes from differentiating between BHCs 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 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 finding that competition improves disclosure quality is robust to several factors, including the following. First, we were concerned that the results might reflect changes in the actual quality of loans following bank deregulation rather than earnings management, so we 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. Second, 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. 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. Finally, we conduct all of the analyses at the bank subsidiary, rather than at the BHC-level, and all of the results hold.

Our work contributes to the debate on the impact of competition on disclosure quality, which has focused on nonfinancial firms (e.g., Datta, Iskandar-Datta, and Singh 2013; Balakrishnan and Cohen 2014; Markarian and Santalo 2014; Tong and Wei 2014; Young 2015).[3] Much of this literature uses industry concentration indicators to gauge the comparative degree of competition across industries. But, as argued by Ali, Klasa, and Yeung (2009), cross-industry concentration differences might reflect other industry differences besides 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 using these cross-industry comparisons. 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 identifying the impact of competition on disclosure quality within the banking industry.

Our work also relates to three recent studies. Following the IBBEA, Dou, Ryan, and Zou (2015) find that LLPs fall, while Burks et al. (2015) find that voluntary disclosures of information through press releases increase. Bushman et al. (forthcoming) use a textual analysis of banks' 10-K filings to gauge the competitive pressures facing banks and find that banks delay the recognition of expected loan losses when they face stronger competition. Our focus and methods are different.[4] First, we assess the impact of an intensification of competition on disclosure quality as measured by abnormal accruals

[3] Existing studies of competition and earnings management focus on nonfinancial firms and yield mixed results. For example, using Lerner and HHI indexes to gauge cross-industry differences in competition, Datta, Iskandar-Datta, and Singh (2013) and Markarian and Santalo (2014) find that competition increases earnings management. While Balakrishnan 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 (2015) finds that increased competition reduces real earnings management, while Tong and Wei (2014) do not find any significant connection between competition and opacity.

[4] Our sample of banks is also very different. Dou, Ryan, and Zou (2015) focus on privately held, one-county banks; Bushman et al. (2016) focus on publicly listed banks; and Burks et al. (2015) focus on the four largest banks in each state. Our sample includes all public and private BHCs and their subsidiaries.

of LLPs and the frequency with which banks restate financial statements; we do not examine the level of LLPs per se. Second, besides interstate branch deregulation, which occurred primarily between 1995 and 1997, we examine what happened to abnormal accruals during the dynamic process of interstate bank deregulation from 1986 through 1995. Finally, the 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 BHCs. We do this by integrating the gravity model's insight that distance matters for investment—and thus the degree to which individual banks face competition from other banks—with the state-specific process of interstate banking agreements that evolved over decades. Moreover, we show that it is statistically and economically important to use these BHC-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.

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

In this section, we (1) define the data, (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. Table 1 provides definitions and summary statistics of all of the variables used in the paper.

1.1 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, Laeven, and Levine (2013) and use RSSD9364 in the Y-9C reports to link bank subsidiaries to the parent BHCs and 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 forty-eight states or the District of Columbia. Consistent with the literature on U.S. 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.[5]

For financial restatements and state characteristics, we use several additional datasets. We manually construct a dataset on financial restatements from 10-K, 10-Q, and 8-K files from EDGAR, which

[5] 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.

gathers information from the SEC filings of public firms. The Bureau of Economic Analysis provides state-level data on social and economic demographics.

1.2 Dates of bank deregulation

We use the lowering of regulatory barriers to interstate banking as an exogenous source 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 and increased interest rates on deposits—it did so without boosting loan delinquency rates (Jayaratne and Strahan 1996, 1998). Johnson and Rice (2008) summarize the history of U.S. deregulation on 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 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, Laeven, and Levine (2013, 2016) 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 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 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.

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. Internet Appendix Table 2 provides the dates of *INTER* and *INTER-BRANCH* for each state.

1.3 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. Because of 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 these abnormal accruals as "disclosure quality" requires 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 use Beatty and Liao's (2014) "preferred" model and confirm 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, that is, 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:

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

In this model, $dNPA_{bjt}$ represents the change in nonperforming 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 $dNPA_{bjt+1}$ because banks might use current and forward-looking information on nonperforming assets in selecting LLPs. The model includes $dNPA_{bjt-1}$ since banks might use historical changes in nonperforming assets in setting LLPs. We do not include $dNPA_{bjt-2}$ as in Beatty and Liao (2014) because it eliminates many observations. However, including it does not affect the results. $SIZE_{bjt-1}$ 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. $dLOAN_{bjt}$ 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 ($dGSP_{jt}$), 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, and Internet Appendix Table 3 provides these estimates.

