The Effect of Subsidiary Accounting Quality on Internal Capital Allocation Efficiency: Evidence from Bank Holding Companies

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Abstract:

This study examines whether subsidiary banks' accounting quality improves internal capital allocation efficiency of multi-bank holding companies (MBHCs). Taking advantage of the filing requirements for subsidiary banks, we find that MBHCs with higher subsidiary accounting quality have higher internal capital efficiency. We further find that this relation is more pronounced for larger MBHCs, MBHCs with a larger number of subsidiaries, and MBHCs with more subsidiaries located further from the MBHC headquarters, consistent with superior accounting quality mitigating information problems between the CEO and subsidiary managers. We also document that the positive relation between subsidiary accounting quality and internal capital market efficiency is stronger for public banks, suggesting that higher quality information is more useful when information asymmetry between the CEO and shareholders is greater. These findings contribute to our understanding of the role of accounting information within an organization and the factors affecting internal capital market efficiency.

1. Introduction

Stein (1997) and Scharfstein and Stein (2000) argue that information asymmetry and agency conflicts between division managers and CEOs in multiple-segment firms result in inefficient internal capital allocation where weaker divisions get subsidized by stronger divisions. They further argue that this inefficient internal capital allocation or "socialism" in internal capital allocation provides an explanation for the finding that diversified firms trade at a lower value compared to stand-alone firms in both non-financial (e.g., Berger and Ofek, 1995; Lang and Stulz, 1994) and financial firm settings (e.g., Goetz et al., 2013). Despite the existence of this inefficiency, little is known regarding how the quality of subsidiary-level information affects internal capital market efficiency. We argue that accounting information is a primary mechanism that can be used to mitigate information asymmetry within the organization and examine whether subsidiaries' financial reporting quality improves internal capital market efficiency in multi-bank holding companies (MBHCs). Understanding the factors that contribute to the efficiency of internal capital markets is important given their effect on bank lending growth (Houston et al., 1997; Campello, 2002), which has implications for the real economy.

To examine our research question, we take advantage of several features of the U.S. banking structure and related reporting requirements. First, in addition to MBHCs that provide quarterly regulatory financial reports (i.e., Y-9C), subsidiary commercial banks are also required to file quarterly Report of Condition and Income, often referred to as the "call report." Call reports provide detailed information that allow MBHC management and external shareholders to assess subsidiary banks' operation efficiency and allow researchers to measure accounting quality. Second, in call reports, we are able to identify cash flow between the MBHCs and the subsidiaries, thereby allowing us to more accurately measure internal capital allocation and subsidiaries' growth opportunities and determine whether the internal capital market is operated

efficiently. Finally, both publicly traded and privately held MBHCs provide regulatory reports, which facilitate the comparison of internal capital efficiency between public versus private MBHCs.

Our main prediction is that higher quality subsidiary financial reporting allows MBHC managers to assess which subsidiaries have strong growth opportunities or are well operated and should therefore have more funds allocated to.[1] This is particularly true in larger organizations for which the ability to directly monitor subsidiary managers or to use soft information is limited, creating an important role for hard accounting information. As a result, better accounting quality allows the MBHC to achieve higher internal capital market efficiency, defined as the extent of capital flow from subsidiaries with lower future profitability to subsidiaries with higher future profitability. To test this prediction, we employ a sample of 23,987 MBHC-quarter observations, representing 776 individual MBHCs from 1996 to 2016. We consider accounting information to be of higher quality if it is more reflective of the true operating outcomes. Given the inherent discretion and importance of loan loss provisions as an indicator of bank performance, we use the absolute value of discretionary loan loss provisions of each subsidiary to capture accounting quality (Beatty and Liao, 2014). We document evidence consistent with our prediction, that MBHCs with better average subsidiary accounting quality have greater internal capital efficiency.

After establishing a positive relation between subsidiary accounting quality and internal capital market efficiency, we examine instances when the relation between accounting quality and internal capital market efficiency is expected to be strongest. Specifically, we argue that the use of accounting information is less effective when MBHC managers can easily observe subsidiary operations or rely on soft information about division managers or their operational

[1] For ease of exposition, we refer to the manager at the top of the organization (BHC-level) as the MBHC manager and to each of the commercial bank level managers as subsidiary managers.

efficiency. Based on this, we posit that the effectiveness of accounting information in addressing the information problems is stronger when the MBHC has more subsidiaries, when the subsidiaries are geographically further from the MBHC headquarters, and when the MBHC is larger in size. Consistent with our prediction, we find that the positive association between accounting quality and internal capital efficiency is more pronounced in the subsample of MBHCs where the average distance between subsidiaries and headquarters, the number of subsidiaries, or the asset size of the MBHC is greater than the sample median. Collectively, these analyses suggest that higher quality subsidiary accounting information increases capital market efficiency to a greater extent when internal information asymmetry is higher.

Finally, based on Scharfstein and Stein's (2000) argument that information problems between CEO and shareholders contribute to the internal capital inefficiency in a multi-segment firm, we further contend that the effect of subsidiary financial reporting quality on internal capital allocation is more pronounced for publicly traded MBHCs versus privately held MBHCs. We argue that shareholders of publicly traded firms can discipline MBHC managers' internal capital allocation decisions via the use of subsidiary accounting information because shareholders can also observe the regulatory reporting by subsidiary banks. We document evidence consistent with this prediction in that the effect of subsidiary accounting quality on internal capital allocation is more significant for public MBHCs than private MBHCs.

To push further on the consequences of our main finding, we examine whether greater subsidiary accounting quality lowers the diversification discount. We use publicly traded one-bank MBHCs' asset multiplier (i.e., market-to-book ratios) to calculate the implied asset multiplier for subsidiaries based on their geographic location and loan types. We find that both geographic and product diversification discounts decrease with subsidiary accounting quality. In

addition, consistent with the notion that subsidiary accounting quality improves internal capital efficiency, we find that subsidiary accounting quality also reduces financial constraints at the subsidiary level. Specifically, we find that the positive association between regulatory capital and loan growth decreases with accounting quality, especially in the periods with tightening monetary policy. Collectively, these tests suggest that higher quality subsidiary accounting information reduces the diversification discount and mitigates the effect of financial constraints on lending growth.

We perform several additional tests to corroborate our main findings and to reduce concerns regarding alternative explanations. First, we utilize an alternative measure of accounting quality based on the audit status of subsidiary banks under the assumption that the receipt of an audit will increase accounting quality. The majority of subsidiary banks are not required to receive an audit and as such, there is variation across bank holding companies in the percentage of subsidiaries that receive an audit. We document that internal capital efficiency for MBHCs increases in the proportion of subsidiaries being audited. This provides evidence that our results are not dependent on the use of loan loss provision discretion as a measure of accounting quality.

Second, to address the possibility that internal capital efficiency and subsidiary accounting information are either simultaneously determined or subject to reverse concerns, we perform our main test using an instrumental variables (IV) approach. Specifically, we adapt the approach from Minnis (2011) and use the residual proportion of banks receiving audits measured at the state level as instruments in a two-stage IV estimation.[2] We continue to find a positive

[2] Specifically, following Minnis (2011), we regress the portion of audited banks in the state on various state-level variables that may be correlated with bank internal capital efficiency, including state assets, interstate branching restrictiveness index, coincident index, litigation rank, net interest margin, and the number of banking institutions.

association between the predicted proportion of audited subsidiaries and internal capital efficiency in this IV estimation.

Finally, to determine whether differences in regulatory enforcement drive our results, we follow Costello et al. (2017) and Nicoletti (2018) in using the U.S. Bank Regulatory Index provided by Agarwal et al. (2014) to measure regulatory leniency across different states. Our results suggest that while the effect of subsidiary accounting quality is stronger for state-chartered subsidiary banks located in the low-leniency states, our findings continue to hold for state banks in the high-leniency states. This finding suggests that while state regulatory leniency affects subsidiary accounting quality, regulatory enforcement variation does not fully explain our findings.

Our study contributes to the literature in the three ways. First, we contribute to the literature on diversification discounts and internal capital market efficiency by documenting the importance of accounting information in improving internal capital market efficiency. Thus, we provide insight into whether accounting quality affects information problems in multi-segment firms. Relatively little is known regarding the informational factors affecting internal capital allocation and in particular, prior research has not explored the information available within the organization. This may be underexplored in prior research due to the lack of financial reporting in non-financial subsidiaries, which makes our focus on banks a particularly powerful setting to examine the association between subsidiary accounting information and internal capital market efficiency. However, it is important to note that our inferences may not necessarily generalize to non-financial firms due to the unique features of banks, including significant regulation and relative homogeneity in products.

