Does subsidiary bank failure affect parents' capital decisions? Evidence from US bank holding companies

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Abstract

I explore the dynamics of capital structure decisions of US bank holding companies (BHCs) around the years of their subsidiary bank failures. I find that financial policies of BHCs are significantly distorted by the failure of their subsidiary banks. Specifically, affected BHCs raise leverage ratios as early as one year prior to the failure of their subsidiaries, and then reduce their leverage following the failure, with this result stronger for small or poorly capitalized holdings and weaker for one-bank holding companies or holdings that have less than full ownership of their subsidiaries. Moreover, BHCs with subsidiary failure also hoard cash or liquidity assets, and cut lending prior to the failure. Overall, the findings are consistent with my theory that BHCs boost their financing to offset the shortfalls in internal funds prior to their subsidiary failure due to more capital funds being transferred to distressed subsidiaries as mandated by the "source of strength" regulation.

Keywords: Bank holding companies; Subsidiary failure; Capital structure; "Source of strength" regulation

JEL Classification: G21 G28 G32

* I would like to thank Jerry Coakley, Claudia Girardone, Neil Kellard, Valerio Potì, seminar participants at University of Glasgow, University of Edinburgh, and Ghent University (Belgium) and conference participants at IFABS 2016 (Barcelona) and FMA 2018 (San Diego) for helpful comments. I also thank Essex Business School for critical funding provided to support this research. Please send correspondence to Essex Business School, University of Essex, Wivenhoe Park, Colchester CO4 3SQ, UK; Email: senyu.wang@essex.ac.uk.

1. Introduction

Prior literature suggests that a bank holding companies (BHC) establishes an internal capital market where it allocates capital among its various subsidiaries and serves as a source of strength to its subsidiary banks financially and managerially (e.g., Houston, James, and Marcus, 1997; Houston and James, 1998).[1] This strand of literature has concluded that by efficiently allocating internal funds within the holding organization via the internal market, BHCs could mitigate or even avoid external financing costs. However, the internal capital market also provides an important mechanism through which subsidiaries affect the cash flow, liquidity, and capital decision of their holding company. Particularly, benefits of affiliation with a holding company such as capital injection from the parent bank could motivate subsidiary banks to take on undue risks (Hughes et al., 1996), which in turn adversely impacts the holding. While the sensitivity of the operations of subsidiaries to the parent's characteristics is well understood, little empirical work has explored how the holding companies may be affected by the financial circumstances of their subsidiary banks, especially when the latter are in periods of financial distress.

In this paper, I aim to fill this gap by specifically focusing on capital structure decisions of BHCs in the US around the time when their subsidiary banks file for bankruptcy. As mandated by the "source of strength" regulation, BHCs should support subsidiary banks facing financial difficulties through internal capital markets (Gilbert, 1991). Such subsidization is most critical when subsidiaries are potentially close to collapse. Yet, subsidizing troubled affiliates depletes internally generated funds of parent banks, leading to an internal fund shortfall. BHCs thus need to offset the shortfall by raising additional funds from external capital markets such as the public

[1] The "source of strength" doctrine is reflected in the Fed regulatory documents. For example, the Board's Regulation Y in 1984 states that "a bank holding company shall serve as a source of financial and managerial strength to its subsidiaries…". A 1987 Federal policy statement further states that a BHC "should stand ready to use available resources to provide adequate capital funds to its subsidiary banks during periods of financial stress".

debt market. As such, more reliance on external funds will inevitably increase total liabilities of holdings, and hence result in higher leverage ratios. Recent anecdotal evidence also points out that BHCs may use proceeds of debt issuance to provide capital subsidies to their subsidiary banks.[2] Additionally, due to the uncertainty of the prospects of subsidiaries running into financial trouble, parent BHCs must also boost their financing in the expectation that they will have to defray the costs of the potential failure of their troubled affiliates.

To test this prediction, I analyze the dynamic patterns of capital structures of BHCs in the US that have subsidiary failure ("troubled" BHCs) using the BHCs that do not have any subsidiary failure ("healthy" BHCs) through my sample period as a benchmark. I note that those BHCs whose subsidiary banks were once on the brink of failure but have since survived could also be simply classified as "healthy" BHCs and I am unable to identify these types of holdings in the sample. However, since I am interested in whether the financial circumstances of subsidiary banks may matter for the capital decisions of holding companies, I expect the deterioration of financial conditions to be more pronounced for those failed subsidiaries prior to them filing for bankruptcy and hence changes in the reliance on external finance at the BHC level to be more observable due to more subsidies channelled from holdings to troubled affiliates during this period.

My baseline test adopts a standard event-study difference-in-differences (DID) approach to studying the dynamics of BHC capital structure, or more specifically, leverage ratios and various financing decisions from two years prior to subsidiary failure to two years after the failure. In this event-study DID framework, I first estimate the leverage changes among BHCs with subsidiary

[2] An article published on the website of the American Bar Association in 2019 states that "the ability to issue debt instruments and downstream the proceeds as capital for the subsidiary bank is one of the key benefits of the holding company" (Silva, 2019). The same point is similarly reflected in another 2019 article from the website of Troutman Pepper, an American law firm, which states that "a holding company may issue debt securities and contribute the proceeds as equity capital to the subsidiary bank" (Ancarrow et al., 2019).

failure around the time of their subsidiary failure *relative to* the contemporaneous leverage changes among those BHCs without subsidiary failure. Using a large sample of US banks from 1986 to 2018, I find that "troubled" BHCs increase their leverage ratio by 6.3% in the year prior to their subsidiary failure and reduce the leverage ratio by 3.6% in the year following their subsidiary failure. I further decompose BHC leverage into deposit and non-deposit liabilities consisting of long-term, short-term, and subordinated debt, and find that the long-term debt financing is the primary cause of changes in leverage ratios of "troubled" BHCs surrounding their subsidiary failure.

To alleviate the identification concern and examine the robustness of my baseline results, I carry out several additional tests. First, I match treatment BHCs (i.e., BHCs with subsidiary failure) to control ones using a propensity score matching (PSM) method and then reconduct the above tests based on the PSM sample. The results are largely consistent with those from the baseline model. Second, I follow the spirit of (Wintoki et al., 2012) and employ dynamic generalized method of moments (GMM) tests to account for potential dynamic endogeneity between subsidiary failure and holdings' capital structure changes. The results continue to hold.

I provide further cross-sectional and time-series evidence to support my main hypothesis that BHCs increase leverage ratios prior to subsidiary failures by focusing on holdings' heterogenous incentives to do so. First, I conjecture that small or poorly capitalized BHCs tend to raise more debt when faced with internal fund shortfalls prior to their subsidiary failure. Since these holdings are more vulnerable to deteriorating financial conditions within the organization and also lack the government's guarantee (Demsetz and Strahan, 1997), the changes in their capital structures are expected to be more pronounced. Second, I expect the dynamic changes of holdings' capital structures around their subsidiary failure to be weaker for one-bank holding companies (OBHCs)

or BHCs that have less than full ownership of their subsidiaries given that the effects of affiliation are weakened for these types of parent banks (Ashcraft, 2008). Third, I expect the dynamics are stronger when the "source of strength" regulation is more stringent following the enactment of the Dodd-Frank Act in 2010. My findings are in line with these predictions.

I also analyze the changes of BHCs' liquidity, lending, and bond price prior to their subsidiary failure. If subsidizing a failing subsidiary bank leads to the parent BHC not having surplus capital to distribute among its other affiliates, and if the regulation limits the BHC's ability to use insured deposits, then it follows that these "troubled" BHCs facing limited internal funds may be forced to hoard cash or other liquidity assets, and curtail loans to ease the shortfall. Consequently, I expect an increase in liquidity assets, and a decline in lending for the "troubled" BHCs relative to the "healthy" ones, prior to the time of subsidiary failure. Further, since BHCs often have their bonds rated by rating agencies, the deteriorating financial condition of a troubled subsidiary can result in a rating downgrade prior to its failure. Creditors will perceive this as an increased probability of default on the BHC's bonds and hence demand a risk premium on the bond yields. As a result, I also expect a rise in the credit spread of bonds for the "troubled" BHCs prior to their subsidiary failure. The results validate these conjectures with the effects being stronger for smaller and poorly capitalized BHCs with subsidiary failure. Taken collectively, my evidence suggests that "troubled" BHCs are proactive in not only raising debt financing (leverage), but also building up liquidity and cutting lending to be ready for the subsidiary failure. In the meantime, the increased spread of their public debt reflects the risk resulting from the deterioration of the financial condition of their failing subsidiary.

Finally, I explore the dynamics of BHC performance and risk following their subsidiary failure. I show that "troubled" BHCs experience worse performance and higher risk subsequent to their

subsidiary failure compared to "healthy" ones. However, I find that the "troubled" BHCs who proactively increase leverage one year before the failure (proactively "troubled" BHCs) suffer less from performance decline and risk increase afterwards relative to their "troubled" counterparts who do not make such a move in advance (non-proactively "troubled" BHCs). The evidence is consistent with the interpretation that BHCs take proactive measures beforehand to prepare for the subsidiary failure, stabilize the performance, and alleviate the risks.