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 these models to proxy for earnings management, as discussed in Beatty and Liao (2014), Dechow, Ge, and Schrand (2010), Yu, (2008), and Jiang, Petroni, and Wang (2010). We interpret the results reported below under the maintained hypothesis that this proxy reflects the discretionary management of LLPs.

Panel B of Table 1 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 nonperforming 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.

1.4 Empirical methodology

We use a difference-in-differences specification to examine the relation between disclosure quality and the basic state-time measures of the regulatory-induced competitive pressures facing BHCs in a state:

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

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 one of the state-time bank deregulation indicators in state *j* and in quarter *t*, that is, *INTER*, *Ln(# of states)*, *Ln(# of states-distance weighted)*, *Ln(# of BHCs from other states)*, or *INTER-BRANCH*. We also include quarter fixed effects (δ_t), 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, Krishnan, and Lobo 2010), X_{bjt} includes the logarithm of bank assets (*logSIZE*), one quarter lag of loan loss provisions (*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.

1.5 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 nonderegulating states, then our estimation strategy could yield erroneous inferences.

To assess the validity of our identification strategy, we first examine the evolution of disclosure quality before and after interstate bank deregulation. We set year zero equal to the year in which 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:

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

where the deregulation dummy variable D_{jt}^{+n} equals one for banks in the *n*th quarter after deregulation, 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 twenty-quarter window, spanning from ten quarters before deregulation until ten quarters after. We then plot the estimated coefficients on the deregulation dummy variables 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 is 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.[6]

[6] 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 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

Furthermore, we plot the trend of the median value of disclosure quality, scaled by *EBTP* (*Discretionary 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 twenty-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 discretionary LLP is $0.43 million. Figure 2 shows that *Discretionary LLP/EBTP* has a median value of 28% during the prederegulation 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 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,

deregulation-induced competition and started to build a reputation for disclosure quality in anticipation of that change (e.g., Baginski and Rakow 2012).

capital ratio of small banks relative to large ones, relative size of insurance in states in which banks may sell insurance (zero otherwise), relative size of insurance in states in which banks may not sell insurance (zero otherwise), an indicator variable equal to one if banks may sell insurance (zero otherwise), the small firm (fewer than twenty employees) share of the number of firms in the state, an indicator variable equal to one if the state has a unit banking law (zero otherwise), share of state government controlled by Democrats, and an indicator taking the value of one if the state is controlled by one party (zero otherwise).[7] Thus, for our sample period, we examine the relation between disclosure quality and the timing of bank deregulations.

Table 2 shows that disclosure quality does not predict the timing of regulatory reforms as measured by *INTER*, *Ln(# of out-of-states)*, *Ln(# of out-of-states – distance weighted)*, *Ln(# of BHCs from out-of-states)*, and *INTER-BRANCH*, respectively. That is, 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.

2. 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 BHC measures of competition. This allows us to control for state-time and BHC fixed effects, enhancing our ability to draw sharper inferences about the impact of regulatory-induced competition on bank opacity.

2.1 Results

In Table 3, 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*

[7] Since the sample consists of observations from 1986 to 2006, and these analyses assess whether discretionary loan loss provisions predict future deregulations, these analyses only includes states that deregulated after 1986: twenty-two states started interstate bank deregulation, and all states completed interstate branch deregulation after 1986.

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 heteroscedasticity-consistent standard errors (as defined in MacKinnon and White 1985) that are clustered at the state level.

The results presented in Table 3 indicate that deregulation reduced bank opacity. Each of the five indicators of regulatory reform is 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 3, each of the three dynamic measures of the evolution of interstate bank deregulation is negative and significant: 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 Internet Appendix Table 4A, however, all of the findings hold when excluding these regressors.

