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Banks' Nonbank Affiliations

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Abstract

In this paper, we highlight the liquidity and capital pressures nonbank affiliates can create on banks residing within the same bank holding company (BHC). We show in a simple model that when banks benefit from a lower cost of funds than their affiliates or parents and nonbanks benefit from lesser regulation, the BHC reallocates capital from the bank to the nonbank through internal dividends. We use the timing of the passage of the Gramm Leach Bliley Act in 1999, which removed restrictions on BHC affiliation with certain types of nonbanks, to test model predictions. A difference-in-differences analysis shows that BHCs funded expansion into lesser regulated investment banking through internal bank dividends, while BHCs that expanded into more regulated insurance-underwriting did not.

Keywords and phrases: *Bank holding companies, nonbanks, dividends, internal capital markets, risk management*
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I. Introduction

The extent to which laws and regulations should allow banking organizations to comingle with nonbanks has been a point of continued historical policy contention and academic debate. The Glass-Stegall Act of 1933 established boundaries between banks and certain nonbanks and regulatory policy altered those boundaries over the subsequent generations. Passed on November 12, 1999, the Gramm-Leach-Bliley Act (GLB) enabled BHCs to operate as financial holding companies (FHCs) and engage in previously prohibited nonbank activities, such as securities underwriting and dealing, insurance underwriting, and merchant banking.[1] The 2008 financial crisis and the Dodd-Frank Act of 2010 rekindled the debate on the scope of activities that banking organizations should perform. While broad-scope banking potentially helps customers by giving them single-window access to a broad menu of services, these effects are not without costs. Regulatory concerns focus on the systemic risk that bank holding companies (BHCs) create because of their nonbank affiliates within the same organization (BHC).[2] In this paper, we highlight a different and somewhat subtle channel in which liquidity and capital pressures on the bank subsidiaries from the parent holding company are a function of the nonbank expansion.

We use the passage of the GLB as a shock to scope economies caused by the elimination of acquisition restrictions of nonbank firms. Although the restrictions of the Glass-Steagall Act had been diluted prior to GLB by the establishment of Section 20 subsidiaries, significant constraints existed that prevented BHCs to expand their nonbank operations.[3] In terms of securities underwriting and dealing, a BHC could not derive more than 25 percent of its gross

[1] The stated rationale for GLB, also known as the Financial Services Modernization Act of 1999, was to "modernize" the industry by taking advantage of economies of scope. As the former President of the Federal Reserve Bank of Richmond, J. Alfred Broaddus remarked, "There are substantial economies to be gained, for example, from combining credit evaluation for the banking and securities businesses in a single company. . . I think these [GLB created] combinations—precisely because they are being driven by basic potential economies of scale and scope—will increase efficiency in financial services markets. . . " (Broaddus (2000)).

[2] Laeven, Ratnovski, and Tong (2014) find that systemic risk increases with the complexity of a bank. Meanwhile, De Jonghe (2010) finds that heterogeneity in banks' tail risk is attributable to differences in the scope of nontraditional banking activities.

[3] The name pertains to section 20 of Glass-Steagall Act, which allowed BHCs to engage in securities and dealing in restricted terms.

revenue in underwriting and dealing in corporate debt and equity securities. In addition, a Section 20 subsidiary of a BHC could not acquire more than 5 percent of voting securities of a company in a dealer capacity. Similar constraints applied to insurance activities. For example, BHCs were not allowed to sell insurance as agent in places that had population of 5,000 or more. In terms of merchant banking, the ability of BHCs to provide equity financing to nonfinancial companies was restricted. BHCs were not allowed to hold more than 5 percent of the voting securities, or more than 24.9 percent of the total equity of a nonfinancial firm. However, GLB freed BHCs from these constraints and gave them the opportunity to expand operations in nonbank activities.

The newly acquired investment powers of GLB necessitated that BHCs decide how to finance the new expansion opportunities. One avenue to expand was through raising equity at the parent holding company level as predicted by Stein (1997). However, BHCs are averse to raising external equity since the size of their balance sheets is determined primarily by the availability of leverage (Adrian and Shin (2010)). Alternatively, parent holding company could borrow either directly from the capital markets or rely on internal dividends from its bank subsidiaries. The latter strategy is sensible if the funding costs are less than alternative funding options in the BHC, either at the parent or nonbank subsidiary levels. In this case, however, leveraging the bank subsidiary brings costly regulatory scrutiny. The goal of this paper is to understand the trade-offs the BHC faces to finance the nonbank expansion and how this decision affects the bank subsidiaries of the BHC.