My results are consistent with the institutional environment of the US banking system in that the "source of strength" regulation forces BHCs to adjust their capital structures prior to the failure of their subsidiary banks. Noticeably, the regulation has been conveyed through the Fed's Regulation Y in 1984, its 1987 policy statement on the subject, and by the Federal Deposit Insurance Corporation Improvement Act (FDICIA) enacted in 1991 which even grants the Federal Reserve the authority to take enforcement actions for the BHCs that fail to provide financial assistance to troubled affiliates when resources are available (Ashcraft, 2008).

I contribute to several strands of the literature. First, this paper adds to prior limited work that focuses on bank capital structure. Some recent work includes Gropp and Heider (2010), Mehran and Thakor (2011), and Allen, Carletti, and Marquez (2015). In particular, Gropp and Heider (2010) show that the determinants of capital structures for banks and non-financial firms are very similar while regulation may only be a second-order determinant of bank capital structure under normal financial conditions by using a large cross-country sample. My paper differs from Gropp and Heider (2010) among others as I emphasize the role the "source of strength" regulation in the US plays in determining variation in bank leverage ratios during periods of financial distress, and hence sheds new light on the debate whether regulation constitutes the overriding departure for banks from the traditional corporate finance theories on capital structures.

Second, this paper contributes to the literature on the operating mechanism of internal capital markets within bank holding companies. Houston et al. (1997) examine the operation of internal capital markets within the US banking industry by examining the sensitivity of lending activities of subsidiary banks to the holding company's cash flow, liquidity, and capital position, and find that contrary to stand-alone banks, BHCs establish internal capital markets to allocate capital across their various subsidiaries. Houston and James (1998) provide further insights into whether internal capital markets within BHCs promote or discourage lending. Internal capital markets are also shown to be the dominant driver of the dynamics of risk-based capital ratios (Schüwer et al., 2019), funding sources (Campello, 2002) and resilience (Ashcraft, 2008) for holding-affiliated banks. However, these papers mainly focus on the impact of holding company affiliation on the subsidiary level via the mechanism of internal capital markets. My work instead provides evidence on how the holding companies are affected by their subsidiary banks by focusing on the periods when the latter are in financial distress.

Finally, this study also broadly relates to the ongoing policy discussions on banking regulation (Kashyap, Rajan, and Stein, 2008; Brunnermeier and Pedersen, 2009; Admati et al., 2013; Thakor, 2014), and its relationship with bank capital structure (Allen, Carletti, and Marquez, 2015; DeAngelo and Stulz, 2015; Gornall and Strebulaev, 2018). I extend this literature by showing that "troubled" BHCs increase leverage (borrowing) and forgo lending to replenish internal fund shortfalls prior to their subsidiary failure due to more capital funds being transferred to distressed subsidiaries as mandated by the "source of strength" regulation.

The remainder of this paper is organized as follows. Section 2 presents the methodology. Section 3 describes the data. Section 4 contains empirical tests. Section 5 explores the dynamics of BHCs' other outcomes around the subsidiary failure. Section 6 concludes.

2. Methodology

I build the sample based on the group of BHCs that had subsidiary failures during specific years (treatment group) and the BHCs that did not have subsidiary failures throughout the sample period (control group). I identify the year in which BHC *i* declares a subsidiary failure as year T_i. To test the hypotheses, I follow Bertrand and Mullainathan (2003) and estimate the following event-study difference-in-differences (DID) regression[3]:

$$Y_{i,t} = \alpha + \sum_{\tau=-2}^{2} \beta_\tau D_{i,t=T_i+\tau} + \delta \mathbf{X}_{i,t-1} + \delta' \overline{\mathbf{X}}_{peers,t-1} + \gamma_i + \lambda_t + \varepsilon_{i,t} \qquad (1)$$

where $Y_{i,t}$ denotes BHC *i*'s leverage in year *t* with *Leverage* defined as one less the ratio of the book value of total equity to the book value of total assets, following Gropp and Heider (2010), and $D_{i,t}$ is a group of DID estimators, which are event year-bank dummies that identify the years prior to and following the failure of a subsidiary of BHC *i*. Specifically, I define the following DID estimators: D_{i,T_i-2}, D_{i,T_i-1}, D_{i,T_i}, D_{i,T_i+1}, and D_{i,T_i+2}. These five indicator variables are set to one if the BHC *i* (1) will have subsidiary failure in two or more years, (2) will have subsidiary failure in one year, (3) has subsidiary failure in the current year, (4) had subsidiary failure one year ago, and (5) had subsidiary failure two or more years ago. I use variable names *Year 2 Before*, *Year 1 Before*, *Year Zero*, *Year 1 After*, and *Year 2 After* to represent the DID estimators in the table output. The regression model also includes a set of control variables $\mathbf{X}_{i,t-1}$ which follow Gropp and Heider (2010) and contain bank characteristics that may affect BHCs' capital structure including *Size* (calculated as the natural logarithm of total assets), *Market-to-book ratio*, *Profitability*, *Collateral*, *Dividend payer indicator*, and *Ln*(*asset risk*). The definitions of these variables are in

[3] Chemmanur, He, and Nandy (2009), Morrison, Gupta, Olson, Cook, and Keenan (2013), Mayer, Morrison, Piskorski, and Gupta (2014), Gupta (2019), among others, have also used this specification to study firm performance around different events.

Appendix A. Moreover, I follow Leary and Roberts (2014) to account for the characteristics of peer BHCs $\bar{X}_{peers,t-1}$ which may play a more important role in shaping a number of bank policies and are calculated as the average for each characteristic of peer BHCs excluding BHC *i* itself. Finally, γ_i, λ_t denote BHC and year fixed effects that control for unobserved time-invariant heterogeneity across BHCs and overall time trends, respectively. Standard errors are clustered at the BHC level to resolve heteroscedasticity and serial correlation of error terms (Petersen, 2009).

The coefficients of interest are β_τ, which capture the dynamic pattern of the effect of subsidiary failure on BHCs' leverage. More specifically, the coefficients measure the estimated changes in the difference between treated and control BHCs' leverage over the years prior to subsidiary failure to the years following the failure. Accordingly, these coefficients trace out the time path of differences between treated and control BHCs' leverage, and are able to capture whether the leverage of a BHC increases or declines as time goes by.

My main focus is on the capital structure of "troubled" BHCs in the year immediately prior to and following subsidiary failure (i.e., $T_i - 1$ and $T_i + 1$). When examining BHCs' capital structure, I mainly look at bank leverage which includes both debt and non-debt liabilities such as deposits. However, bank capital structure is different from that of non-financial firms because a bank takes deposits, and non-deposit debt has become a more important source of bank financing over time (Gropp and Heider, 2010). Thus, I further decompose BHC leverage into non-deposit liabilities and deposits in Section 4.2.

It is worth noting that the regression framework of the specification (1) corresponds to an event-study difference-in-differences estimation strategy which is different from the general DID technique. In the traditional quasi-natural experimental design, the validity of the general DID requires that in the absence of the treatment, the difference between the treatment and control

group is constant over time. In other words, there should be no pre-treatment trends and the parallel trend assumption needs to be satisfied. However, the event-study DID approach in this paper is used to discover the time trends of the changes in outcomes before and after the treatment. That is, the event-study DID is to investigate whether there exists pre-treatment trends or post-treatment trends, while the general DID technique shall only be used after demonstrating that there are no pre-treatment trends.

3. Data

I examine the BHCs that are publicly listed in the United States, and only consider BHCs that are at the top of the ownership hierarchy. I collect consolidated financial information of BHCs from FR Y-9C reports over the 1986 to 2018 period.[4][5] I also obtain data on BHCs' long-term and short-term debt from COMPUSTAT Bank. BHC stock price data come from the Center for Research in Security Prices (CRSP). I obtain information on BHCs' subsidiary bankruptcy from FDIC Failed Bank List, and then merge this data with BHC data. I focus on the BHCs who have subsidiary failure occurring only once during the sample period to avoid compound effects by more than one subsidiary bankruptcy in consecutive time periods. The final treatment sample thus restricts to 363 BHCs that have failed subsidiaries. My analyses further require a control group to compare with the BHCs with subsidiary failure. I obtain a control group based on all BHCs that do not have subsidiary failures ("healthy" BHCs) throughout the sample period.

[4] The FR Y-9C reports are only available from 1986 when consolidated financial information of bank holding companies started being filed by the Federal Reserve. The FR Y-9C can be accessed from the WRDS database.
[5] To check the robustness of the results, I later use 2004 as the end point of the sample in order to avoid the confounding effects of banks anticipating the implementation of the Basle II regulatory framework and the global financial crisis (2007 – 09). I then run all the tests again. My results remain qualitatively similar.

Panel A of Table 1 reports summary statistics for the full sample. The typical sample BHC has a leverage of 91.4% and a profitability of 0.6%. These figures suggest that banking appears to be a highly levered and low return industry compared to those non-financial firms (e.g., see Table 1 in Lemmon et al., 2008).