The estimated coefficients reported in Table 3 suggest that the economic impact of bank deregulation on disclosure quality is economically large. To help interpret the economic magnitude of those continuous deregulation measures, Table 3 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 -0.0434 (Column 2), which implies an 8% =(0.0434 * 1.8) decrease in abnormal LLPs, with a one-standard-deviation increase in *Ln(#states)*. Similarly, for the other two state-specific deregulation 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 3 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).

2.2 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—and 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 these investment decisions, including the decision of BHCs to open subsidiaries in other states (Goetz, Laeven, and Levine 2013, 2016). 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

$$Subsidiary\ Competition\ (Distance\ Weighted)_{sjt} = Ln \sum_i [{}^{I_{jit}}\!/_{DIS_{si}}], \tag{4}$$

where I_{jit} equals one if BHCs from state *i* are allowed to establish subsidiaries in state *j* in period *t*, and zero otherwise; DIS_{si} equals the distance between subsidiary *s* and state *i*.[8]

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, that is, all *s* within each *b*, and performing the following calculation:

$$BHC\ Competition\ (Distance\ Weighted)_{bkt} = \sum_{s \in b} \left[Subsidiary\ Compeittion\ (Distance\ Weighted)_{sjt} \right] * P_{sbt}, \tag{5}$$

where P_{sbt} 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:

[8] In those cases in which $\sum_i [{}^{I_{j,i,t}}\!/_{DIS_{si}}] = 0$, we set the value to 0.000001.

$$1 = \sum_{s \in b} P_{sbt} \,.^{9} \tag{6}$$

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's subsidiaries in other states to greater competition.

We also create two additional bank subsidiary and BHC-specific measures of competition that further weight distance by the economic size and number of banks in states. Specifically, we weight *Subsidiary competition (distance weighted)*$_{sjt}$ by either the gross state product (*GSP*) of states allowed to establish subsidiaries in state *j* or the number of banks in states allowed the same. For the economic size-weighted measure of the competitive pressures facing a subsidiary, *s*, located in state *j* in period *t*, we compute the following:

$$\begin{aligned} &Subsidiary\ Competition\ (Distance\ and\ GSP\ Weighted)_{sjt} \\ &= Ln \sum_i [GSP_i * {}^{I_{jit}}\big/_{DIS_{sj}}]. \end{aligned} \tag{7}$$

For the number of banks-weighted measure, we follow an analogous procedure and weight by the number of BHCs in state *i* rather than by the *GSP* in state *i*. Then using the same method described in Equations (5) and (6) to construct *BHC competition (distance weighted)*, we compute two additional BHC-specific measures of competition: *BHC competition (distance and GSP weighted)* and *BHC competition (distance and # of BHCs weighted)*.[10]

[9] To address any concerns that changes in P_{sbt}, rather than changes in competition, shape the results below, we implement three sensitivity checks. First, we construct *BHC Competition (Distance Weighted)* using lagged P_{sbt-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_{sbt} and obtain very similar results, as shown in Internet Appendix Table 4.

[10] Specifically, we use the underlying subsidiary measures to construct the BHC measure as in Equation (5), so that $BHC\ Competition\ (Distance\ and\ GSP\ Weighted)_{bkt} = \sum_{s \in b}\left[Subsidiary\ Competition\ (Distance\ and\ GSP\ Weighted)_{sjt}\right] * P_{sbt}$.

2.3 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:

$$Disclosure\ Quality_{bjt} = \beta' \cdot BHC\ Compeittion\ (Distance\ Weighted)_{bjt} + \gamma' \cdot X_{bjt} + \delta_{jt} + \delta_b + \varepsilon_{bjt}, \quad (8)$$

where δ_{jt} and δ_b represents state-time and BHC fixed effects, respectively. If (1) the earlier results were driven by competition and (2) the distance of a potential competitor to a market influences the competitiveness of that market, then β should be negative and significant. 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 be insignificant.

It is worth noting and addressing a potential concern with including time-varying BHC controls in Equation (8). If BHC 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 4, we first provide estimates without including any of the BHC 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 controls.