We first develop a simple model to understand the trade-offs of bank versus parent debt financing. In the model, either the parent holding company or the bank subsidiary raises external debt and the latter has a funding cost advantage. In addition, the parent can reallocate capital from the bank subsidiary to the nonbank via internal dividends. A regulatory capital constraint exists both at the bank subsidiary and the consolidated BHC level, which limit the ability of the parent to use the bank subsidiary as a source of cheap funding. We show that strictly positive funding cost advantages at the bank and strictly higher returns on investments at the nonbank are both necessary conditions for the bank to fund the nonbank via internal dividends, but neither is sufficient. Consequently, we predict that in the context of GLB, BHCs are more likely to use internal dividends from the bank subsidiary to fund nonbank expansion for lesser regulated investment banks than more highly regulated insurance affiliates. We follow a novel approach and use internal dividends information reported in regulatory filings to test this hypothesis.

Our working assumption in testing the increase in banks' internal dividends is that GLB created exogeneity in the timing at which bank subsidiaries could begin affiliating with certain nonbanks. Under GLB, BHCs could undertake previously prohibited affiliations as early as March 2000 by becoming financial holding companies (FHCs). We assume that those BHCs that opted to become FHCs in March 2000, and particularly those that immediately established subsidiaries in previously prohibited activities, had been constrained by the Glass-Steagall restrictions.[4] In our baseline specification, the treated group consists of thirty-two BHCs that converted to FHCs by December 31, 2000 and had an investment bank subsidiary by that date. The control group consists of 229 BHCs that converted to FHCs by December 31, 2000, but did not have an investment bank subsidiary by that date. Similarly, the treated group of FHCs with insurance subsidiaries is 106, with 155 control FHCs. The control groups allow us to account for other trends in the banking industry surrounding GLB and we assume that the restrictions on affiliation for the control groups had not been binding prior to GLB.

To determine the significance of the capital withdrawal from the bank subsidiaries, we undertake a difference-in-differences analysis. We show that following the GLB, consistent with the predictions of the model, bank subsidiaries belonging to the newly formed FHCs that expanded into investment banking increased their payout ratios significantly by 16-percentage points relative to the control group during the 2000 to 2002 period. In contrast, we find that banks within FHCs expanding into insurance underwriting did not increase significantly their internal dividends. The different internal dividends responses of FHCs with insurance and

[4] On March 13, 2000, the first day that BHCs were eligible to become FHCs, the Federal Reserve approved 117 applications. In fact, forty of the forty-two US BHCs that operated section 20 subsidiaries became FHCs. The two remaining BHCs operated their section 20 subsidiaries under the GLB's provisions. Source: Report to the Congress on Financial Holding Companies under the GLB Act, November 2003. P. 8.

investment banking subsidiaries imply that our results cannot be attributed to expansion itself (e.g., mergers), but rather reflects the reaction to the nature of the expansion. We further show that those FHCs that increased their internal bank dividends following GLB were those that also had higher subsequent nonbank investments. FHCs expanding into investment banks also did not increase their external dividends following GLB, suggesting that bank capital was reallocated internally. Collectively, the investment bank treated FHCs in our sample increased internal dividends from \$64 billion in the three years preceding GLB to \$99 billion in the three years subsequent to GLB. Simultaneously, treated FHCs nonbank investments rose by \$21 billion from the three years preceding GLB to the subsequent three years.[5]