Panel B of Table 1 presents a univariate comparison of the mean values of the main variables between "troubled" BHCs and "healthy" BHCs in the year prior to subsidiary failure (i.e., $T_i - 1$). Panel B suggests that the BHCs with subsidiary failure in the next year, on average, have higher leverage ratio compared with BHCs without subsidiary failure (95.6% versus 91.0% of total assets). BHCs with subsidiary failure in the next year tend to have more long-term debt (15.7% versus 6.5% of total assets), have more subordinate (1.4% versus 0.7% of total assets), but rely less on short-term debt financing (2.8% versus 5.4% of total assets) than those BHCs without subsidiary failure in the following year. In terms of control variables, "troubled" BHCs are less profitable than "healthy" ones in year $T_i - 1$. The former also typically have larger size, lower market-to-book ratio, and more asset risk prior to subsidiary failure.

[Insert Table 1 here]

I present the univariate results for the year following subsidiary failure (i.e., $T_i + 1$) in Panel C of Table 1. As shown in the table, following subsidiary failure the "troubled" BHCs on average have lower leverage ratio compared to those "healthy" ones. When decomposing BHCs' leverage, I find that, in contrast to the financing activities in year T_i - 1, following the subsidiaries filing for bankruptcy parent BHCs are more likely to reduce long-term debt financing. The comparisons between the "troubled" and the "healthy" BHCs in terms of other control variables in year $T_i + 1$ are similar to those in year T_i - 1.

4. Empirical results

4.1. BHCs' leverages around subsidiary failure

Columns (1) and (2) in Table 2 present the baseline results from estimating Equation (1) by using *Leverage* as the outcome variable. I report the coefficient estimates of β_τ from two years before to two years after subsidiary failure. Column (1) reports the results from estimating the model without including control variables using the full sample. Column (2) adds additional controls that may affect BHCs' leverage. The coefficients on *Year 1 Before* in both columns are positive and statistically significant. When controlling for BHC characteristics in column (2), the estimated coefficient on *Year 1 Before* implies an increase of 6.3 percentage points in the leverage of those BHCs with subsidiary failure, relative to the control group, during the year prior to their subsidiary failure. In contrast, the consistently negative and significant coefficients on *Year 1 After* in columns (1) and (2) indicate a significant decline in leverage ratios for "troubled" BHCs relative to "healthy" ones in the year following subsidiary failure.

One possible concern about using *Leverage* as the dependent variable is that the changes in leverage ratios could be driven by changes in total assets rather than changes in the amount of debt outstanding. To address this concern, I replace *Leverage* with an alternative measure - the natural logarithm of one plus the book value of total debt and then rerun the regression model Equation (1). Column (3) in Table 2 reports the estimation results that confirm the baseline findings in columns (1) and (2). Further examination on BHCs' equity issuance activities in column (4) shows that there is no association between subsidiary failures and holdings' equity issuance decisions. Taken collectively, the evidence suggests that "troubled" BHCs adjust leverage ratios by changing their total debt outstanding around subsidiary failures.

In terms of control variables, I find that BHC leverage is negatively associated with market-to-book ratio, profitability, dividend payment, and asset risk, and positively related with size and collateral. These findings are generally in line with prior studies on bank capital structure (e.g., Gropp and Heider, 2010). Additionally, column (2) of Table 2 shows that BHC leverage is negatively correlated with average market-to-book ratio and asset risk of peer BHCs, and positively associated with the average peer BHC size. The results reveal that the characteristics of peers also play an important role in determining capital structures, a phenomenon similarly documented by Leary and Roberts (2014) who use general firm data. All in all, my findings uphold the hypothesis that BHCs are more likely to be more levered in the year prior to their subsidiary failure, and less levered in the year after.

[Insert Table 2 here]

4.2. Decomposing BHC leverage

In the above analysis, I calculate BHC leverage by de facto dividing bank total liabilities by total assets and examine its changes around subsidiary failure. In this section I decompose BHC liabilities into deposit and non-deposit liabilities, consisting of long-term, short-term, and subordinated debt, and then run regressions against each item using equation (1) to show which item is the primary cause of changes in leverage ratios of "troubled" BHCs surrounding their subsidiary failure.[6]

Table 3 reports the results. In column (1), I observe a substantial pre-failure increase and post-failure decrease in "troubled" BHCs' long-term debt. Specifically, the positive and significant coefficient on *Year 1 Before* in column (1) indicates that long-term debt of BHCs with subsidiary

[6] Bank non-deposit liabilities can be viewed as debt for firms. They consist of senior long-term debt, subordinated debt and other debenture notes.

failure increases by 11 percentage points, on average, in the year prior to their subsidiary failure. The negative and significant coefficient on *Year 1 After* indicates that BHCs with subsidiaries filing for bankruptcy in the previous year significantly lower the long-term debt relative to those without subsidiary failure. The significant coefficients on *Year 1 Before* in columns (2) and (3) imply that "troubled" BHCs also reduce their short-term debt financing and issue more subordinated debt one year prior to their subsidiary failure. The increase in subordinated debt reflects its attractive feature as an inexpensive alternative to raising equity capital and "troubled" BHCs' efforts to shore up capital without diluting existing shareholders (Sironi, 2003). The negative and significant coefficient on *Year 1 After* in column (4) suggests that depositors discipline "troubled" BHCs that have subsidiary failure by moving their savings out of these banks, which corroborates the existence of the market discipline effect.

The findings in Table 3 show that "troubled" BHCs prefer to adjust their long-term debt financing around their subsidiary failure. Particularly, my results imply that "troubled" BHCs tend to tap into the long-term debt market despite having to pay a higher interest rate. Doing so reduces their greater liquidity risk of being unable to roll over short-term debt upon subsidiary failure. Consequently, large increases in long-term debt result in a higher leverage for those "troubled" BHCs prior to the failure.

[Insert Table 3 here]

4.3. Robustness checks

4.3.1. Propensity score matching approach

I next examine the robustness of the baseline results by reconstructing a matched sample by matching treatment BHCs (i.e., BHCs with subsidiary failure) to control ones using a propensity

score matching (PSM) procedure. The PSM enables me to build a sample where the control variables for matched treated and control BHCs are not significantly different (Rosenbaum and Rubin, 1983).

I estimate propensity scores using a logistic model where the dependent variable is $Treat$ which is an indicator variable set to one if a BHC experiences subsidiary failure and the regressors are the full set of BHC-specific characteristics from column (2) of Table 2. Having obtained the results of the logistic regression (reported in Panel A of Table 4), I match each treatment BHC to a control BHC with the nearest propensity score. I then rerun the above regressions based on the new matched sample.

Panel B of Table 4 reports the results. I observe similar pre-failure and post-failure trends of capital structure changes compared with those reported in Table 2 and Table 3. For instance, the positive (negative) and significant coefficient on *Year 1 Before* (*Year 1 After*) in column (1) indicates that, relative to the PSM control group, the leverage ratios of the BHCs in the treatment group increase (decline) significantly during the year prior to (following) the subsidiary failure. The results in the other columns are largely comparable to those reported in Table 3. The evidence confirms my earlier finding that "troubled" BHCs increase leverage ratios one year prior to the failure of their subsidiaries, and that leverage increase is significantly reversed following the failure.

Due to the loss of a significant number of observations when using the PSM approach, I continue to use the original sample throughout the rest of the paper. However, my following findings are qualitatively similar when using the matched sample based on the PSM procedure.

[Insert Table 4 here]

4.3.2. Dynamic GMM estimations

In my analysis, the dynamic nature of the variables could be a concern since it is possible that the failure of a subsidiary bank is caused by the holding's past capital structure decisions. Consequently, I follow the spirit of Wintoki et al. (2012) and employ a dynamic panel GMM model proposed by Arellano and Bover (1995) and Blundell and Bond (1998) to alleviate the concern of dynamic endogeneity. More specifically, I rewrite the regression equation (1) by including two lags of the capital structure measure (with one and two lags) as explanatory variables. I then use all the explanatory variables that are lagged three years or more as instruments. The estimation of the model then involves two steps: (i) first-differencing all variables to eliminate potential omitted variable bias, and (ii) estimating the first-differenced equation via GMM using lagged values of the capital structure variable and BHC characteristics as instruments.

The results reported in Table 5 using the dynamic GMM estimator are largely consistent with the baseline results in Tables 2 and 3. Most importantly, the coefficient on *Year 1 Before* (*Year 1 After*) continues to be positive (negative) and significant for both the dependent variable *Leverage* and *Long-term debt*.

With respect to the validity of the estimations, the p-values for the AR(2) tests suggest that the null hypothesis of no second-order serial correlation cannot be rejected in all specifications. Further tests for the validity of instruments employed in the model based on the Hansen test of overidentification and the difference-in-Hansen test of exogeneity conclude that lagged BHC characteristics and capital structure variables are exogenous and can be used as valid instruments.

Overall, the dynamic GMM results indicate that my main finds are not likely to be driven by dynamic endogeneity.[7]

[Insert Table 5 here]

4.4. Cross-sectional variations in the dynamics of BHCs' leverages

My findings have so far drawn an overall picture of how BHC leverage changes around subsidiary failure. In this section, I provide further evidence to support my main hypothesis by focusing on holdings' heterogenous incentives to do so.