As shown in Table 4, each of these three measures of the competitive environment facing individual BHCs is negative and significant and has an economically large coefficient. To illustrate the economic magnitude, we provide a row in Table 4 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 competition (distance weighted)* is 0.0543, which suggests that a one-standard deviation increase (1.76) of *BHC competition (distance weighted)* reduces discretionary loan loss provisions by about 10% (= 0.0543 × 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 can neither 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 redid all of the analyses, while limiting the sample to those BHCs that never expand into other states. Even when restricting the analyses to these "nonexpanders," all of the results hold as shown in Internet Appendix Table 10. Second, we were concerned about selection into and out of banking, since there was considerable exit and entry during this deregulatory period. Consequently, we again redid the analyses; this time while limiting the sample to BHCs that exist for the entire period. All of the results hold as shown in Internet Appendix Table 11.

We also assess the value added by 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 4 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 4. 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.

The results are also robust to conducting the analyses at the bank subsidiary level. Specifically, we (1) compute discretionary LLPs at the bank subsidiary level using the same procedures discussed above in the context of BHCs and (2) use the three bank subsidiary competition measures, *Subsidiary competition (distance weighted)*, *Subsidiary competition (distance and GSP weighted)*, and *Subsidiary competition (distance and # of subsidiaries weighted)* 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. All of the results hold and the estimated economic magnitudes are very similar to those reported in Table 4, as shown in Internet Appendix Table 4B.

3. Extensions and Robustness Tests

3.1 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.[11] By doing so, our sample only includes publicly traded BHCs. 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

[11] 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. For more details of the definition and classification of financial restatement, please refer to Table 1.

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 ordinary least squares (OLS) models. Specifically, given the binary distribution of the dependent variable, we first use a probit regression model and report the marginal effects. We confirm the results using OLS. In the analyses, we control for year and BHC fixed effects. To trace out the dynamics, the regressors include separate dummy variables for one year before interstate branch deregulation through five years after a state first removed restrictions on interstate branching. The reference period is the year in which 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 preinterstate branch deregulation period is 0.15, the estimated impact of deregulation on restatement is economically large. Because of 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, Leone, and Miller 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 rerun the dynamic effect model and provide the results in Columns 3 and 4 of Table 5. As shown, excluding unintentional misstatements does not alter the estimates from Columns 1 and 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 postderegulation coefficients are negative and statistically significant from the second year onward.

3.2 Additional robustness tests

We conducted several robustness tests of the measurement of discretionary LLPs. We summarize the results here and provide the regression estimates in the Internet Appendix. First, we considered three additional models of loan loss provisioning, two suggested by Beatty and Liao (2014) and one by Bushman and Williams (2012). We estimated these models, collected the residuals, constructed new versions of the discretionary LLP proxies based on these residuals, and redid the analyses. All of the results hold (see Internet Appendix Table 5). Second, we modified the Equation (1) discretionary LLP model to allow 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. All of the results hold both in terms of statistical significance and in terms of the sizes of the estimated coefficients (see Internet Appendix Table 6). Third, we were concerned that using the absolute value of the residuals from the LLP prediction model to measure "abnormal" accruals could distort the results if positive values 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 making additional ("abnormally" high) provisions for loan losses (Office of the Comptroller of the Currency 1996).[12] Therefore, as a robustness check, we construct an alternative measure for disclosure quality that only considers the negative residuals emerging from LLP econometric model and drops all positive residuals. We find our results are robust at both the BHC level and subsidiary bank level (see Internet Appendix Table 7).

[12] Provisions for loan losses are an expense on a bank's income statement. In contrast, allowances for loan losses enter as a contra-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.

We were also concerned that 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. Interstate bank deregulation did not have a significant effect on charge-offs, further highlighting the independent link between competition and opacity (see Internet Appendix Table 8).

We also examined the sources of variation in the competitive pressures facing banks after interstate bank deregulation. One possible source is 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. A second possible source of variation in the competition pressures facing a BHC is the cross-state geographic dispersion of a BHC's subsidiaries, regardless of the dispersion of those subsidiaries within states. We find that both sources of variation in competition help in accounting for changes in disclosure quality. First, we close off the second source of variation—the cross-state dispersion of a BHC's subsidiaries—and focus only on within-state geographic dispersion. We do this by examining individual bank subsidiaries instead of BHCs. All of the results hold. Second, we close off this first source of variation and focus only a BHCs cross-state holding of subsidiaries.[13] Again, all of the results hold (see Internet Appendix Table 9).