Then we use the residual of this regression as our IV that is designed to capture the exogenous portion of the instrument.

Second, our study extends the literature on the real effects of accounting information. This literature has mainly focused on the usefulness of accounting information in addressing information problems with external stakeholders (e.g., Biddle et al., 2009; Beatty et al., 2010), rather than whether accounting information also addresses information problems within an organization.[3] Finally, we contribute to the limited literature examining the MBHC-commercial bank organizational structure and reporting requirements in the accounting literature. Beatty and Harris (2001) document that BHCs use the timing of investment sales to manage taxes, earnings, and capital at both the subsidiary and BHC level. We complement their paper by examining how discretion in the loan loss provision affects the efficiency of internal capital markets.

The rest of the paper is structured as follows. In Section 2, we provide institutional background and literature reviews. We develop hypotheses in Section 3 and discuss research methodology in Section 4. In Section 5, we show the empirical findings and supplemental analyses. Finally, we conclude in Section 6.

2. Literature Review and Institutional Background

2.1 Literature Review

2.1.1 Inefficiency in Multi-Segment Firms

Berger and Ofek (1995) note that while the earlier literature addresses the benefits of diversification in a conglomerate, most recent studies focus on the costs of diversification. For example, Stulz (1990) argues that while diversified firms can address the underinvestment problem by creating an internal capital market, these diversified firms may cross-subsidize too much in segments with poor investment opportunities. Meyer et al. (1992) provide a similar

[3] Although prior research (e.g., Hope and Thomas, 2008) finds that segment profitability disclosure has the potential to mitigate agency problems, nonfinancial firms' segment disclosure does not allow researchers to distinguish between good and bad reporting quality. In addition, their focus is mostly on the agency conflicts between parent management and external stakeholders.

argument that cross-subsidization allows a failing business to have a negative value that would otherwise not happen if the business operates on its own. Stein (1997) argues that because private benefits of division managers increase with the resources under their control, they have incentives to over-report their performance and investment prospects to secure capital from the headquarters' "winner-picking" practice. Scharfstein and Stein (2000) further argue that a two-tiered agency model can explain the inefficient internal capital market in a conglomerate. They argue that self-serving CEOs respond to weaker division managers' rent-seeking behavior by distorting allocation among divisions, which tend to be "socialist" in nature. That is, strong divisions are more likely to subsidize weaker divisions than the other way around.[4]

Many studies find results consistent with both the benefits and costs of the internal capital market. Supportive of the benefits of the internal capital market, Almeida et al. (2015) find that the internal capital markets in Korean business groups help them mitigate the negative effects of the financial crisis on firm investment. In addition, Khanna and Tice (2001) find that diversified firms make better investment decisions upon Wal-Mart's entry as diversified firms are quicker to either "exit" the discount business or "stay and fight". Other studies find that the internal capital efficiency depends on how resources are allocated among divisions. Billett and Mauer (2003) find that subsidies to financially constrained segments with good investment opportunities increase excess value while transfers of resources from segments with good investment opportunities decrease excess value.[5] Shin and Stulz (1998) find that investment by segments of a diversified firm depends on the cash flow of other segments and that this relation increases

[4] Rajan et al. (2000) argue that when divisions have similar resources and opportunities, funds are transferred from divisions with poor opportunities to those with good opportunities. However, when diversity in resources and opportunities increases, resources can flow toward the most inefficient division.

[5] Contrary to the efficiency internal capital market theory, Billet and Mauer (2003) find that subsidies to small financial constrained segments with poor investment opportunities also significantly increase excess value. This finding however is consistent with Rajan et al. (2000) who argue that headquarters transfer resources to small segments with poor growth opportunities to mitigate divisional managers' incentives to choose self-serving investments.

with diversification. However, this sensitivity to other segments' cash flow does not depend on whether its investment opportunities are better than other segments. Consistent with the costs of internal capital markets outweighing the benefits, Berger and Ofek (1995) find that multi-segment firms' actual value is 13-15% lower than the sum of stand-alone values.

While Berger and Ofek (1995) argue that the diversification discount should be lower when the divisions are in similar industries such as in banking, Goetz et al. (2013) find that increased geographic diversification results in a reduction in MBHC values. They also find that MBHC geographic diversification increases insider lending and reduced loan quality. In contrast, Ashcraft (2003) argues that affiliation with MBHCs reduces the probability of future financial distress and that subsidiary banks are more likely to receive capital injections and recover more quickly than other banks at distress.

2.1.2 The Effect of Accounting Information on Real Activities

There is a large literature discussing how accounting information may mitigate information problems between external capital providers and the firm. For example, Biddle and Hilary (2006) find that firms with better financial reporting quality are less likely to be financially constrained and therefore have lower investment-cash flow sensitivities, a proxy for investment efficiency. Biddle et al. (2009) find that firms with better accounting quality have both less overinvestment and underinvestment problems. Beatty et al. (2010) find that, after controlling for endogeneity, the association between accounting quality and investment efficiency is attenuated in the presence of bank monitoring. Consistent with Beatty et al. (2010), Bharath et al. (2008) find that firms with better accounting quality are more likely to tap on the bond market than the loan market.

In a multi-segment setting, Hope and Thomas (2008) examine the consequence of SFAS 131 that no longer requires geographic segments to disclose profitability. They find that relative to firms that continue to disclose geographic earnings, non-disclosers experience a greater increase in foreign sales and have lower firm value in the post-SFAS 131 period. Berger and Hann (2007) argue that multi-segment firms trade off the potential proprietary costs and agency costs when making the disclosure decisions of segment profitability after SFAS 131. Bens and Monahan (2004) find a positive association between excess value of diversification and analyst rating of disclosure quality. D'Mello et al. (2017) find that internal control effectiveness, measured at the headquarter level, affects internal capital allocation efficiency and thereby the diversification excess value.

An important novelty of our study is that we explicitly focus on the potential information problems between the MBHC manager and subsidiary managers with an emphasis on the internal capital allocation. In addition, the test variable we employ is the quality of accounting information at the subsidiary level. While Hope and Thomas (2008) and Berger and Hann (2007) also examine segment profitability disclosure, their focus is mostly on the agency problems between parent managers and external shareholders. In addition, segment profitability disclosure does not capture the quality of accounting information used by MBHC managers in the capital allocation process. Instead, it is more reflective of MBHC managers' strategic choice when making the disclosure decisions; that is, division managers have little discretion in this disclosure choice.

2.2 Institutional Background

As mentioned above, our study relies on the MBHC banking structure and the requirements of subsidiary banks' reporting requirements. In this section, we discuss the banking structure and the reporting requirements in all bank levels in the U.S.

2.2.1 Banking Structure and Regulators

A bank holding company (BHC) controls one or more commercial banks and is regulated by the Federal Reserve. A typical multi-bank holding company may own multiple bank subsidiaries that engage in commercial banking activities and nonbanking subsidiaries that engage in a broader range of businesses (Avraham et al., 2012). These non-banking businesses include underwriting, insurance, private equity, leasing, asset management, etc. In our sample, a MBHC on average has 8.67 subsidiaries, 4 of which are commercial banks, representing 98% of total assets. Bank holding companies are governed by the Bank Holding Company Act of 1956 (BHCA), which restricts the extent to which BHCs or their subsidiaries can engage in non-banking activities. BHCs are required to maintain regulatory capital minimums and to provide financial assistance when their banking subsidiaries are in distress. After the passage of Gramm-Leach-Bliley Act in 1999, large BHCs are also registered as a financial holding company co-governed by the SEC and Federal Reserve, under which BHCs can further broaden their non-banking businesses.

Commercial banks in the U.S. can choose between a national and state charter. While national chartered banks are supervised by the Office of the Comptroller of the Currency (OCC) and state member banks are regulated by the Federal Reserve, state non-member banks are jointly supervised by the banking authority of their home state and Federal Deposit Insurance Corporation (FDIC). Broker-dealer subsidiaries of a financial holding company are regulated by

the SEC, whereas the insurance subsidiaries are supervised by state insurance regulators. While banking subsidiaries can raise insured deposits and borrow at the Federal Reserve's discount window, they are subject to separate regulatory capital requirements just like BHCs. In addition, while BHCs are allowed to engage in non-banking activities, these activities cannot take place in BHCs' commercial banks or their subsidiaries.