4.4.1. The heterogeneity of BHC size and capital ratio

Small or poorly capitalized banks are often more vulnerable to deteriorating financial conditions within the organization (Demsetz and Strahan, 1997). They are generally believed to be more absent from the government's guarantee, in contrast to those "too-big-to-fail" institutions. In addition, anecdotal evidence suggests that the "Small BHC Policy Statement" which was originally adopted by the Fed in 1980, allows small BHCs to incur various kinds of debt in greater amounts than large BHCs and the proceeds from such debt could be contributed to banking subsidiaries as capital (MacDonald, 2017). As such, I conjecture that these types of BHCs have more incentives to seek external finance and hence raise more debt when faced with internal fund shortfalls prior to their subsidiary failure.

[7] Alternatively, I estimate the dynamic panel GMM model including past capital structures up to three-year lags as regressors and the capital structure variable and BHC characteristics with four or more lags as instruments and find my results continue to hold.

To test this hypothesis, I first define a dummy variable *Small* as one if the total assets of a BHC are below $10 billion, and zero otherwise.[8] Note that in 72.3% of the sample observations the BHCs fall into the small category. I then interact it with the DID estimators in equation (1) to examine the size effect. Panel A of Table 6 presents the results from my main specification. For brevity, I only report the coefficients of interest on the interaction terms for each regression. The positive and significant coefficient on *Year 1 Before* × *Small* in column (1) shows that small BHCs have relatively more leverage increase than large BHCs do in the year prior to subsidiary failure. I also find that small BHCs experience more long-term and subordinated debt increases, and more short-term debt decline one year before subsidiary failure as indicated by the significant coefficients on the interaction term *Year 1 Before* × *Small* in columns (2) through (4).

Further, I find that the leverage of small BHCs declines more than that of large BHCs in the year immediately following subsidiary bankruptcy. Moreover, the negative and significant coefficient on *Year 1 After* × *Small* in column (2) in Panel A of Table 6 shows that the long-term debt of small BHCs also significantly declines more during the same period. This reflects a higher debt financing cost for small BHCs as their financial circumstances deteriorate more severely after the failure.

Next, I define a dummy variable *Poor Capitalization* as one if the BHC's Tier 1 capital ratio is less than 6%, which is the minimum Tier 1 capital ratio specified in Basel III, and zero otherwise.[9] Note that in 26.1% of the sample observations the BHCs fall into the poorly capitalized category based on this definition. I then interact this dummy with the DID estimators in equation (1) to examine the regulatory effect. Panel B of Table 6 reports the results. I find that in the year prior to

[8] BHCs which are above $10 billion asset threshold are subject to stress testing and large-bank deposit pricing rules (Bennett, Güntay, and Unal, 2015).

[9] The minimum Tier 1 capital ratio increases from 4% in Basel II to 6% in Basel III whose implementation is delayed until 1 January 2023 in the wake of the COVID-19 pandemic.

subsidiary failure, poorly capitalized BHCs significantly increase more leverage than well capitalized BHCs do. The former also increase more in long-term and subordinated debt, and reduce more in short-term debt financing. One year after subsidiary failure, poorly capitalized BHCs significantly reduce more long-term debt and have more leverage decline as shown by the negative and significant coefficients on *Year 1 After* × *Poor Capitalization* in columns (1) and (2) in Panel B.

[Insert Table 6 here]

4.4.2. The heterogeneity of holding company affiliation

A second dimension of cross-sectional heterogeneity that may influence the association between subsidiary failure and BHC leverage is the heterogeneity of holding company affiliation. A bank affiliated with a multi-bank holding company (MBHC) is found to be safer than a bank affiliated with a one-bank holding company (OBHC) as distressed MBHC affiliates are more likely to receive capital injections (Ashcraft, 2008). As a result, changes in capital structures of OBHCs around their subsidiary failure should be weaker given distressed OBHC affiliates are less likely to be subsidized. Ashcraft (2008) also points out that the effects of holding company affiliation are weakened when the parent has less than full ownership of the subsidiary. Hence, I also expect a weaker level of leverage changes for the holdings that do not fully own their troubled subsidiaries.

To test these predictions, I create two indicator variables *OBHC* and *Part Ownership* that are set to one if a BHC is a OBHC and if a BHC does not fully own its troubled subsidiary, respectively. I then interact them with the DID estimators in equation (1) to examine the affiliation effect. Panels C and D of Table 6 present the results. As expected, the negative and significant coefficients on *Year 1 Before* × *OBHC* and *Year 1 Before* × *Part Ownership* in column (1) of Panels C and D

imply that holdings' leverage increase before their subsidiary failure is less pronounced for those OBHCs and BHCs that do not fully own their distressed subsidiaries. They also reduce leverage less following subsidiary failure as shown by the positive and significant coefficients on *Year 1 After* × *OBHC* and *Year 1 After* × *Part Ownership*. In addition, the results in column (2) of Panels C and D show a similar pattern of weaker changes in long-term debt of these two types of BHCs around their subsidiary failure.

Overall, the evidence confirms my predictions and provides further assurance that the main finding that BHCs increase leverage ratios prior to their subsidiary failure and lower leverage afterwards is robust to the holding heterogeneity.

4.5. Time-series variations in the dynamics of BHCs' leverages

My results so far shed light on BHCs' heterogenous incentives to subsidize distressed subsidiaries as mandated by the "source of strength" regulation. The strength of the regulation has, however, not been always homogeneous since its introduction. The Fed's expectation for a BHC to serve as a source of financial strength for its subsidiaries is further upheld and strengthened by the 2010 Dodd-Frank Act where the term "source of strength" is precisely defined and such expectation is required as an ongoing obligation for BHCs.[10] Consequently, the strength of financially assisting troubled subsidiaries is likely to be increased following the enactment of the Dodd-Frank Act in 2010. Therefore, I expect changes in leverage ratios of BHCs around their subsidiary failure to be stronger during these periods.

[10] The 2010 Dodd-Frank Act defines the term "source of strength" as "the ability of a company that directly or indirectly owns or controls an insured depository institution to provide financial assistance to such insured depository institution in the event of the financial distress of the insured depository institution."

To test this hypothesis, I create an indicator variable *Post-2010* that is equal to one if the year is after 2010 and then interact it with the DID estimators in equation (1). Table 7 reports the results. Again, for brevity, I only report the coefficients of interest on the interaction terms. The positive (negative) and significant coefficients on *Year 1 Before* (*After*) × *Post-2010* in columns (1) and (2) imply that increase (decline) in BHCs' leverage and long-term debt before (after) their subsidiary failure is larger after 2010 when the Dodd-Frank Act was enacted. In sum, these results indicate that the dynamic changes of holdings' capital structures as a result of subsidizing distressed subsidiaries are more pronounced when the "source of strength" regulation is more stringent, and hence provide further support for the mechanisms underlying my baseline results.

[Insert Table 7 here]

5. Analysis of the dynamics of BHC other outcomes around subsidiary failure

5.1. BHC liquidity, lending, and bond price prior to subsidiary failure

In this section, I analyze the changes of BHCs' liquidity, lending and bond price prior to their subsidiary failure. I have shown that BHCs' external borrowing significantly rises prior to subsidiary failure. If subsidizing a failing subsidiary bank leads to the parent BHC not having surplus capital to distribute among its other affiliates via the internal capital market, and if the regulation limits the BHC's ability to use insured deposits, these "troubled" BHCs may be forced to also hoard cash or other liquid assets, and curtail loans when faced with limited internal funds. Therefore, I expect an increase in liquidity assets, and a cut in lending for the "troubled" BHCs relative to the "healthy" ones, prior to the time of subsidiary failure. Further, since BHCs often have their bonds rated by rating agencies, the assessment can produce valuable private information which may reach the market through ratings released to the public following the examination

process. Particularly, if the deteriorating financial condition of a troubled affiliate results in a rating downgrade prior to its failure, creditors will perceive this as an increased probability of default on the BHC's bonds and hence demand a risk premium on the bond yields. As a result, I also expect a rise in the credit spread of bonds for the "troubled" BHCs prior to their subsidiary failure.

To test these conjectures, I replace the dependent variable in Equation (1) with *Liquidity assets*/*assets*, *Total loans*/*assets*, and *Credit Spread*, defined as the ratio of the sum of cash and available for sale securities to the book value of total assets, the ratio of total loans to the book value of total assets, and the difference in yield between a BHC bond and a Treasury bond with the same maturity as collected from Datastream,[11] respectively. In particular, to construct the variable *Credit Spread*, of all the outstanding bonds of each BHC I choose the one that has the fewest missing data for its yield within my sample period. BHCs with no outstanding bonds are dropped from the sample. Additionally, I exclude any non-straight bond such as convertibles, callable bonds, etc. The sample size for this variable is thus heavily reduced because of either the above screening procedure or the availability of bond yield data.