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

$$SUB_{sjt} = Ln \sum_i [\, I_{jit}].$$

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, that is, all *s* within each *b*, and calculate

$$BHC\_STATES_{bkt} = \sum_{s \in b} \left[SUB_{sjt} \right] * P_{sbt}.$$

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

4. 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 bank executives 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 disciplining banks more difficult for private investors or for the regulators who supervise banks. Our findings are consistent with the view that exposing BHCs to greater competition will facilitate the monitoring of banks, with potentially beneficial repercussions on the governance and regulation of banks.

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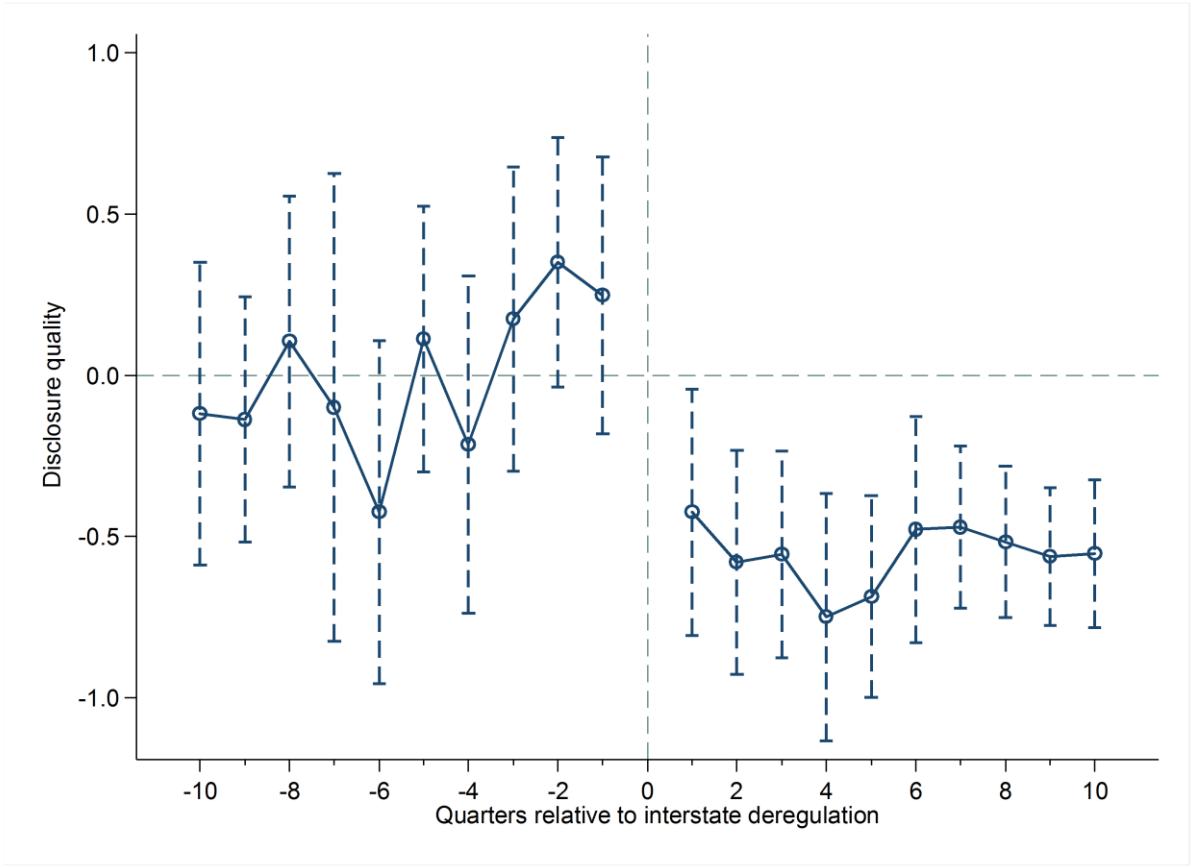
Figure 1. Evolution of disclosure quality around interstate bank deregulation