2.2.2 Reporting and Audit Requirements

Both publicly traded and privately held BHCs are required to file FR Y-9C: Consolidated Report of Condition and Income (Y-9C) with the Federal Reserve on a quarterly basis if their total assets exceed a specific threshold. The threshold was originally $150 million when the Y-9C requirement was enacted in 1986 but was subsequently increased to $500 million in 2006 and finally to the current $1 billion threshold in 2015. Y-9C reports include balance sheet and income statement data similar to 10K and 10Q filings with the SEC, but also include important information related to several aspects, including regulatory capital adequacy, securitization activities, off-balance sheet exposure, and loan loss indicators (e.g., charge offs and non-accrual loans) (Avraham et al., 2012). Similar to BHCs, each domestic commercial bank, regardless of whether they are affiliated with a BHC and independent of their size, are required to the Report of Condition and Income (i.e., Call Reports) on a quarterly basis with their respective regulators.[6] Call reports and Y-9Cs are very similar in their content, although call reports provide more detailed breakdowns of core banking activities while Y-9Cs include information about broader financial activities.[7]

[6] Specifically, banks file the FFIEC 031 form if the bank has both foreign and domestic offices or the FFIEC 041 if the bank does not have foreign offices.

[7] Large (small) foreign *bank and nonbank* subsidiaries need to file FR 2314 (FR 2314S) on a quarterly (annual) basis. Large (small) domestic nonbank subsidiaries in BHCs also need to provide FR Y-11 (FR Y-11S) on a quarterly (annual) basis to disclose their financial condition and performance.

Although all publicly-traded banks are required to receive an independent audit of the financial statements, privately-held banks have different requirements. The primary regulation outlining audits of private banks is the Federal Deposit Insurance Corporation Improvement Act of 1991 (FDICIA), which requires an audit if the bank exceeds $500 million in total assets. Moreover, FDICIA requires management at banks with total assets of at least $500 million to provide a report on internal control effectiveness and to receive attestation by an audit firm on this report. This threshold was increased to $1 billion in 2005. For banks that are part of a BHC, these audit and internal control report requirements can be met at the holding company level. For fiscal years beginning after June 15, 2010, the assets of the subsidiary bank(s) must comprise at least 75% of the holding company's assets to waive the audit and internal control requirements at the subsidiary level.

In this study, we take advantage of the fact that bank subsidiaries in BHCs, unlike in non-financial conglomerates, are also required to provide detailed financial information that can be used by MBHC managers in capital allocation and by shareholders to monitor MBHC managers' capital allocation decisions. In addition, we also exploit the disclosure of capital flow from and to the subsidiaries to better measure internal capital efficiency. Moreover, in supplemental analyses, we use variation in the audit status at subsidiary banks as an alternative measure of accounting quality.

3. Hypothesis Development

Based on Stein (1997) and Scharfstein and Stein (2000), information asymmetry between division and parent managers and associated agency problems give rise to inefficiency of internal capital allocation that may explain the valuation discounts in multi-segment firms. We argue that in the bank setting, subsidiary banks' accounting information contained in the call reports can assist MBHC managers to better evaluate whether the subsidiary has strong growth opportunities

and whether the subsidiary is operated efficiently. This is particularly true in large organizations as the MBHC manager generally cannot directly monitor the subsidiary manager and therefore, will need to rely on "hard" information that is easier to transfer and verify. As a result, if subsidiaries' accounting information is of high quality that is more reflective of the underlying performance and financial condition, MBHCs can better use accounting information to allocate resources from divisions with weaker opportunities to ones with better opportunities and operation efficiency. Based on these arguments, our first hypothesis is stated as follows.

H1: MBHCs with greater subsidiary accounting quality have higher internal capital market efficiency.

Our next hypothesis explores the mechanism through which we expect accounting information to influence internal capital market efficiency. Specifically, we argue that when information asymmetry between MBHC managers and division managers is greater, the effect of subsidiary accounting on MBHC internal capital efficiency is more important. We expect information asymmetry to be greater when the MBHCs are larger, have more subsidiaries, and when the subsidiaries are more distant from the BHC headquarters. In these instances, it is difficult for the MBHC manager to directly assess subsidiary manager performance or rely on soft information given the size, complexity or geographical location of the various subsidiaries. Thus, the use of hard accounting information becomes more important in monitoring subsidiary managers and transferring information within the organization. Based on these arguments, our second hypothesis is the following:

H2: The effect of subsidiary accounting quality on MBHC internal capital market efficiency is more pronounced when the potential information asymmetries between the BHC and its subsidiaries are greater (i.e., when the BHC is larger, is more distant from its subsidiaries or has more subsidiaries).

External stakeholders can also use accounting information disclosed by subsidiary banks to discipline MBHC managers' internal capital allocation and to prompt MBHC managers to use subsidiary accounting information to improve internal capital allocation. That is, accounting information at the subsidiary level also mitigates information asymmetry between MBHC managers and external shareholders, further mitigating the potential inefficiency in internal capital allocation. Based on this, we argue that the effect of subsidiary accounting quality on BHC internal capital allocation efficiency should be greater for publicly traded MBHCs that also tend to have greater information asymmetry than private MBHCs.

H3: The impact of subsidiary accounting quality on MBHC internal capital market efficiency is more pronounced for publicly traded MBHCs than privately held MBHCs.

4. Research Design

4.1 Data and Sample Selection

We obtain quarterly financial statements from call reports for (subsidiary) banks and from Y-9C reports for BHCs. We use the data item RSSD9364 in call reports to link each bank subsidiary to its parent BHC. Only multi-bank BHCs (MBHCs) are included in our analyses because our interest is capital transfers among bank subsidiaries within a BHC. Our primary sample period is from 1996 to 2016.[8] To address the possibility that our analyses may be affected by mergers and acquisitions, we exclude all observations with total assets growth greater than 50% in any quarter. We also require an MBHC to have at least two years' non-missing data to ensure that our results are not driven by the change in sample composition. After imposing these data restrictions, our final sample consists of 23,987 BHC-quarter observations, representing 776 MBHCs.

[8] Our sample starts in 1996 because 1996 is the first year that the Y-9C template is available on the Fed website and we need this information to accurately identify the BHC variables required for our analysis.

4.2 Model specifications

To test H1, we estimate model (1) below to examine the relation between subsidiary bank financial reporting quality and BHC internal capital market efficiency.

$$\begin{aligned} CapEff = \quad & \beta_0+\beta_1 TranspBankSub+\beta_2 BHCSize+\beta_3 LevCap+\beta_4 EBP \\ & +\beta_5 LoanToAssets+\beta_6 AssetsGrowth+\beta_7 HHI+\beta_8 LogNumSubs \\ & +\beta_9 TranspBHC+ BHC\ Fixed\ Effects + Quarter\ Fixed\ Effects+ \varepsilon \end{aligned} \quad (1)$$

The dependent variable *CapEff* is measured as the extent to which the internal capital flows from weakly performing segments to better performing ones, to capture BHC internal capital market efficiency. Our approach is adapted from Billett and Mauer's (2003) approach in measuring internal capital market efficiency for nonfinancial conglomerates and involves four steps.

First, we compute the capital injection each bank receives from its holding company based on Holod and Peek's (2010) approach, constructed as the sum of proceeds from the sale of capital to and acquisition of capital from the parent BHC, and other transactions with the parent BHC less dividends paid to the parent holding company.[9] If the capital injection is positive, it is considered a "subsidy", otherwise it is considered a "transfer-out." Second, a "subsidy" is considered efficient (inefficient) if the subsidy receiving subsidiary has better (worse) expected performance than other banks that its parent holds. We measure a bank's expected performance using the actual next quarter earnings before provisions (*EBP*).[10] Similarly, a "transfer-out" is

[9] We use call report data items (RIAD4346+RIAD4415-RIAD4470-RIAD4460) before 2001 and (RIADB509 +RIADB510+RIAD4415-RIAD4470-RIAD4460) from 2001 onwards. The account numbers in call reports refer to the following items: RIAD4346 is sale, conversion, acquisition or retirement of capital stock (net); RIAD4415 is other transactions with parent holding company; RIAD4470 refers to cash dividends declared on preferred stock; RIAD4460 refers to cash dividends declared on common stock; RIADB509 refers to sale, conversion, acquisition or retirement of capital stock (net, excluding treasury stock transactions); and RIADB510 refers to treasury stock transactions. We use different items for the period before 2001 and the period after because of the change in the data items in call reports.

[10] We use one-quarter ahead earnings before provision as our expected return calculations instead of earnings because the loan loss provision contains significant managerial discretion, particularly compared to other accounts (Beatty and Liao, 2014).

considered efficient (inefficient) if the subsidiary bank transferring capital out has worse (better) expected performance than other banks that its parent holds.