Table 8 reports the results. As shown in column (1), the coefficient on *Year 1 Before* is positive and significant for the dependent variable *Liquidity assets*/*assets.* The result indicates that "troubled" BHCs significantly increase cash and other liquid assets one year before subsidiary failure. The negative and significant coefficient on *Year 1 Before* for the dependent variable *Total loans*/*assets* in column (2) shows that "troubled" BHCs cut lending significantly in the meantime. The coefficient on *Year 1 Before* in column (3) is positive and significant, suggesting that the credit

[11] Due to the long timespan of the sample and the data limit on bond yields from Datastream, I compile additional sources to complement my bond yield data including Trade Reporting and Compliance Engine (TRACE, available from 2002) and Lehman Brothers Fixed Income Database (available between 1973 - 1997).

spread of bonds for the "troubled" BHCs is widened in the year prior to their subsidiary failure. These findings are consistent with the above predictions.

I further explore cross-sectional variations of these dynamics. Similar to what I do in Table 6, I first interact the size dummy *Small* with the DID estimators in equation (1) to capture the size effect. Columns (4) in Table 8 shows that the "troubled" BHCs with smaller size tend to hoard more cash and liquid assets prior to their subsidiary failure, as shown by the positive and significant coefficient on the interaction term *Year 1 Before* × *Small*. In a similar vein, column (5) shows that smaller BHCs with subsidiary failure reduce more loan assets in the year prior to failure. Finally, the coefficient on the interaction term *Year 1 Before* × *Small* in column (6) is positive and significant, indicating that the rise in the credit spread of bonds one year before subsidiary failure is stronger for those small "troubled" BHCs. These results, viewed collectively, show that small BHCs are more vulnerable to capital shortage and have more adjustments in both their asset and liability parts when facing internal fund shortfalls, and as a result, investors demand a larger risk premium on the yields for expecting higher default risks.

I next use the dummy variable *Poor Capitalization* defined above and interact it with the DID estimators in equation (1) to capture the regulatory effect. Columns (7), (8) and (9) in Table 8 show that in the year prior to the subsidiary failure, the increase in cash and other liquidity assets as well as the credit spread of bonds, and the decline in total loans for the "troubled" BHCs are all more intensified among those poorly capitalized ones, as shown by the significant coefficients on the interaction term *Year 1 Before* × *Poor Capitalization*. The findings suggest that poorly capitalized BHCs expect more severe financial deteriorations upon subsidiary failure. The higher risk due to poor capitalization is reflected by the larger credit spread since BHC bonds are priced according to their risks. Finally, untabulated analyses for cross-sectional differences in holding company

affiliation reveal similarly weaker results for those OBHCs and BHCs that do not fully own their distressed subsidiaries.

Overall, the findings show that parent BHCs are proactive in not only increasing borrowing (leverage), but also building up liquidity and slashing lending in order to not only offset the shortfalls in internal funds but also be prepared for the incoming subsidiary failure. In the meantime, the increased spread of their public debt reflects the risks associated with deteriorating financial conditions of their troubled affiliates.

[Insert Table 8 here]

5.2. BHC performance and risk following subsidiary failure

I next examine the dynamics of BHC performance and risk following their subsidiary failure. As a "troubled" BHC has to defray the costs of its failed subsidiary bank, I expect them to experience worse performance and higher risk subsequent to the failure. To validate the inference, I substitute the dependent variable in Equation (1) with *Profitability*, *Market-to-book ratio* (Tobin's Q), and *Asset Risk* all of which have been predefined and re-estimate the regression. The coefficients on the DID estimators compare the performance or risk changes of "troubled" BHCs versus "healthy" counterparts around the failure year, and are thus able to capture the dynamic effects of subsidiary failure on "troubled" BHCs' performance and risk. The results are reported in columns (1) through (3) in Table 9. As shown in the three columns, BHCs with subsidiary failure fare worse in terms of their market performance (negative and significant coefficient on *Year 1 After* in column (2)) and have higher asset risk (positive and significant coefficient on *Year 1 After* in column (3)), one year after the failure, a result that is consistent with my prediction.

Furthermore, my finding so far has shown that the "troubled" BHCs tend to raise leverage, improve liquidity, and cut lending beforehand to mitigate the adverse impact. I thus expect that following the subsidiary failure, these proactive BHCs should suffer less from performance decline and risk increase than those non-proactively "troubled" ones that do not make such adjustments in advance. To test this conjecture, I create an indicator variable *Leverage increase 1 year before* that is set to one if the leverage ratio for a "troubled" BHC increases one year before its subsidiary failure, and then re-estimate the specifications in columns (1) through (3) of Table 9 by including the interaction terms between this new indicator variable and the DID estimators in Equation (1) as well as the indicator itself as additional variables.

Columns (4) through (6) in Table 9 report the results. Note that the dummy *Leverage increase 1 year before* is time-invariant but varies in the cross-section. Therefore, it is dropped from the regression because of the inclusion of BHC fixed effects. As shown in column (5), the positive and significant coefficient on *Year 1 After* × *Leverage increase 1 year before* implies that the negative association between subsidiary failure and the market performance of parent BHCs in the next year is attenuated for the proactively "troubled" BHCs with leverage increase in the year prior to the failure.[12] The negative and significant coefficient on *Year 1 After* × *Leverage increase 1 year before* in column (6) suggests that the positive impact of subsidiary failure on the subsequent risk of the parent BHC is weakened for the proactively "troubled" BHCs.

Overall, the findings further imply that BHCs take proactive measures to prepare for the failure of their troubled affiliates so as to stabilize the performance and alleviate the risks.

[12] Although I do not find significant association between subsidiary failure and the operating performance (profitability) of parent BHCs in the following year as shown in column (1), the negative and significant coefficient on *Year 1 After* and the positive and significant coefficient on *Year 1 After* × *Leverage increase 1 year before* in column (4) do imply that the negative association between subsidiary failure and the operating performance of parent BHCs one year after is stronger for those non-proactively "troubled" BHCs without leverage increase in advance. This adverse impact is attenuated for their proactive counterparts.

[Insert Table 9 here]

6. Conclusion

In this paper, I explore the dynamics of capital structure decisions of US BHCs around the years when their subsidiary banks fail. I argue that "troubled" BHCs suffer internal fund shortfalls prior to their subsidiary failure due to more subsidies being channeled to distressed subsidiaries as mandated by the "source of strength" regulation. These BHCs are forced to adjust their capital structures, resulting in higher leverage ratios prior to the failure of their subsidiary banks. Once the regulation does not apply following the failure, their leverage ratio is reduced given the likelihood of becoming financially distressed for taking on too much debt.

Using a large sample of US banks from 1986 to 2018, I document a significant increase in BHCs' leverage ratios in the year prior to their subsidiary failure, and a significant decline in the year after. These dynamics are more pronounced for small or poorly capitalized BHCs. These types of holdings are more vulnerable to shocks to internal wealth and hence have more incentives to seek external finance when faced with internal fund shortfalls prior to their subsidiary failure. By contrast, the dynamics are weaker for one-bank holding companies (OBHCs) or holdings that have less than full ownership of their subsidiaries due to the weaker holding-subsidiary affiliation. In addition, I also find that the dynamic changes of holdings' capital structures around subsidiary failures are accentuated after 2010, when the "source of strength" regulation is strengthened.

I further show that "troubled" BHCs tend to boost liquidity and forgo lending prior to the incoming subsidiary failure, despite the credit spread of their bonds being widened. Following the failure, these proactively "troubled" BHCs suffer less from performance decline and risk surge

relative to their non-proactively "troubled" counterparts who do not make such adjustments in advance.

Overall, the results are consistent with my theory that "troubled" BHCs boost their financing to offset the shortfalls in internal funds and in the expectation that they will have to defray the costs of the potential failure of their distressed subsidiaries. Therefore, the findings have implications for the role the "source of strength" regulation plays in determining variation in bank leverage during periods of financial distress and for the public to understand various incentives that banks may have in adjusting their financial policies.

Appendix

A. Variable definitions

Variable	Description
BHC Capital Structure	
Leverage	One less the ratio of the book value of total equity to the book value of total assets
Ln(1 + total debt)	The natural logarithm of one plus the book value of total debt
Equity issuance	The difference between sale of common and preferred stock and purchase of common and preferred stock, scaled by the book value of total assets
Long-term debt	The ratio of long-term debt to the book value of total assets
Short-term debt	The ratio of debt in current liabilities to the book value of total assets
Subordinate	The ratio of subordinate debt to the book value of total assets
Deposits	The ratio of total deposits to the book value of total assets
BHC other outcomes	
Liquidity assets/assets	The ratio of the sum of cash and available for sale securities to the book value of total assets
Total loans/assets	The ratio of total loans to the book value of total assets
Credit spread	The difference in yield between a BHC bond and a Treasury bond with the same maturity
BHC Characteristics	
Size	Natural logarithm of the book value of total assets
Market-to-book ratio	The ratio of the market value of total assets to the book value of total assets
Profitability	The ratio of income before extraordinary items to the book value of total assets