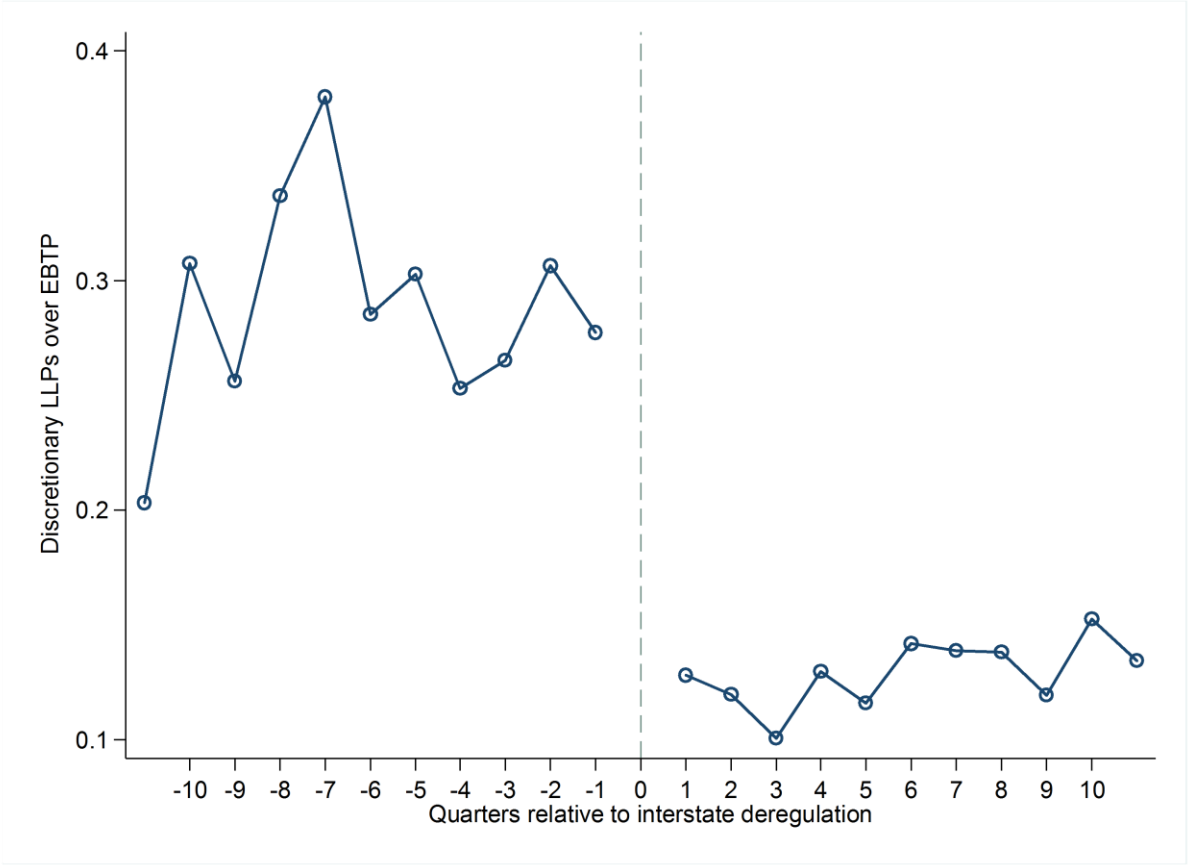
This figure plots the impact of interstate bank deregulation on disclosure quality by banks in a state. Disclosure quality is measured as the natural logarithm of the absolute value of residuals predicted from equation (1). The deregulation term D_{jt} represents the interstate deregulation *INTER* in 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 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 (β_1, β_2, …), 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



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 (1) (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. Variable definition and summary statistics

A. Variable definitions

Variable name	Definition
Deregulation measures	
INTER	A dummy variable that equals one if the BHC is headquartered in a state that has deregulated interstate banking with at least one other state, and zero otherwise
INTER-BRANCH	A dummy variable that equals one if the BHC is headquartered in a state that has liberalized restrictions on interstate branching with at least one other state, and zero otherwise
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 competition (distance weighted)	The variable 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 (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 competition (distance and # of BHCs weighted)	The variable 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*, 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 competition (distance and GSP weighted)	The variable 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*, 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