Third, for each bank, we measure the value of internal market allocation by considering the four components below: (i) the value of efficient subsidy, calculated as (expected EBP of subsidy subsidiaries – average expected EBP of other subsidiaries held by the same BHC)× the percentage of equity held by BHC;[11] (ii) the value of efficient transfer-out, calculated as (average expected EBP of other subsidiaries held by the same BHC – expected EBP of transfer-out subsidiaries) × the percentage of equity held by BHC; (iii) the value of inefficient subsidy, calculated as (expected EBP of subsidy subsidiaries – average expected EBP of other subsidiaries held by the same BHC) × the percentage of equity held by BHC ; and (iv) the value of inefficient transfer-out, calculated as (average expected EBP of other subsidiaries held by the same BHC – expected EBP of transfer-out subsidiaries) × the percentage of equity held by BHC. The value of internal market allocation at the *bank subsidiary* level=(i)+(ii)-(iii)-(iv). Fourth, we aggregate the value of internal market allocation to the *BHC* level.

The variable of interest in model (1), *TranspBankSub*, is equal to one if the MBHC's average provision quality of each subsidiary for the past four quarters is above the sample median and zero otherwise. We use discretion of loan loss provision to capture the overall accounting quality based on Beatty and Liao's (2014) discussion of how the loan loss provision is the most significant accrual for banks and is an important indicator of credit quality. We measure provision quality for each subsidiary bank by estimating the following model, following Beatty and Liao (2014):

[11] We use RSSD9364 in Call Reports to identify a bank's holding company and RSSD9365 to identify the percentage of equity held by BHC.

$$LLP_t = \beta_0+\beta_1\Delta NPL_{t+1}+\beta_2\Delta NPL_t+\beta_3\Delta NPL_{t-1}+\beta_4\Delta NPL_{t-2}+\beta_5 BHCSize_t +\beta_6\Delta LoanToAssets_t+\beta_7 ALW_{t-1}+\beta_8 CO_t+\varepsilon \quad (2)$$

We argue that innate provision depends on current, lagged and one-quarter ahead non-performing loans (Δ*NPL*), BHC bank size (*BHCSize*), change in proportion of loans to total assets (Δ*LoanToAssets*), lagged total loan loss allowance (*ALW*) and concurrent charge-offs (*CO*). Absolute values of residuals from this estimation capture banks' discretionary loan loss provisions for a given quarter, and we multiply discretionary loan loss provisions with -1 so that a higher value represent a higher quality. Based on the analysis in Beatty and Liao (2014), larger absolute values of discretionary loan loss provisions of the above model are associated with future restatements and comment letters related to the provision. Thus, we argue that lower discretion likely better reflects the underlying performance of the bank.

In model (1), we also control for BHC characteristics such as leverage capital ratio (*LevCap*), earnings before provisions (*EBP*), loan to assets ratio (*LoanToAssets*), asset growth (*AssetGrowth*), BHC geographic diversification (HHI), the log value of the number of bank subsidiaries (*LogNumSubs*). To ensure we are capturing the effect of subsidiary banks' accounting quality but not the accounting quality at the BHC level, we control for *TranspBHC* equal to one if provision quality measured at the BHC level in the past four quarters is above the sample median and zero otherwise. We further include BHC fixed effects and year fixed effects to control for the unobserved heterogeneity across BHCs and time. Appendix A provides variable definitions.

To test H2 and H3, which examine cross-sectional differences in either internal information asymmetry (i.e., between the CEO and subsidiary managers) or external information asymmetry (i.e., between the CEO and shareholders), we estimate the following model:

$$CapEff = \beta_0 + \beta_1 TranspBankSub + \beta_2 InfoAsym + \beta_3 Public + \beta_4 TransBankSub * InfoAsym + \beta_5 TransBankSub * Public + \beta_6 BHCSize + \beta_7 LevCap + \beta_8 EBP + \beta_9 LoanToAssets + \beta_{10} AssetsGrowth + \beta_{11} HHI + \beta_{12} LogNumSubs + \beta_{13} TranspBHC + BHC\ Fixed\ Effects + Quarter\ Fixed\ Effects + \varepsilon \quad (3)$$

In model (3), we interact *TranspBankSub* with *InfoAsym* to investigate whether the impact of subsidiary accounting quality on BHC internal capital market efficiency is more pronounced when the potential information problems between the BHC and its subsidiaries are greater. In particular, we interact *TransBankSub* with *Large*, *Distant*, and *MoreSubs*. *Large* is an indicator variable equal to one if the BHC size is above the sample median and zero otherwise. *Distant* is an indicator variable equal to one if the median distance between a BHC and its bank subsidiaries is above the sample median and zero otherwise. *MoreSubs* is an indicator variable equal to one if the number of bank subsidiaries a BHC owns is above the sample median and zero otherwise. We expect the coefficients on the interacted terms with each of these three variables to be positive based on H2. In model (3), we also interact *TransBankSub* with an indicator variable *Public* that is equal to one if the MBHC is publicly traded, and zero otherwise. Based on H3, we expect the coefficient on *TransBankSub*×*Public* to be positive.

5. Results

5.1 Descriptive Statistics

We find that the average internal capital efficiency (*CapEff*) is negative in Table 1, which suggests that bank internal capital markets tend to be inefficient on average, consistent with prior evidence (e.g., Rajan et al., 2000; Billett and Mauer, 2003; D'Mello et al., 2017). Our sample MBHCs on average have 4 bank subsidiaries. In Table 2, we find that, consistent with H1, internal capital efficiency and the bank accounting quality at the subsidiary level are positively correlated, although more accurate inference should be made using multi-variate analyses. Not

surprisingly, we find that accounting quality at the BHC level is positively correlated with that measured at the subsidiary level (44%).

5.2. Main Analyses

Table 3 shows that BHC internal capital market efficiency is positively associated with subsidiary accounting transparency. Column (1) presents results of estimating equation (1), which examines the effect of subsidiary accounting quality on internal capital market efficiency. We document a positive coefficient on *TranspBankSub,* which is significant at the 5% level. This suggests that higher quality accounting information allows more efficient capital allocation within the BHC organization. Given that accounting quality of the BHC and subsidiaries is positively correlated, as shown in Table 2, we examine the association between internal capital efficiency and BHC accounting quality in column (2). We do not find a significant coefficient on BHC accounting quality, suggesting that BHC accounting quality does not drive the capital allocation among subsidiaries. For completeness, in column (3), we control for BHC accounting quality in additional to including subsidiary accounting quality. We continue to find a positive and significant coefficient on *TranspBankSub*. In addition, the coefficient does not change after we control for BHC accounting quality, suggesting we indeed capture the effect of subsidiary banks' accounting quality on internal capital allocation among subsidiaries.

After establishing a positive association between subsidiary accounting quality and internal capital market efficiency on average, we next examine cross-sectional differences in information asymmetry. As previously discussed, we argue that the primary mechanism through which subsidiary accounting quality likely affects internal capital market efficiency is by mitigating information asymmetry. As such, our second hypothesis predicts that the effect of subsidiary accounting quality on internal capital market efficiency is more pronounced when

internal information asymmetry (i.e., between the MBHC manager and subsidiary managers) is greater. Table 4 presents results of estimating equation (3) with interactions between *TranspBankSub* and each of the three information asymmetry measures. The positive and significant interactions across all columns illustrate that the positive effect of subsidiary accounting quality on internal capital market efficiency is greater when the MBHC is larger (column 1), is more distant from its subsidiaries (column 2), or has more subsidiaries, relative to the sample median (column 3). These findings suggest that when the MBHC manager can directly observe and supervise subsidiary operation or rely on soft information to monitor subsidiary management, subsidiary banks' accounting quality becomes less relevant. Thus, when the information asymmetry is greater, accounting information becomes useful for the MBHC manager to make capital allocation decisions.

Our third hypothesis also examines cross-sectional differences in information asymmetry but focuses on whether the positive association between subsidiary accounting quality and internal capital market efficiency differs when external information asymmetry (i.e., between the MBHC manager and shareholders) is greater. Table 4 shows that the effect of subsidiary banks' provision quality on internal capital allocation is more pronounced for publicly traded BHCs than privately held ones as the coefficient on *Public*×*TransBankSub* is positive and significant in two of the three columns. This finding is consistent with the notion that information asymmetry between MBHC managers and external shareholders also contributes to the internal capital inefficiency.