Collateral	The sum of total securities, treasury bills, bonds, CDs, cash, and tangible assets divided by the book value of total assets
Dividend payer indicator	A dummy variable that equals one if a BHC pays a common dividend in that year, and zero otherwise
Asset risk	Annualized standard deviation of daily stock returns × market value of equity/market value of assets
Small	A dummy variable that equals one if the total assets of a BHC are below $10 billion, and zero otherwise
Poor Capitalization	A dummy variable that equals one if the Tier 1 capital ratio of a BHC is less than 6%, and zero otherwise
OBHC	A dummy variable that equals one if a BHC is a one-bank holding company (OBHC), and zero otherwise
Part Ownership	A dummy variable that equals one if a BHC does not fully own its troubled subsidiary, and zero otherwise
Post-2010	A dummy variable that equals one if the year is after 2010, and zero otherwise

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Table 1
Summary Statistics

This table reports summary statistics for the main variables in the regression models. Panel A presents summary statistics for the full sample. Panel B reports univariate results comparing the mean values of variables for "troubled" (treatment) BHCs and "healthy" (control) BHCs in the year prior to subsidiary failure (i.e., $T_i - 1$). Panel C reports univariate results comparing the mean values of variables for "troubled" BHCs and "healthy" BHCs in the year following subsidiary failure (i.e., $T_i + 1$). Appendix A provides variable definitions. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

Panel A: Summary Statistics for Full Sample

	N	Mean	Std. Dev.	P25	Median	P75
BHCs' capital structure						
Leverage	12319	0.914	0.081	0.882	0.918	0.947
Long-term debt	12319	0.061	0.037	0.025	0.050	0.076
Short-term debt	12319	0.046	0.025	0.012	0.033	0.068
Subordinate	12319	0.008	0.012	0.001	0.004	0.011
Deposits	12319	0.764	0.168	0.708	0.795	0.843
BHC-specific characteristics						
Size [ln(total assets)]	11263	14.501	1.554	13.468	14.320	16.275
Market-to-book ratio	11263	1.042	0.073	0.998	1.031	1.079
Profitability (ratio)	11263	0.006	0.011	0.004	0.007	0.011
Collateral (ratio)	11263	0.303	0.197	0.152	0.284	0.417
Dividend payer indicator	11263	0.834	0.364	0	1	1
Asset risk	11263	0.055	0.046	0.010	0.049	0.092

Panel B: Comparing Sample Means for Treatment and Control BHCs in Year $T_i - 1$

	BHCs with subsidiary failure			BHCs without subsidiary failure				
	N	Mean	Median	*N*	Mean	Median	Difference	*t*-statistics
BHCs' capital structure								
Leverage	363	0.956	0.947	11956	0.910	0.913	0.046***	3.50
Long-term debt	363	0.157	0.146	11956	0.065	0.045	0.092***	6.75
Short-term debt	363	0.028	0.021	11956	0.054	0.035	-0.026**	-2.19
Subordinate	363	0.014	0.008	11956	0.007	0.004	0.007***	2.64
Deposits	363	0.774	0.792	11956	0.782	0.796	-0.008	-0.81
BHC-specific characteristics								
Size [ln(total assets)]	363	15.172	14.659	10900	14.369	14.068	0.803***	6.18
Market-to-book ratio	363	0.978	0.967	10900	1.045	1.033	-0.067*	-1.70
Profitability (ratio)	363	0.005	0.005	10900	0.007	0.009	-0.002***	-2.83
Collateral (ratio)	363	0.289	0.291	10900	0.308	0.275	-0.019	-0.77
Dividend payer indicator	363	0.674	1	10900	0.887	1	-0.213	-1.41
Asset risk	363	0.066	0.062	10900	0.052	0.046	0.014*	1.89
Panel C: Comparing Sample Means for Treatment and Control BHCs in Year $T_i + 1$								
BHCs' capital structure								
Leverage	363	0.879	0.881	11956	0.910	0.913	-0.031***	-2.86
Long-term debt	363	0.010	0.008	11956	0.066	0.045	-0.056***	-4.32
Short-term debt	363	0.036	0.032	11956	0.055	0.035	-0.019	-1.57
Subordinate	363	0.008	0.002	11956	0.006	0.004	0.002	0.95
Deposits	363	0.723	0.714	11956	0.782	0.796	-0.059***	-3.73
BHC-specific characteristics								
Size [ln(total assets)]	363	15.297	14.777	10900	14.369	14.068	0.928***	7.22
Market-to-book ratio	363	0.950	0.936	10900	1.046	1.033	-0.096**	-2.31
Profitability (ratio)	363	0.004	0.009	10900	0.007	0.009	-0.003**	-2.15
Collateral (ratio)	363	0.293	0.298	10900	0.308	0.275	-0.015	-0.50
Dividend payer indicator	363	0.751	1	10900	0.887	1	-0.136	-1.03
Asset risk	363	0.075	0.067	10900	0.052	0.046	0.023***	2.94

Table 2
Subsidiary Failure and BHC Leverage

This table reports estimates of Equation (1) for US BHCs from 1986 to 2018. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Leverage	(2) Leverage	(3) Ln(1 + total debt)	(4) Equity issuance
Year 2 Before	-0.009	0.012	0.083	0.008
	(-0.24)	(0.27)	(0.92)	(0.73)
Year 1 Before	0.068***	0.063***	0.217***	0.005
	(3.44)	(3.41)	(2.95)	(0.21)
Year Zero	-0.020	0.026	0.125	-0.002
	(-0.66)	(0.81)	(1.58)	(-0.32)
Year 1 After	-0.032***	-0.036**	-0.141***	0.006
	(-4.58)	(-2.15)	(-3.27)	(0.40)
Year 2 After	0.003	-0.004	-0.052	-0.001
	(0.04)	(-0.32)	(-1.09)	(-0.03)
BHC-specific characteristics				
Size		0.012***	0.208***	0.021
		(13.14)	(27.15)	(0.74)
Market to book ratio		-0.036***	-0.080***	0.034
		(-4.61)	(-8.84)	(1.63)
Profitability		-0.450***	-0.065***	-0.052
		(-13.55)	(-3.57)	(-0.47)
Collateral		0.028***	0.172***	-0.149**
		(3.16)	(12.58)	(-1.97)
Dividend payer		-0.007*	-0.037**	0.002
		(-1.83)	(-2.35)	(0.53)
Ln(asset risk)		-0.002*	0.051	-0.055
		(-1.77)	(1.09)	(-1.60)
Peer BHC averages				
$\text{Size}_{\text{peer average}}$		0.042***	0.137***	0.080*
		(11.64)	(17.61)	(1.71)
$\text{Market to book ratio}_{\text{peer average}}$		-0.008***	-0.034**	0.032
		(-9.10)	(-2.26)	(0.84)
$\text{Profitability}_{\text{peer average}}$		-0.015	-0.093	-0.013
		(-0.67)	(-1.08)	(-0.89)
$\text{Collateral}_{\text{peer average}}$		0.019	0.160**	0.005
		(0.72)	(2.39)	(0.16)
$\text{Dividend payer}_{\text{peer average}}$		-0.009	-0.075*	0.024
		(-1.08)	(-1.92)	(0.41)
$\text{Ln(asset risk)}_{\text{peer average}}$		-0.051*	-0.127	-0.035***
		(-1.75)	(-0.66)	(-3.14)
BHC fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	12319	11263	11263	11263
Adj. R^2	0.095	0.246	0.329	0.182

Table 3
Decomposing BHC Leverage

This table reports estimates of Equation (1) after decomposing BHC leverage into long-term debt, short-term debt, subordinated debt, and deposits. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Long-term debt	(2) Short-term debt	(3) Subordinate	(4) Deposits
Year 2 Before	0.027***	0.006	-0.003	-0.024
	(2.87)	(0.56)	(-0.44)	(-0.64)
Year 1 Before	0.110***	-0.030**	0.009***	0.030
	(9.01)	(-2.44)	(2.60)	(0.91)
Year Zero	-0.012	-0.015	0.002	0.033
	(-1.00)	(-1.31)	(0.08)	(1.00)
Year 1 After	-0.060***	0.021	-0.003	-0.042**
	(-5.33)	(1.59)	(-1.42)	(-2.40)
Year 2 After	0.003	0.012	-0.001	0.018
	(0.26)	(0.57)	(-0.01)	(0.60)
BHC-specific characteristics				
Size	0.017***	0.016***	0.001	-0.047***
	(5.03)	(5.75)	(1.15)	(-6.70)
Market to book ratio	-0.060**	0.066***	-0.008***	0.241***
	(-2.22)	(2.97)	(-2.69)	(3.77)
Profitability	0.113	0.022	0.012	-0.893***
	(1.14)	(0.30)	(1.24)	(-4.52)
Collateral	0.008	-0.009	-0.002	0.009
	(0.41)	(-0.85)	(-1.30)	(0.23)
Dividend payer	-0.012	-0.007	-0.002	-0.047
	(-0.86)	(-0.59)	(-0.91)	(-1.10)
Ln(asset risk)	-0.000	0.003	0.000	-0.005
	(-0.12)	(1.37)	(1.21)	(-0.80)
Peer BHC averages				
$\text{Size}_{\text{peer average}}$	0.023***	0.018***	0.001*	-0.174***
	(4.19)	(4.61)	(1.78)	(-12.66)
$\text{Market to book ratio}_{\text{peer average}}$	0.010	0.037	-0.003	0.304*
	(0.13)	(1.55)	(-0.75)	(1.74)
$\text{Profitability}_{\text{peer average}}$	-0.233**	0.087	-0.081***	-1.917***
	(-2.24)	(1.38)	(-4.93)	(-6.99)
$\text{Collateral}_{\text{peer average}}$	0.083***	0.062***	-0.008**	-0.141***
	(3.71)	(3.04)	(-2.32)	(-4.51)
$\text{Dividend payer}_{\text{peer average}}$	-0.006	0.003	0.001	-0.047
	(-0.57)	(0.26)	(0.34)	(-1.51)
$\text{Ln(asset risk)}_{\text{peer average}}$	-0.000	0.005***	-0.001	-0.010***
	(-0.20)	(2.70)	(-1.38)	(-2.76)
BHC fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263
Adj. R^2	0.207	0.085	0.506	0.267