Table 1
Continued
A. Variable definitions

Variable name	Definition
Other variables	
logSIZE	The natural logarithm of total assets in millions of U.S. dollars
LOSS	A dummy variable that equals one if net income is negative, and zero otherwise
CAP	Book value of equity over total assets
EBTP	Income before taxes, provisions recognized in income in millions of U.S. dollars
LLP	Loan loss provisions over the quarter scaled by total loans at the beginning of the quarter
LLP_lag	One quarter lag of LLP
NPA	Nonperforming assets over the quarter, scaled by total loans at the beginning of the quarter
dNPA	Change in NPA over the quarter, divided by total loans at the beginning of the quarter
LOAN	Total loans over the quarter in million U.S. dollars
dLOAN	Change in total loans over the quarter, divided by total loans at the beginning of the quarter
LOAN_ASSETS	Total loans over the quarter, divided by total assets
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
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. More specifically, we count the following nonfraud cases as financial restatement reported in EDGAR files: adjustment due to mergers and acquisitions; adjustment due to new accounting principles; adjustment in income, balance sheet, or cash-flow statements; 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
NONERROR RESTATEMENT	An indicator variable that represents the incidence of financial restatement, which equals one if the BHC restates its financial restatements that is not due to clerical error in year *t* and zero otherwise

Table 1
Continued
B. Summary statistics

Variable	N	Mean	SD	P25	Median	P75
INTER	27,137	0.98	0.14	1	1	1
INTER-BRANCH	27,137	0.56	0.50	0	1	1
Ln(# of states)	27,137	3.45	1.80	3.58	3.91	3.91
Ln(# of states – distance weighted)	27,137	0.82	1.55	0.90	1.25	1.26
Ln(# of BHCs from other states)	27,137	6.78	2.16	6.99	7.33	7.36
BHC competition (distance weighted)	25,803	0.72	1.76	0.88	1.25	1.26
BHC competition (distance and # of BHCs weighted)	25,803	4.10	2.19	4.29	4.74	4.81
BHC competition (distance and GSP weighted)	25,803	2.01	1.92	2.04	2.57	2.66
SIZE	27,137	11014	64318	477	1067	3569
logSIZE	27,137	7.34	1.59	6.17	6.97	8.18
LLP_lag (%)	27,137	0.14	0.27	0.04	0.08	0.15
LOSS	27,137	0.04	0.21	0	0	0
CAP	27,137	0.09	0.04	0.07	0.08	0.1
LLP (%)	27,137	0.14	0.27	0.04	0.08	0.15
NPA	27,137	0.01	0.02	0	0.01	0.02
dNPA (%)	27,137	-0.01	1.18	-0.15	-0.02	0.11
LOAN	27,137	5880	28660	300	680	2180
dLOAN	27,137	0.03	0.09	0	0.02	0.05
LOAN_ASSETS	27,137	0.64	0.12	0.58	0.65	0.72
CSRET	27,137	0.01	0.01	0.01	0.02	0.02
dUNEMP	27,137	-0.02	0.03	-0.2	-0.1	0.1
dGSP	27,137	1.72	2.00	0.57	1.63	2.78
EBTP	27,137	31.89	171.54	1.18	3.02	9.89
RESTATEMENT	5,520	0.14	0.34	0.00	0.00	0.00
NONERROR RESTATEMENT	5,520	0.13	0.34	0.00	0.00	0.00

This panel 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, panel A, for variable definitions.

Table 2. Banking deregulations and lagged disclosure quality

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 (0.0081)	0.0105 (0.0104)	0.0831 (0.0578)	0.0745 (0.0506)	0.0970 (0.0674)
State-weighted residuals two years before interstate deregulation		0.0022 (0.0077)	0.1012 (0.0770)	0.0885 (0.0654)	0.1194 (0.0911)
State-weighted residuals three years before interstate deregulation		0.0020 (0.0072)	0.0391 (0.0251)	0.0373 (0.0231)	0.0447 (0.0296)
Controls	yes	yes	yes	yes	yes
No. of observations	310	275	275	275	275

B. Interstate branch deregulation

	(1)	(2)
Dep var	*INTER-BRANCH*	
State-weighted residuals one year before Branching deregulation	-0.0049 (0.0087)	-0.0030 (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
No. of observations	773	682

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 *INTER* (Columns 1 and 2), *Ln (# of states)* (Column 3), *Ln (# of states-distance weighted)* (Column 4), and *Ln (# of BHCs from other states)* (Column 5). In panel B, the dependent variable is *INTER-BRANCH*. Definitions for these variables are presented in Table 1. The variable *State-weighted residuals* is 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. For the control variables (*Controls*), we follow Kroszner and Strahan (1999) as discussed in the text. We also include state fixed effects. Standard errors are adjusted for state-level clustering and appear in parentheses. *, **, and *** indicate significant at 1%, 5%, and 10%, respectively.