5.2 Financial Constraints

In this section, we examine whether subsidiary accounting quality can mitigate the effect of financial constraints faced by subsidiary banks on loan growth as this is one important benefit

of efficient internal capital markets. We estimate the following model at the subsidiary bank level to shed light on this prediction.

$$\begin{aligned} LoanGrowth = {} & \beta_0 + \beta_1 Capr1 + \beta_2 BMIndex + \beta_3 TranspBankSub + \beta_4\, Capr1 \times TranspBankSub \\ & + \beta_5 BMIndex \times Capr1 + \beta_6 BMIndex \times TranspBankSub \\ & + \beta_7\, Capr1 \times BMIndex \times TranspBankSub + \beta_8 Size + Bank\ Fixed\ Effects + \\ & Quarter\ Fixed\ Effects + \varepsilon \end{aligned} \quad (4)$$

Based on prior research (e.g., Houston et al., 1997) suggesting that banks with limited internal funds, especially when facing a binding capital requirement, may be forced to curtail loan growth, we expect the relation between loan growth (*LoanGrowth*) and a bank's Tier 1 capital ratio (*Capr1*) to be positive. The positive coefficient on *Capr1* in column (1) of Table 5 is consistent with this notion. Further, Campello (2002) finds that the positive relation between bank lending and regulatory capital is stronger when the Fed tightens monetary policy. The negative coefficient on *BMIndex*× *Capr1* in column (2), where a higher *BMIndex* indicates a more expansionary monetary policy, is consistent with their finding.

After confirming that our baseline analyses are consistent with prior research, we examine whether subsidiary accounting quality mitigates the effect of credit constraints faced by bank subsidiaries on loan growth in monetary tightening periods. We predict and find a negative coefficient on *Capr1*×*TranspBankSub* and a positive coefficient on *Capr1*×*BMIndex*×*TranspBankSub*. These findings suggest that subsidiary accounting quality has a potential to mitigate the financial constraints faced by subsidiary banks through internal capital markets.[12]

[12] In an untabulated analysis, we replace subsidiary accounting quality with internal capital market efficiency, *CapEff* in model (4). We find a negative coefficient on *Capr1*× *CapEff* and a positive coefficient on *Capr1*×*BMIndex*×*CapEff*, consistent with our expectation that internal capital markets have a potential to mitigate financial constraints.

5.3 Excessive Value

Prior literature (e.g., Berger and Ofek, 1995) has used excessive value measured as the difference between the actual and imputed value of the conglomerate to capture the diversification discount that may be caused by inefficiency of internal capital allocation. In this section, we use the excessive value to indirectly capture internal capital (in)efficiency, although we believe that our efficiency measure is superior due to the observable cash flow among subsidiaries. Using a sample of public MBHCs, we examine whether subsidiary accounting quality increases excessive value. The first excessive value measure is based on geographic diversification (*ExcessVal*1) while the second measure is based on loan portfolio diversification (*ExcessVal*2). The first measure is calculated based on the following steps. First, we compute the implied asset multiplier by state using the average of all public one-bank BHCs in each state: (market capitalization + preferred stock+ total liabilities) / total assets.[13] Second, we use this implied multiplier to get imputed market value for each subsidiary bank based on its location. Third, we then aggregate the imputed market value at the BHC level. Finally, *ExcessVal*1 is measured as the natural log of the ratio of actual market value over imputed market value for the BHC.[14]

The second measure is calculated based on the following steps. We first regress Tobin's Q on three loan types (real estate loans, consumer loans, and commercial and industrial loans) for all public one-bank BHCs and then use the coefficients to estimate the imputed market value for each bank based on its loan types before aggregating them at the BHC level. We then calculate *ExcessVal2* as the natural log of the actual market value over imputed market value for

[13] We use Y9C items BHCK3283 for preferred stock, BHCK2948 for total liabilities, and BHCK 2170 for total assets.

[14] If a state does not have any one-bank BHCs, we use the median implied asset multiplier of its neighboring states as its implied asset multiplier.

the BHC. Similar to the main analysis, we expect these two excessive values to be positively correlated with subsidiary accounting quality.

Column (1) of Table 6 shows that the positive association between MBHC internal capital market efficiency (*CapEff*), our primary measure of internal capital efficiency, and subsidiary accounting quality continues to hold in this subsample. Column (2) shows that MBHCs with more transparent accounting information from subsidiaries have greater excess values capturing lower geographical diversification discounts and higher internal capital efficiency. This finding also suggests that subsidiary accounting information has an important market valuation implication in multi-segment banks. Finally, we find that MBHCs with higher subsidiary provision quality tend to have higher product-based excessive values in column (3), further bolstering our inferences.

5.4 Supplemental Analyses

5.4.1 Bank Subsidiary Audits as Alternative Accounting Quality Variable

As an alternative accounting quality measure, we use the percentage of audited bank subsidiaries in an MBHC as a proxy for bank subsidiary accounting quality and re-examine the effect of subsidiary accounting quality on BHC internal capital market efficiency. In Table 7, we find that MBHC internal capital market efficiency increases with the percentage of banks being audited. This finding further bolsters our inference that subsidiary accounting quality increases internal capital market efficiency and that our results are not driven by the use of discretionary loan loss provisions as the measure of accounting quality.[15]

[15]In a robustness check, we examine whether internal capital efficiency increases when the proportion of audited subsidiaries increases in a difference-in-differences design. We construct the treatment sample by identifying MBHCs that experience an increase in the percentage of bank subsidiaries being audited. For each MBHC in the treatment sample, we then choose another MBHC with the closet size in total assets that does not experience an increase in the percentage of audited subsidiaries as our control sample. We continue to find that an increase in audited subsidiaries leads to an improvement in internal capital efficiency.

5.4.2 IV Estimation

One concern is that internal capital market efficiency and subsidiary accounting quality or audits are endogenously chosen, such that our results may be driven by either correlated omitted variables or reverse causality. To address this concern, we modify the Minnis (2011) approach by using state level audit as an instrument, i.e., the percentage of banks being audited in the state, to predict the percentage of subsidiary banks being audited based on the location of the subsidiary banks. One concern of using this proportion of audited banks in the state as the instrument is that it may be correlated with state-level characteristics that also influence MBHC internal market efficiency. To address this concern, following Minnis (2011), we use the portion of state audit level orthogonal to observable state-level regulatory and economic factors as our instrument.

Specifically, similar to Minnis (2011), we argue that state assets, interstate branching restrictiveness index, coincident index, litigation rank, net interest margin, and the number of banking institutions may be correlated with MHBC internal market efficiency. Accordingly, we regress the percentage of banks being audited in a state on these state level variables and then calculate the residual to capture the orthogonal portion of this instrument, which we refer to as the state audit residual. This analysis is tabulated in Appendix B. Because each MBHC may operate in multiple states, we use the location of the subsidiary banks and the corresponding state audit residual to further calculate the weighted average of the state audit residual within each MBHC based on subsidiary total assets (i.e., *StateAudRes*). *StateAudRes* is then used as our IV in the two-stage model to predict the proportion of subsidiary banks being audited in an MBHC.

In Panel A of Table 8, we find that the percentage of audit in an MBHC's subsidiaries increases with the IV, *StateAudRes*, suggesting that the proportion of subsidiary being audited in

an MBHC depends on the location of the subsidiary. Panel B of Table 8, the second stage model, further indicates a positive association between the instrumented subsidiary audit and internal capital market efficiency. Although we cannot definitively rule out endogeneity concerns, the results of this tests suggest that our results are not completely driven by endogeneity.[16]

5.4.3 Regulatory Enforcements

Based on Costello et al. (2017) and Nicoletti (2018), state regulators' differential enforcements may affect state banks' accounting quality. To ensure that our results are not driven by state regulators, we take advantage of the state regulatory leniency index provided by Agarwal et al. (2014). Specifically, this measure takes advantage of the fact that state banks are examined on an alternating basis by their federal regulator and state regulator. Thus, larger values of *Strictness* correspond to states for which the state regulator is relatively stricter. Because this measure is only valid for state banks, we restrict the sample to MBHCs that do not have national banks as subsidiaries.[17] The results are presented in Table 9 and show that the interaction between *Strictness* and *TranspBankSub* is positive and significant, indicating that the positive effect of subsidiary accounting quality on internal capital market efficiency is stronger when state regulators are relatively stricter. However, we also find that the coefficient on *TranspBankSub* remains positive and significant. Thus, even though regulatory enforcement also affects internal capital market efficiency, we document that our main results continue to hold for

[16] An instrumental variable has two requirements. The first is relevance, which requires that the instrument is sufficiently correlated with the potentially endogenous variable. The instrument does not suffer from the weak instrument problem as the F-stat 56.46 is higher than the cut-off of 8.96 (Larcker and Rusticus, 2010). The second requirement is the exclusion restriction and is fundamentally untestable. However, we argue that the extent of accounting establishments in a state should not directly affect internal capital market efficiency at the bank level.