Table 4
Subsidiary Failure and BHC Capital Structure: PSM Approach

This table reports estimates of Tables 2 & 3 based on the propensity score matched sample. I match BHCs using a one-on-one nearest neighbour matching procedure, without replacement and based on a host of BHC-specific characteristics. Panel A tabulates the estimates used to generate the propensity scores for matching BHCs with subsidiary failure and BHCs without subsidiary failure in the year prior to subsidiary failure. *Treat* is an indicator variable set to one if the BHC experiences subsidiary failure. Panel B presents the results examining the dynamics of BHC capital structure around their subsidiary failure based on the PSM sample. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

Panel A: Estimations of propensity scores

	Treat
Size	-0.353***
	(-2.79)
Market to book ratio	-0.150
	(-0.36)
Profitability	-4.237*
	(-1.73)
Collateral	1.241
	(1.53)
Dividend payer	0.506
	(0.82)
Ln(asset risk)	-0.581
	(-1.26)
N	11263
Pseudo R^2	0.092

Panel B: Subsidiary failure and BHC capital structure based on the PSM sample

	(1) Leverage	(2) Long-term debt	(3) Short-term debt	(4) Subordinate	(5) Deposits
Year 2 Before	0.025	0.023**	-0.024*	0.004	0.047
	(0.93)	(2.42)	(-1.91)	(1.42)	(1.49)
Year 1 Before	0.051***	0.122***	-0.037***	0.011***	0.041
	(3.08)	(11.37)	(-2.92)	(2.95)	(1.26)
Year Zero	0.017	0.015	0.020	-0.002	0.012
	(0.70)	(1.36)	(1.38)	(-1.23)	(0.38)
Year 1 After	-0.033**	-0.049***	-0.009	-0.005*	-0.036*
	(-2.32)	(-4.16)	(-0.86)	(-1.83)	(-1.72)
Year 2 After	0.010	-0.018	0.014	-0.000	-0.022
	(0.51)	(-1.61)	(1.20)	(-0.00)	(-0.91)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	2138	2138	2138	2138	2138
Adj. R^2	0.216	0.252	0.083	0.466	0.215

Table 5
Subsidiary Failure and BHC Capital Structure: GMM Approach

This table checks the robustness of the estimation results in Tables 2 & 3 by using a dynamic GMM estimator. The coefficients on the dependent variable with one and two lags and the coefficients on the BHC characteristics and peer average controls are not reported for brevity. AR(1) and AR(2) are tests for first-order and second-order serial correlations in the first-differenced residuals, under the null hypothesis of no serial correlation. The Hansen tests for over-identification are under the null hypothesis that all instruments are valid. The difference-in-Hansen tests of exogeneity are under the null hypothesis that the instruments used for the equations in levels are exogenous. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Leverage	(2) Long-term debt	(3) Short-term debt	(4) Subordinate	(5) Deposits
Year 2 Before	0.020	0.031***	0.008	-0.001	-0.019
	(0.48)	(3.57)	(0.66)	(-0.05)	(-0.57)
Year 1 Before	0.056***	0.117***	-0.026**	0.014***	0.031
	(3.06)	(9.62)	(-2.28)	(3.21)	(1.53)
Year Zero	0.032	0.011	-0.010	0.008	0.021
	(1.51)	(1.05)	(-1.06)	(1.23)	(0.74)
Year 1 After	-0.029***	-0.073***	0.024*	-0.004	-0.030*
	(-3.37)	(-5.19)	(1.72)	(-1.07)	(-1.86)
Year 2 After	-0.012	-0.016	0.018	-0.001	-0.012
	(-0.68)	(-0.82)	(1.19)	(-0.00)	(-0.53)
Two lags of the dependent variable	Yes	Yes	Yes	Yes	Yes
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
AR(1) test (*p*-value)	0.000	0.001	0.001	0.000	0.000
AR(2) test (*p*-value)	0.739	0.716	0.652	0.720	0.784
Hansen test of overidentification (*p*-value)	0.327	0.291	0.265	0.386	0.397
Difference-in-Hansen test (*p*-value)	0.506	0.533	0.321	0.472	0.349
N	9820	9820	9820	9820	9820

Table 6
Cross-sectional variation in BHC capital structure changes

This table employs difference-in-difference-in-differences (DDD) regression models to test whether BHC capital structure adjustments around subsidiary failure may exhibit heterogeneity in the cross-section. *Small* is a dummy variable that equals one if the total assets of a BHC are below $10 billion, and zero otherwise. *Poor Capitalization* is a dummy variable that equals one if the Tier 1 capital ratio of a BHC is less than 6%, and zero otherwise. *OBHC* is a dummy variable that equals one if a BHC is a one-bank holding company (OBHC), and zero otherwise. *Part Ownership* is a dummy variable that equals one if a BHC does not fully own its troubled subsidiary, and zero otherwise. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. For brevity, only the coefficients of interest on the interaction terms are tabulated for each regression. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Leverage	(2) Long-term debt	(3) Short-term debt	(4) Subordinate	(5) Deposits
Panel A: Small vs. large BHCs					
Year 2 Before × Small	0.001	0.011**	0.007	-0.001	-0.009
	(0.08)	(2.49)	(1.18)	(-1.35)	(-0.69)
Year 1 Before × Small	0.062**	0.051***	-0.009*	0.003**	0.027
	(2.14)	(7.48)	(-1.71)	(2.21)	(1.05)
Year Zero × Small	0.040	-0.011	0.000	0.000	0.021
	(1.58)	(-1.20)	(0.03)	(0.18)	(0.85)
Year 1 After × Small	-0.054***	-0.030***	0.005	0.001	0.035
	(-2.75)	(-7.13)	(0.85)	(1.02)	(1.56)
Year 2 After × Small	-0.048	0.002	-0.002	0.000	0.033
	(-1.52)	(0.18)	(-0.16)	(0.08)	(1.25)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263
Adj. R^2	0.295	0.183	0.120	0.286	0.220
Panel B: Poorly vs. well capitalized BHCs					
Year 2 Before × Poor Capitalization	-0.002	0.025	0.003	-0.000	-0.012
	(-0.16)	(0.93)	(0.72)	(-0.73)	(-0.99)
Year 1 Before × Poor Capitalization	0.070***	0.072***	-0.008*	0.002***	0.009
	(3.37)	(5.15)	(-1.95)	(2.77)	(0.76)
Year Zero × Poor Capitalization	0.009	-0.002	-0.004	-0.000	0.011
	(0.66)	(-0.58)	(-1.05)	(-0.03)	(0.94)
Year 1 After × Poor Capitalization	-0.074**	-0.057***	0.006	-0.001	-0.002
	(-2.26)	(-8.48)	(1.26)	(-1.18)	(-0.20)
Year 2 After × Poor Capitalization	0.012	-0.001	0.009	-0.000	0.004
	(0.77)	(-0.30)	(1.44)	(-0.01)	(0.35)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263
Adj. R^2	0.246	0.115	0.058	0.285	0.219
Panel C: OBHCs vs. MBHCs					
Year 2 Before × OBHC	-0.006	-0.009	0.009	0.005	0.015
	(-0.18)	(-0.74)	(1.13)	(0.37)	(0.48)
Year 1 Before × OBHC	-0.034**	-0.083***	-0.011	-0.016*	0.021
	(-2.07)	(-6.96)	(-1.02)	(-1.82)	(0.65)
Year Zero × OBHC	0.008	-0.017	-0.017	0.000	-0.019
	(0.19)	(-1.35)	(-1.36)	(0.00)	(-0.42)
Year 1 After × OBHC	0.025**	0.020**	-0.039***	0.007	0.017

	(2.34)	(2.03)	(-3.26)	(0.55)	(0.56)
Year 2 After × OBHC	0.007	0.001	-0.019	-0.000	0.004
	(0.15)	(0.12)	(-1.60)	(-0.00)	(0.18)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263
Adj. R^2	0.272	0.224	0.093	0.417	0.281
Panel D: Part ownership vs. full ownership					
Year 2 Before × Part Ownership	-0.015	-0.007	0.017	-0.005	-0.020
	(-0.93)	(-0.68)	(1.42)	(-0.86)	(-0.43)
Year 1 Before × Part Ownership	-0.043***	-0.065***	0.028*	0.005	-0.016
	_(-2.72)	(-6.03)	(1.93)	(1.57)	(-0.78)
Year Zero × Part Ownership	-0.024	-0.010	-0.009	0.006	0.007
	(-1.28)	(-0.89)	(-0.94)	(1.32)	(0.34)
Year 1 After × Part Ownership	0.056***	0.021**	-0.012	0.002	-0.028
	(3.20)	(2.34)	(-0.85)	(0.31)	(-1.55)
Year 2 After × Part Ownership	-0.003	0.003	0.026*	-0.004	-0.003
	(-0.21)	(0.22)	(1.89)	(-1.29)	(-0.12)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263
Adj. R^2	0.292	0.230	0.078	0.356	0.231