Table 3
Disclosure quality and deregulation

	(1)	(2)	(3)	(4)	(5)
INTER	-0.5123***				
	(0.1482)				
Ln(# of states)		-0.0434***			
		(0.0057)			
Ln(# of states-distance weighted)			-0.0508***		
			(0.0077)		
Ln(# of BHCs from other states)				-0.0357***	
				(0.0052)	
INTER-BRANCH					-0.5604***
					(0.0963)
logSIZE	0.0554	0.0618	0.0576	0.0628	0.0278
	(0.0391)	(0.0395)	(0.0398)	(0.0394)	(0.0450)
LLP_Lag	4.2726	4.7338	5.0100	6.5030*	6.2413
	(4.1693)	(3.3719)	(3.4172)	(3.3329)	(4.1119)
LOSS	1.4040***	1.4094***	1.4044***	1.3973***	1.3224***
	(0.0593)	(0.0589)	(0.0619)	(0.0611)	(0.0656)
CAP	1.7315**	1.7310**	1.7105**	1.7266**	1.3900*
	(0.7055)	(0.6847)	(0.6670)	(0.6742)	(0.6984)
% change in *y* with one standard deviation change in continuous deregulation measures	–	0.08	0.08	0.08	–
Quarter fixed effects	yes	yes	yes	yes	yes
BHC fixed effects	yes	yes	yes	yes	yes
N	27,137	27,137	27,137	27,137	27,137
R-sq	0.3078	0.3124	0.3107	0.3087	0.3233

This table presents OLS regressions of disclosure quality on five 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 five deregulation measures are (*INTER, Ln (# of states), Ln (# of states-distance weighted), Ln (# of BHCs from other states)*, and *INTER-BRANCH). Other BHC traits* include *LOSS* and *LLP_lag*. Table 1 provides variable definitions. Standard errors are heteroscedasticity consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

Table 4
Disclosure quality and BHC-specific deregulation measures

	(1)	(2)	(3)	(4)	(5)	(6)
BHC competition (distance weighted)	-0.0543***			-0.0530***		
	(0.0187)			(0.0187)		
BHC competition (distance and # of BHCs weighted)		-0.0474***			-0.0462***	
		(0.0151)			(0.0152)	
BHC competition (distance and GSP weighted)			-0.0555***			-0.0540***
			(0.0170)			(0.0172)
logSIZE				0.0114	0.0097	0.0089
				(0.0386)	(0.0355)	(0.0359)
LLP_Lag				5.1550	5.6918*	5.5342
				(3.4411)	(3.3731)	(3.4399)
LOSS				1.3780***	1.3759***	1.3668***
				(0.0732)	(0.0753)	(0.0744)
CAP				2.0979***	2.0236***	2.0327***
				(0.7203)	(0.7255)	(0.7257)
% change in *y* with one standard deviation change in continuous deregulation measures	0.10	0.10	0.11	0.09	0.10	0.10
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	25,803	25,803	25,803	25,803	25,803	25,803
R-sq	0.2426	0.2425	0.2425	0.2856	0.2857	0.2846

This table presents OLS regressions of disclosure quality on three 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 three regulatory-induced competitive measures are *BHC competition (distance weighted)*, *BHC competition (distance and # of BHCs weighted)*, and *BHC competition (distance and GSP weighted)*. Table 1 provides variable definitions. Standard errors are heteroscedasticity consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.

Table 5
Financial restatement after the banking deregulation

	(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	2,875	5,520	2,819	5,520
R-sq	0.1620	0.3065	0.1558	0.2984

This table presents regression results of the dynamic effects of interstate branching deregulation on the incidence of financial restatements. Financial restatements are modeled by leads and lags from one year before to five years or more after the first year (year 0) that a state deregulates interstate branching restrictions. 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. The other BHC traits include *LOSS* and *LLP_lag*. Table 1 provides variable definitions. Standard errors are heteroscedasticity consistent, clustered at the state level, and reported in parentheses. *, **, and *** indicate significant at 10%, 5%, and 1%, respectively.