[17] In this subsample, we exclude MBHCs with national banks because the leniency measure only applies to states with dual regulators (both state and federal regulators) but not national banks whose sole regulator is OCC. In a robustness check, we include all MBHCs and allow the effect on accounting quality to vary with state leniency, and we continue to find similar results (untabulated).

MBHCs with only state banks that are located in states with more lenient regulators. This indicates that our results are unlikely to be completely driven by regulatory enforcement.

5.5 Robustness Checks

In our main tests, we only capture the capital allocation efficiency within banks without considering the capital flow between banks and nonbank subsidiaries in a MBHC as documented in Pogach and Unal (2017). To address this possibility, in a robustness check, we only include MBHCs with aggregate bank assets (from call reports) greater than 90% of total BHC assets (reported in Y-9C), and our inferences remain the same.

6. Conclusion

Taking advantage of the regulatory reporting requirement of both BHCs and subsidiary commercial banks, this study examines whether subsidiary bank accounting quality, measured using discretionary provisions, affects internal capital market efficiency. We find that subsidiary banks' accounting quality increases internal capital efficiency in a MBHC. In addition, we find that this relation is most pronounced for larger BHCs, and BHCs with more subsidiaries and subsidiaries that are distant from the BHC headquarter, consistent with subsidiary accounting quality addressing information problems between the MBHC managers and subsidiary managers. We also find that the effect of accounting quality is more pronounced for publicly traded MBHCs than privately held ones. These findings suggest that BHC managers may use accounting information provided by the subsidiaries for their capital allocation decisions, and in particular for BHCs with more information asymmetry between BHCs and subsidiaries and between BHCs and external shareholders.

We further show that greater subsidiary accounting quality reduces the diversification discount and financial constraints during times of tightening monetary policy. Moreover, we perform numerous sensitivity tests. Specifically, our findings hold using an alternative measure

of subsidiary accounting quality, an instrumental variable approach, and controlling for differences in regulatory strictness.

This study contributes to the literature in the following ways. First, while prior research documents the effect of accounting information in addressing information problems between insiders and external capital providers, few studies examine the usefulness of accounting information in mitigating internal information problems and in internal capital decisions. This is perhaps driven by the lack of subsidiary accounting data in a non-financial conglomerate. Second, while it is well documented that firms or banks face diversification discounts perhaps due to internal capital inefficiency, few studies have focused on the importance of accounting information in this phenomenon. One important caveat of our study, though, is that the inference of our study may not be extended to non-financial setting as there exists several important institutional differences between banks and non-financial firms. Nonetheless, we argue that our setting provides a powerful setting to examine the effects of accounting information within an organization.

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Appendix A Variable Definitions

Variable	Definition
ALW	Loan loss allowance, calculated as (BHCK3123/BHCK2122) or (RCFD3123/RCFD2122) for BHCs and for banks, respectively (Y9C or Call Reports).
AssetsGrowth	Assets growth, calculated as (BHCK2170/BHCK2170$_{t-1}$-1) (Y9C).
BankCapr1	Bank Tier One capital Ratio, calculated as ((RCFD8274-RCFDC228)/(RDFDA223-RDFDB504)) (Call Reports).
BankDeposits	Bank deposits, calculated as (RCFD2200/RCFD2170) (Call Reports).
Banking Inst	The log number of the number of banking institutions in the state per the FDIC. We obtain the data from the FDIC website: https://www5.fdic.gov/hsob/SelectRpt.asp?EntryTyp=10&Header=1.
BankSize	Log value of total assets at the beginning of the quarter (RCFD2170 $_{t-1}$) (Call Reports).
BHCCapEffD	An indicator variable equal to one if a BHC's internal capital efficiency is above the quarter median and zero otherwise (Call Reports).
BHCSize	Log value of total assets at the beginning of the quarter (BHCK2170 $_{t-1}$) (Y9C).
BM Index	We the Boschen-Mills (BM) Index proposed by Boschen and Mills (1995) to measure monetary policy, and a period is considered contractionary if the BM index is negative. We obtain the BM index from 1996 to 2007Q2 from the website of Charles L. Weise at: http://www.gettysburg.edu/academics/economics/char_weisehomepage/charles_weise.dot and Lo (2015). We read the Federal Open Market Committee (FOMC) meeting minutes and use the procedures described in Boschen and Mills (1995) to update the index through 2016.
BRI	The Branching Restrictiveness Index is the number of restrictions on interstate branching for each state from Rice and Strahan (2010). The restrictiveness index is set to one for the most open states, and one is added to the index when a state imposes any of the following four anticompetitive obstacles to interstate branching: if a state imposes a minimum age of 3 or more years on target institutions of interstate acquirers, if a state does not permit de novo interstate branching, if a state does not permit the acquisition of individual branches by an out-of-state bank, and if a state imposes a deposit cap less than 30%. The Dodd-Frank Act of 2010 (section 613) removed any remaining restrictions, and following , Biswas et al. (2017), we set BRI to 0 for all states.
CapEff	Internal capital market efficiency for BHCs. Please see Section 3.2 for detailed procedures (Call Reports).
CO	Net charge-offs, calculated as (BHCK4635-BHCK4605) or (RIAD4635-RIAD4605) for BHCs and for banks, respectively (Y9C or Call Reports).
CoincidentIndex	The coincident index combines four state-level indicators to summarize current economic conditions in a single statistic: nonfarm payroll employment, average hours worked in manufacturing, the unemployment rate, and wage and salary disbursements deflated by the consumer price index (U.S. city average). See the website of Federal Reserve Bank of Philadelphia for more details. https://www.philadelphiafed.org/research-and-data/regional-economy/indexes/coincident/.

EBP	Earnings before provisions, calculated as ((BHCK4301+BHCK4230 +BHCK4243)/BHCK2170$_{t-1}$) (Y9C).
ExcessVal1	The first diversification discount measure based on geographic diversification. It is calculated as following: (i) We compute the implied asset multiplier by state using the average of all public one-bank BHCs in each state: (market capitalization+BHCK3283+BHCKk2948)/BHCK2170; (ii) We then use this implied multiplier to get imputed market value for each bank based on the state it is in. (iii) We then aggregate the imputed market value at the BHC level. (iv) *ExcessVal1*=Log(actual market value)/imputed market value)) for the BHC (CRSP, Y9C, and Call reports).
ExcessVal2	The second diversification discount measure based on loan portfolio diversification. It is calculated as following: (i) We regress Tobin's Q on three loan types (real estate loans, consumer loans, and commercial and industrial loans for public one-bank BHCs and then use the coefficients to estimate the imputed Q for each BHC based on its loan types; (ii) *ExcessVal2*=log(actual market value)/imputed market value)) for the BHC (CRSP, Y9C, and Call reports).
HHI	Herfindal Index of assets concentration, calculated as the sum of squared share of assets held in different states by the parent BHC (Call Reports).
Large	An indicator variable equal to one if the BHC size is above the median and zero otherwise (Y9C).
LevCap	Leverage capital ratio, calculated as (BHCK3210/BHCK2170) (Y9C).
LitRank	Each year, the U.S. Chamber of Commerce Institute for Legal Reform ranks the legal climate of each state on a variety of categories For instance, this is the rank for 2012: https://www.uschamber.com/sites/default/files/legacy/reports/lr_FinalWeb_PDF.pdf. We collect the data from 2002 to 2017 and fill in missing years using interpolation.
LLP	Loan loss provisions ((BHCK4230+BHCK4243)/BHCK2170$_{t-1}$ or (RIAD4230/RCFD2122 $_{t-1}$) for BHCs and for banks, respectively (Y9C or Call Reports). (Y9C or Call Reports).
LoanGrowth	Loan growth, calculated as (RCFD2122/ RCFD2122$_{t-1}$) (Call Reports) (Call Reports).
LoanToAssets	Loan to assets ratio, calculated as (BHCK2122/BHCK2170) (Y9C).
LogNumSubs	Log value of the number of bank subsidiaries held by the same BHC (Call Reports).
MoreSubs	An indicator variable equal to one if the number of bank subsidiaries a BHC has is above the median and zero otherwise (Call Reports).
NetInterestMargin	The median ratio of net interest income divided by total loans for each state-year (Call Reports).
NPL	Non-performing loans, calculated as (BHCK5525+BHCK5526)/BHCK2122 and (RCFD1403+RCFD1407)/RCFD2122 for BHCs and for banks, respectively (Y9C or Call Reports). (Y9C or Call Reports).
PostAudInc	An indicator variable equal to one after the percentage of banks being audited increases. We use RCFD6724 in Call Reports to identify whether a bank is audited (Call Reports).
Public	An indicator variable equal to one if the BHC is public and zero otherwise.
StateAssets	Log value of total assets of all commercial banks for each state-year (Call Reports).
StateAud	A state-year level variable calculated as the number of banks that receive audits divided by the total number of banks within that state. Following Minnis (2011), we

	calculate the value of this variable prior to eliminating observations with insufficient financial data for the main analyses.
StateAudRes	Following Minnis (2011), we first calculate the residual of the regression in Appendix B (excluding *StateAcctEstab*). Next, we calculate the weighted average of the state residuals for each BHC according to its bank subsidiary locations. We then use this weighted average variable as an instrument.
Strictness	The opposite of the leniency index provided by Agarwal et al. (2014). For each BHC, we use the average strictness index weighted by bank assets based on the state that the bank is located in (Call Reports, Agarwal et al. (2014)).
TranspBankSub	An indicator variable equal to one if the average financial reporting quality at bank subsidiaries for the past four quarters is above the median and zero otherwise. We measure financial reporting quality for banks following Beatty and Liao (2014) (Call Reports).
TranspBHC	An indicator variable equal to one if the average financial reporting quality of the BHC for the past four quarters is above the median and zero otherwise. We measure financial reporting quality for BHCs following Beatty and Liao (2014) (Y9C).