Table 7
Time-series variation in BHC capital structure changes

This table employs difference-in-difference-in-differences (DDD) regression models to test whether BHC capital structure adjustments around subsidiary failure may exhibit heterogeneity across time. *Post-2010* is a dummy variable that equals one if the year is after 2010, and zero otherwise. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. For brevity, only the coefficients of interest on the interaction terms are tabulated for each regression. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Leverage	(2) Long-term debt	(3) Short-term debt	(4) Subordinate	(5) Deposits
Year 2 Before × *Post-2010*	0.019	0.024***	-0.005	0.004	0.011
	(0.83)	(2.68)	(-1.19)	(0.95)	(0.36)
Year 1 Before × *Post-2010*	0.051***	0.107***	-0.038***	0.007**	0.018
	(2.87)	(8.35)	(-3.17)	(2.12)	(0.62)
Year Zero × *Post-2010*	-0.003	-0.016	0.002	0.001	0.007
	(-0.09)	(-1.52)	(0.15)	(0.05)	(0.20)
Year 1 After × *Post-2010*	-0.042***	-0.053***	0.016	-0.002	-0.023
	(-2.62)	(-4.74)	(1.08)	(-1.39)	(-1.36)
Year 2 After × *Post-2010*	-0.007	-0.006	0.013	0.000	-0.012*
	(-0.71)	(-1.28)	(0.52)	(0.02)	(-1.72)
BHC-specific and peer average controls	Yes	Yes	Yes	Yes	Yes
BHC and year fixed effects	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263
Adj. R^2	0.255	0.214	0.093	0.380	0.271

Table 8
BHC liquidity, lending, and bond price around subsidiary failure

This table reports the dynamics of BHCs' liquidity, lending, and bond yield spreads around their subsidiary failure. *Small* is a dummy variable that equals one if the total assets of a BHC are below $10 billion, and zero otherwise. *Poor Capitalization* is a dummy variable that equals one if the Tier 1 capital ratio of a BHC is less than 6%, and zero otherwise. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Liquidity assets/Assets	(2) Total Loans/Assets	(3) Credit spread (%)	(4) Liquidity assets/Assets	(5) Total Loans/Assets	(6) Credit spread (%)	(7) Liquidity assets/Assets	(8) Total Loans/Assets	(9) Credit spread (%)
Year 2 Before	-0.045	-0.013	1.053	-0.022	-0.003	0.649	0.025	-0.020	1.134
	(-1.37)	(-1.33)	(1.25)	(-0.85)	(-0.26)	(0.69)	(0.68)	(-0.70)	(1.51)
Year 1 Before	0.043*	-0.048***	2.210**	0.036*	-0.038**	1.160	0.029*	-0.043**	1.802*
	(1.69)	(-3.63)	(2.09)	(1.68)	(-2.44)	(0.92)	(1.81)	(-2.52)	(1.67)
Year Zero	0.038	0.012	1.218*	0.013	0.027	0.885	0.124	-0.027	0.983
	(1.53)	(1.27)	(1.73)	(0.23)	(1.56)	(0.74)	(1.32)	(-1.06)	(1.22)
Year 1 After	0.012	0.009	0.765	0.032	0.009	0.543	-0.033	-0.034	0.851
	(0.56)	(0.88)	(0.81)	(1.48)	(0.49)	(0.51)	(-0.55)	(-1.11)	(0.93)
Year 2 After	0.029	0.009	-0.532	0.018	0.015	-0.279	-0.094	-0.006	-0.657
	(1.26)	(0.97)	(-0.76)	(1.00)	(1.02)	(-0.57)	(-0.98)	(-0.27)	(-0.71)
Year 2 Before × Small				-0.011	0.004	1.004			
				(-0.19)	(0.27)	(1.16)			
Year 1 Before × Small				0.040*	-0.024**	3.792***			
				(1.76)	(-2.49)	(3.28)			
Year Zero × Small				-0.057	-0.011	1.891**			
				(-1.02)	(-0.60)	(2.10)			
Year 1 After × Small				-0.078	-0.013	0.360			
				(-1.38)	(-1.24)	(0.25)			
Year 2 After × Small				-0.010	-0.005	-0.296			
				(-0.23)	(-0.55)	(-0.62)			
Year 2 Before × Poor Capitalization							0.021	-0.020	0.895
							(1.28)	(-0.74)	(1.19)
Year 1 Before × Poor Capitalization							0.039**	-0.036***	2.186**
							(2.07)	(-3.22)	(2.43)
Year Zero × Poor Capitalization							-0.026	0.042	1.534**
							(-0.88)	(1.54)	(2.25)
Year 1 After × Poor Capitalization							0.018	0.026	0.620
							(0.80)	(0.80)	(0.67)
Year 2 After × Poor Capitalization							-0.029	0.017	0.008
							(-1.03)	(0.71)	(0.09)
Small				-0.004	-0.061***	5.628***			
				(-0.56)	(-4.22)	(4.73)			
Poor Capitalization							-0.022	0.008	2.137***
							(-1.42)	(0.96)	(6.19)
BHC-specific controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peer average controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
BHC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	11263	11263	3026	11263	11263	3026	11263	11263	3026
Adj. R^2	0.307	0.322	0.198	0.439	0.410	0.325	0.461	0.483	0.356

Table 9

The Dynamic Patterns of BHC Performance and Risk Around Subsidiary Failure

This table reports the dynamics of BHC performance and risk around their subsidiary failure. *Leverage increase 1 year before* is a dummy variable that equals one if the leverage ratio for a "troubled" BHC increases one year before its subsidiary failure, and zero otherwise. *Year 2 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in two or more years and zero otherwise. *Year 1 Before* is an indicator variable equal to one if a BHC will have subsidiary failure in one year and zero otherwise. *Year Zero* is an indicator variable equal to one if a BHC has subsidiary failure in the current year and zero otherwise. *Year 1 After* is an indicator variable equal to one if a BHC had subsidiary failure one year ago and zero otherwise. *Year 2 After* is an indicator variable equal to one if a BHC had subsidiary failure two or more years ago and zero otherwise. Appendix A provides all other variable definitions. All control variables are at the consolidated BHC level. Standard errors are clustered at the BHC level. *t*-statistics are in parentheses. *** = significant at 1%; ** = significant at 5%; * = significant at 10%.

	(1) Profitability	(2) Market to book ratio	(3) Asset Risk	(4) Profitability	(5) Market to book ratio	(6) Asset Risk
Year 2 Before	0.002***	-0.008	-0.008	0.003	0.058	-0.035
	(2.82)	(-1.04)	(-0.80)	(0.69)	(0.77)	(-1.41)
Year 1 Before	0.002	0.014	-0.007	-0.000	0.021	-0.013
	(1.40)	(0.24)	(-0.70)	(-0.00)	(0.51)	(-0.37)
Year Zero	-0.000	-0.010	0.005	0.003	-0.008	0.028
	(-0.12)	(-1.36)	(0.47)	(0.37)	(-0.23)	(1.16)
Year 1 After	-0.001	-0.019**	0.013*	-0.006***	-0.040***	0.047***
	(-0.45)	(-2.27)	(1.84)	(-3.53)	(-4.53)	(3.83)
Year 2 After	-0.002	-0.018**	0.004	-0.004**	-0.020	0.015
	(-1.02)	(-2.03)	(0.40)	(-2.03)	(-0.65)	(0.83)
Year 2 Before × Leverage increase 1 year before				-0.001	-0.070	0.025
				(-0.17)	(-0.94)	(1.08)
Year 1 Before × Leverage increase 1 year before				0.002	-0.005	0.005
				(0.26)	(-0.23)	(0.15)
Year Zero × Leverage increase 1 year before				-0.004	-0.006	-0.024
				(-0.41)	(-0.27)	(-0.92)
Year 1 After × Leverage increase 1 year before				0.005***	0.023*	-0.030**
				(2.83)	(1.82)	(-2.49)
Year 2 After × Leverage increase 1 year before				0.003	0.002	-0.012
				(1.60)	(0.06)	(-0.59)
Constant	0.055***	1.086***	-0.387	0.055***	1.086***	-0.393
	(6.01)	(26.50)	(-0.63)	(6.00)	(26.49)	(-0.64)
BHC-specific controls	Yes	Yes	Yes	Yes	Yes	Yes
Peer average controls	Yes	Yes	Yes	Yes	Yes	Yes
BHC fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
N	11263	11263	11263	11263	11263	11263
Adj. R^2	0.265	0.538	0.304	0.265	0.535	0.304