Our model predicts that for transfers of capital through internal dividends to occur, banks need to have a funding cost advantage. Thus, we test for differences between banking organizations and investment banks and insurance firms. In addition, we test for differences within the banking organization between the parent holding company and its bank subsidiaries. We find that bonds at issuance for parent and their subsidiary banks had spreads over treasury of about 13 bps lower than bonds at issuance for investment banks and 18 bps less than bonds at issuance for insurance firms. Within the BHC, issuance at the bank subsidiary is advantageous relative to the parent holding company. Bonds issued by the bank subsidiaries have ratings about 0.8 notches higher than bonds with similar characteristics issues by the parent. Consequently, we find that within the same BHC, bond issuance costs at the parent holding company were 41 bps higher than issuance at its subsidiary banks, making the bank subsidiary a cheaper source of funding for the organization. We note that the funding cost advantage may be even greater for the bank if we were to also consider the advantage of being able to raise insured deposits. However, the challenge of measuring the full cost of deposits (e.g. operation of bank branches) and lack of comparable debt instruments at nonbanks make bonds the most appropriate basis for comparison.

The other requirement for bank funds to be channeled to a nonbank affiliate is that the nonbank must have higher return investment opportunities than the bank, for example, due

[5] The data do not allow us to distinguish the specific nonbank to which capital is downstreamed.

to differences in the regulatory oversight of operations. At the time of GLB, investment banks were regulated by the SEC but subject to weaker capital regulation than banks (two percent of aggregate debit items, SEA Rule 15c3-1) whereas insurance firms were regulated by states and were under risk-based capital regulation similar to banks that penalized non-investment grade securities.[6] Given the observed funding advantages at the bank subsidiary, a profit maximizing BHC can find it optimal to channel bank capital to investment banking subsidiaries where capital can be levered at a higher multiple rather than at insurance subsidiaries or banks. In addition, there existed demand for growth in the investment bank industry relative to the insurance industry. During the 2000 to 2006 period, the average insurance underwriting firm in COMPUSTAT grew by 123 percent, while the average investment banking firms grew by 349 percent (excluding companies that are BHC affiliated in both cases). Such a high relative growth in competitors required extensive financing needs for the new entrants to the industry, which placed pressure on the parent company to ease the financing constraints and costs on investment banking subsidiaries. In addition to these factors, other regulation induced incentives could have created the tendency for a BHC to move capital from the bank subsidiary to a nonbank subsidiary. For example, regulations treat nonbank subsidiary as bankruptcy remote in a bank failure in a way that the parent entity and other banks within the BHC are not. Particularly, FDIC can assess the cost of resolving a failed bank against other banks within the BHC but not against other nonbanks.

At first glance, regulatory constraints might impede our hypothesis that the BHC would use bank capital to support nonbank operations. Sections 23A and 23B of the Federal Reserve Act address regulatory concerns relating to a BHC's incentive to use the its bank subsidiaries as support for other parts of the BHC. These regulations require that transactions across affiliates within the BHC, including credit decisions, asset sales, and leases, be conducted at arm's length. In addition, these regulations restrict advertising that suggests that the bank "shall in any way be responsible for obligations of its affiliates." Thus, regulation recognizes

[6] See NAIC Model Laws, Regulations, Guidelines and Other Resources, April 2001, https://www.naic.org/store/free/MDL-283.pdf

the incentive to use the bank to support a nonbank affiliate and restricts doing so through these limitations.

Yet, Board of Governors of the Federal Reserve System (2016), the Bank Holding Company Supervisory Manual (BHCSM) explicitly argues in favor of using bank internal dividends to support a nonbank affiliate. For example, guidance states, "because the bank is usually the largest subsidiary, the holding company may attempt to draw upon the resources of the bank to aid the nonbank subsidiary. The bank can transfer a substantial portion of its capital through dividends to the parent company, which may pass these funds on to the troubled nonbank subsidiary" (BHCSM, 2016 Section 4030.0). In other words, internal dividends remain a mechanism through which the BHC can use the bank to support the rest of the organization.

Our paper relates to several strands of literature. First, the results add to the literature on economies of scope in general and banking in particular. Cetorelli, Jacobides, and Stern (2017) demonstrate the expansion of nonbank activities over time and report a negative relationship between scope expansion and BHC performance. Their results are consistent with both a narrower literature in banking that finds a similar result (e.g., Stiroh (2004), Stiroh and Rumble (2006), DeYoung and Torna (2013)) as well as a broader literature on scope-economies (e.g., Comment and Jarrell (1995), Morck, Shleifer, and Vishny (1990), Matvos, Seru, and Silva (2018), Villalonga (2004), Schoar (2002)). In contrast, our paper leaves aside the question of whether scope economies are efficient and focuses instead on the funding decisions through which BHCs achieve economies of scope. We find that scope expansion via internal dividends is generally associated with a diversion of funds from the bank subsidiaries to the nonbank affiliates.