Appendix B State Level Audit Prediction

	(1)
Dependent Variable =	*StateAudit*
StateAssets	0.0175***
	(0.000)
BRI	-0.0079*
	(0.058)
CoincidentIndex	0.0007***
	(0.002)
LitRank	0.0039***
	(0.000)
NetInterestMargin	-0.6648
	(0.436)
BankingInst	-0.0828***
	(0.000)
Constant	0.3303***
	(0.001)
Observations	750
Adjusted R-squared	0.340

This table presents the results of an OLS regression of the instrumental variable, *StateAudit*, on various state level economic and characteristic variables. The unit of analysis is state-year. Data for the District of Columbia is not available for all variables and we only have the data from 2002 for state litigation rank. P-values are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, 10% levels, respectively (two-tailed tests). Definitions of independent variables are provided in Appendix A.

Table 1: Descriptive Statistics

Variable	N	Mean	p25	Median	p75	sd
CapEff	23,987	-0.001	-0.002	0.000	0.000	0.005
TranspBankSub	23,987	0.499	0.000	0.000	1.000	0.500
TranspBHC	23,987	0.499	0.000	0.000	1.000	0.500
BHCSize	23,987	14.075	12.763	13.579	14.850	1.760
LevCap	23,987	0.093	0.076	0.090	0.106	0.028
EBP	23,987	0.008	0.004	0.008	0.012	0.005
AssetsGrowth	23,987	0.645	0.583	0.666	0.730	0.128
LoanToAssets	23,987	0.022	-0.002	0.015	0.036	0.046
HHI	23,987	0.889	0.816	1.000	1.000	0.180
LogNumSubs	23,987	5.008	3.000	4.000	5.000	4.139
Large	23,987	0.500	0.000	0.000	1.000	0.500
Distant	23,987	0.499	0.000	0.000	1.000	0.500
MoreSubs	23,987	0.540	0.000	1.000	1.000	0.498

This table contains summary statistics for the variables used in the main analyses. The analyses are at the BHC-quarter level. The sample period is 1996 to 2016. The number of observations for diversification discount is smaller because this variable is only available for public BHCs.

Table 2: Pearson Correlations

		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1)	*CapEff*									
(2)	*TranspBankSub*	0.03 0.00								
(3)	*TranspBHC*	0.01 0.08	0.44 0.00							
(4)	*BHCSize*	0.01 0.13	-0.11 0.00	0.06 0.00						
(5)	*LevCap*	0.03 0.00	0.00 0.72	-0.02 0.00	0.02 0.01					
(6)	*EBP*	-0.01 0.07	-0.01 0.32	0.00 0.70	0.10 0.00	0.25 0.00				
(7)	*LoanToAssets*	-0.06 0.00	0.07 0.00	0.05 0.00	-0.10 0.00	-0.21 0.00	0.02 0.00			
(8)	*AssetsGrowth*	-0.02 0.00	0.03 0.00	0.01 0.10	-0.03 0.00	-0.10 0.00	0.11 0.00	0.02 0.00		
(9)	*HHI*	0.07 0.00	0.11 0.00	-0.02 0.01	-0.30 0.00	0.03 0.00	-0.02 0.00	-0.03 0.00	-0.03 0.00	
(10)	*LogNumSubs*	-0.12 0.00	-0.07 0.00	0.06 0.00	0.33 0.00	-0.03 0.00	0.05 0.00	-0.01 0.16	0.04 0.00	-0.36 0.00

This table reports Pearson correlations among the variables (and p-values, two-tailed) used in the main analysis.

Table 3: Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency

Dependent Variable =	Predicted Sign	(1) *CapitalEff*	(2) *CapitalEff*	(3) *CapitalEff*
TranspBankSub	+	0.0003**		0.0003**
		(0.013)		(0.012)
BHCSize		-0.0001	-0.0001	-0.0001
		(0.813)	(0.787)	(0.822)
LevCap		-0.0073	-0.0070	-0.0073
		(0.190)	(0.208)	(0.191)
EBP		0.0072	0.0084	0.0074
		(0.722)	(0.677)	(0.715)
LoanToAssets		0.0004	0.0005	0.0004
		(0.755)	(0.707)	(0.746)
AssetsGrowth		-0.0019**	-0.0018**	-0.0019**
		(0.015)	(0.021)	(0.015)
HHI		0.0009	0.0010	0.0009
		(0.411)	(0.394)	(0.412)
LogNumSubs		-0.0001	-0.0001	-0.0001
		(0.197)	(0.200)	(0.197)
TranspBHC			0.0000	-0.0001
			(0.731)	(0.574)
Constant		0.0015	0.0017	0.0015
		(0.774)	(0.752)	(0.782)
Observations		23,987	23,987	23,987
Adjusted R-squared		0.242	0.241	0.241
BHC FE		YES	YES	YES
Quarter FE		YES	YES	YES

The table reports the results of the effect of subsidiary financial reporting transparency on BHC internal capital market efficiency. The dependent variable is *CapEff*. The sample includes all the multi-bank BHCs with required data from 1996 to 2016. The unit of analysis is BHC-quarter level. The standard errors are clustered at both the BHC level and the quarter level, and p-values are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 4: Differences in the Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency based on Information Asymmetry

Dependent Variable =	Predicted Sign	(1) *CapitalEff*	(2) *CapitalEff*	(3) *CapitalEff*
Large		-0.0002		
		(0.538)		
Distant			-0.0002	
			(0.575)	
MoreBankSubs				-0.0006**
				(0.028)
Public		0.0001	0.0000	0.0000
		(0.831)	(0.986)	(0.979)
Large×TranspBankSub	+	0.0004**		
		(0.043)		
Distant×TranspBankSub	+		0.0003**	
			(0.033)	
MoreBankSubs×TranspBankSub	+			0.0004**
				(0.030)
Public×TranspBankSub	+	0.0003	0.0005**	0.0005**
		(0.151)	(0.031)	(0.035)
TranspSub		-0.0000	-0.0001	-0.0001
		(0.859)	(0.685)	(0.437)
TranspBHC		-0.0001	-0.0001	-0.0000
		(0.603)	(0.627)	(0.690)
Size		-0.0001	-0.0001	-0.0000
		(0.841)	(0.834)	(0.952)
Leverage		-0.0068	-0.0070	-0.0073
		(0.225)	(0.209)	(0.191)
EarnbeforeProv		0.0070	0.0069	0.0058
		(0.731)	(0.734)	(0.775)
LoanToAssets		0.0004	0.0005	0.0003

	(0.734)	(0.703)	(0.834)
AssetsGrowth	-0.0019**	-0.0019**	-0.0018**
	(0.015)	(0.016)	(0.023)
HHI	0.0009	0.0009	0.0007
	(0.432)	(0.429)	(0.565)
LogNumSubs	-0.0001	-0.0001	-0.0001
	(0.187)	(0.192)	(0.268)
Constant	0.0014	0.0015	0.0012
	(0.798)	(0.785)	(0.816)
Observations	23,987	23,987	23,987
Adjusted R-squared	0.242	0.242	0.243
BHC FE	YES	YES	YES
Quarter FE	YES	YES	YES

The table reports how the effect of subsidiary financial reporting transparency on BHC internal capital market efficiency varies with public versus private ownership and with potential information asymmetry between BHCs and bank subsidiaries. We present results using three measures of information asymmetry between BHCs and subsidiary banks: BHC size (column 1), the distance between the BHC and its bank subsidiaries (column 2), and the number of bank subsidiaries (column 3). The dependent variable is *CapEff*. The sample includes all the multi-bank BHCs with required data from 1996 to 2016. The unit of analysis is BHC-quarter level. The standard errors are clustered at both the BHC level and the quarter level, and p-values are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 5: Effect of Subsidiary Accounting Quality on Subsidiary Loan Growth

Dependent Variable =	Predicted Sign	(1) *LoanGrowth*	(2) *LoanGrowth*	(3) *LoanGrowth*
Capr1	+	0.3847***	0.3869***	0.3991***
		(0.000)	(0.000)	(0.000)
BMIndex			-0.0201	-0.0174
			(0.433)	(0.499)
TranspBankSub				0.0064**
				(0.028)
Capr1×TranspBankSub				-0.0447**
				(0.045)
BMIndex× Capr1	–		-0.0132**	-0.0166**
			(0.039)	(0.029)
BMIndex×TranspBankSub				0.0016
				(0.260)
Capr1×BMIndex×TranspBankSub	+			0.0174**
				(0.049)
Size		0.0024	0.0022	0.0025
		(0.318)	(0.342)	(0.299)
Constant		-0.0584	-0.0355	-0.0436
		(0.158)	(0.554)	(0.468)
Observations		79,783	79,783	79,783
Adjusted R-squared		0.198	0.198	0.200
Bank FE		YES	YES	YES
Quarter FE		YES	YES	YES

The table reports the results of the role of BHC internal capital markets in influencing bank subsidiary investment efficiency. The dependent variable is *LoanGrowth*. The sample includes banks that belong to multi-bank BHCs with required data from 1996 to 2016. The standard errors are clustered at both the bank level and the quarter level, and p-values are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 6: Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency and Excess Value for Public BHCs

Dependent Variable =	Predicted Sign	(1) *CapitalEff*	(2) *ExcessVal1*	(3) *ExcessVal2*
TranspBankSub	+	0.0006**	0.0106**	0.0095***
		(0.012)	(0.019)	(0.009)
BHCSize		0.0001	0.0009	0.0027
		(0.833)	(0.830)	(0.481)
LevCap		0.0001	-0.0056	0.0015
		(0.818)	(0.758)	(0.925)
EBP		-0.0043	-0.3107	-0.3389
		(0.694)	(0.186)	(0.105)
LoanToAssets		-0.0487	1.4756*	1.0551
		(0.202)	(0.064)	(0.157)
AssetsGrowth		-0.0004	-0.0071	-0.0264
		(0.890)	(0.913)	(0.568)
HHI		-0.0010	0.0491	0.0590*
		(0.468)	(0.158)	(0.062)
LogNumSubs		0.0005	0.0434	0.0516*
		(0.764)	(0.347)	(0.091)
TranspBHC		-0.0001	0.0005	0.0012
		(0.220)	(0.633)	(0.195)
Constant		-0.0008	0.0779	-0.0599
		(0.938)	(0.810)	(0.825)
Observations		9,131	9,131	9,131
Adjusted R-squared		0.209	0.740	0.796
BHC FE		YES	YES	YES
Quarter FE		YES	YES	YES

The table reports the results of the effect of subsidiary financial reporting transparency internal capital markets efficiency and excess value for public BHCs. The dependent variable is *CapEff*. The sample includes all the multi-bank public BHCs with required data from 1996 to 2016. The unit of analysis is BHC-quarter level. The dependent variable is *CapEff* in column 1, *ExcessVal1* in column 2, and *ExcessVal2* in column3. The standard errors are clustered at both the BHC level and the quarter level, and p-values are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 7: Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency using Alternative Accounting Quality Measure

Dependent Variable=	*Predicted Sign*	CapEff
AuditPctg	+	0.0003*
		(0.088)
BHCSize		0.0000
		(0.749)
LevCap		-0.0001
		(0.769)
EBP		-0.0072
		(0.196)
LoanToAssets		0.0088
		(0.662)
AssetsGrowth		0.0005
		(0.708)
HHI		-0.0019**
		(0.017)
LogNumSubs		0.0010
		(0.397)
TranspBHC		-0.0001
		(0.205)
Constant		0.0018
		(0.734)
Observations		23,987
Adjusted R-squared		0.241
BHC FE		YES
Quarter FE		YES

The table reports the results of the effect of subsidiary financial reporting transparency on BHC internal capital market efficiency using the percentage of bank subsidiaries being audited as a measure of subsidiary accounting quality. The dependent variable is *CapEff*. The sample includes all the multi-bank BHCs with required data from 1996 to 2016. The unit of analysis is BHC-quarter level. The standard errors are clustered at both the BHC level and the quarter level, and p-values are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 8: Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency using State Audit as an Instrumental Variable

Panel A. First Stage: Prediction Model

Dependent Variable =	Predicted Sign	(1) *AuditPctg*
StateAudRes	+	0.3486***
		(0.000)
Size		-0.0013
		(0.729)
Leverage		0.0130
		(0.175)
EarnbeforeProv		0.2707**
		(0.032)
LoanToAssets		-0.7534
		(0.164)
AssetsGrowth		0.0103
		(0.778)
HHI		0.1613***
		(0.000)
LogNumSubs		0.0277
		(0.263)
TranspBHC		-0.0029***
		(0.002)
Constant		-0.1668
		(0.257)
Observations		14,002
Adjusted R-squared		0.717
BHC FE		YES
Quarter FE		YES

The panel reports the OLS estimates of the percentage of banks receiving an audit for each BHC. The dependent variable is *AuditPctg*. Following Minnis (2011), we first calculate the residual of the proportion of audited banks in the regression of proportion of audited banks on state assets, interstate branching restrictiveness index, coincident index, litigation rank, net interest margin, and the number of banking institutions at the state level. Next, we calculate the weighted average of the state residuals for each BHC according to its bank subsidiary locations. We then use this weighted average variable as an instrument. We only use the period from 2002 for this analysis because litigation rank, a variable we use to estimate state level residuals, is only available for this period. The analysis is at the BHC-quarter level. P-values are reported in parentheses. ***, **, and * indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Panel B. Second Stage: State Audit as an Instrumental Variable

Dependent Variable =	Predicted Sign	(1) *Capital Eff*
AuditPctg (Instrumented)	+	0.0081**
		(0.030)
TranspBHC		-0.0198
		(0.671)
Size		-0.0005**
		(0.047)
Leverage		-0.0144***
		(0.000)
EarnbeforeProv		0.0241*
		(0.096)
LoanToAssets		0.0015
		(0.117)
AssetsGrowth		-0.0034***
		(0.004)
HHI		0.0004
		(0.555)
LogNumSubs		-0.0002***
		(0.000)
Constant		0.0055
		(0.203)
Observations		14,002
Adjusted R-squared		0.234
BHC FE		YES
Quarter FE		YES

The panel reports the effect of subsidiary financial reporting transparency on BHC internal capital market efficiency using the IV approach. *AuditPctg* is the percentage of subsidiary banks that are predicted to be audited. We only use the period from 2002 for this analysis because litigation rank, a variable we use to estimate state level residuals, is only available for this period. The analysis is at the BHC-quarter level. P-values are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).

Table 9: Differences in the Effect of Subsidiary Accounting Quality on Internal Capital Market Efficiency based on Regulator Strictness

Dependent Variable=	Predicted Sign	*CapEff*
TranspBankSub	+	0.0005**
		(0.019)
Strictness		-0.0202*
		(0.080)
Strictness×TranspBankSub	+	0.0038**
		(0.043)
TranspBHC		-0.0001
		(0.344)
Size		0.0005
		(0.262)
Leverage		-0.0034
		(0.659)
EarnbeforeProv		0.0041
		(0.882)
LoanToAssets		0.0011
		(0.405)
AssetsGrowth		-0.0014
		(0.232)
HHI		0.0001
		(0.949)
LogNumBankSubs		-0.0002**
		(0.013)
Constant		-0.0079
		(0.244)
Observations		11,498
Adjusted R-squared		0.290
BHC FE		YES
Quarter FE		YES

The panel reports how the effect of subsidiary financial reporting transparency on BHC internal capital market efficiency varies with regulator strictness. *Strictness* is the opposite of the leniency index provided by Agarwal et al. (2014). We use the weighted average of the index for each BHC according to the states where its subsidiary banks are located. The dependent variable is *CapEff*. This analysis includes BHCs with state banks only. The unit of analysis is BHC-quarter level. The standard errors are clustered at both the BHC level and the quarter level, and p-values are reported in parentheses. ∗∗∗, ∗∗, and ∗ indicate significance at 1%, 5%, 10% levels, respectively (two-tailed, or one-tailed when appropriate).