Second, the results presented in the paper fit into a large literature on the internal capital markets at BHCs. This literature focuses on the management of loans using internal capital markets between banks within a BHC. Houston, James, and Marcus (1997), Houston and James (1998), and Holod and Peek (2010) find that multibank holding companies establish internal markets to smooth loan growth. The literature also shows that internal capital markets lessen the impact of monetary policy on bank lending and reallocate resources to those banks with the greatest need for capital and that this reallocation occurs through loan sales and purchases (Campello (2002)). Further, banks raise deposit rates at branches in one state to help fund loan growth in other states (Ben-David, Palvia, and Spatt (2015)). Another branch of this literature focuses on lending by multi-market and multinational banks. Cortés and Strahan (2017) show that multi-market banks reallocate funds toward markets with high credit demand and away from their traditional markets. De Haas and Van Lelyveld (2010) find that the parent's financial strength is an important determinant of credit supply for foreign subsidiaries in times of crisis. Cetorelli and Goldberg (2012) show that liquidity is reallocated using internal capital markets such that those affiliates deemed most important for revenue generation are protected, while traditional funding locations are used as a buffer against shocks to the parent's balance sheet. In contrast to these studies, we study the internal capital markets at work between bank and nonbank segments within the holding company, and we examine the internal dividends rather than focusing on investments, particularly on loan sales and purchases.

Last, we add to the literature on mergers and acquisitions by proposing a new channel through which the acquirer can relax a target's financial constraints. Namely, the target nonbanks in our case need funding for expansion and parent uses one segment of the holding company, the bank, to provide nonbanks the flexibility in terms of financing needs. In this regard, our paper complements Erel, Jang, and Weisbach (2015), who focus on the targets after acquisition by nonfinancial firms whereas we focus on the existing subsidiaries of the acquirer.

The paper is organized as follows. Section II presents a simple modeling framework to understand BHC funding incentives for nonbank expansion. Section III describes the data. Section IV discusses the difference-in-differences analysis and results and examines the uses of internal dividends at FHCs. Section V examines funding costs differences between banks, other financials, and parent holding companies. Section VI concludes.

II. Model

In this section, we model the funding decision of a parent holding company when it faces an unexpected and exogenous regulatory change that allows nonbank expansion opportunity into an investment bank or insurance agency. Before the regulatory change, we consider a simple structure for the BHC organization, such that it is composed of a parent holding company and a bank subsidiary. Regulatory change provides new opportunities to expand into investment bank and insurance underwriting activities. We assume investment banking is less regulated than insurance agencies and banks, consequently, they have higher returns. To finance the expansion, the parent holding company can borrow from external sources and downstream the funding to its nonbank.[7] Alternatively, the bank subsidiary can raise debt and can pass funds to the parent via internal dividends, which then downstreams the funds to the nonbank subsidiaries. In the model, there is a tradeoff between using the funding cost advantage of the bank subsidiary to fund the higher return nonbank affiliate and the regulatory cost of increasing bank leverage and weakening the bank capital ratio. The following framework models these financing options and develops predictions for our empirical tests.

Our modelling exercise relates to the literature of organizational funding and funding structure of firms, particularly financial firms. Boot and Ratnovski (2016) argue that banks may inefficiently allocate too much capital to trading activities, exacerbated by risk-shifting incentives. Other papers in the literature characterize the optimal organization structure given various institutional environments. Luciano and Nicodano (2014) and Nicodano and Regis (2019) rationalize organizational structures and intrafirm transfers based upon a tax-bankruptcy tradeoff. The latter finds that "it never pays to concentrate leverage in the subsidiary, absent bailouts." Kahn and Winton (2004) suggest that a "bipartite" structure with separate subsidiaries tends to be more efficient from a "unitary" structure in which activities are combined, mitigating moral hazard in financial firms. Kolasinski (2009) concludes similarly for nonfinancial firms. Meanwhile, Banerjee and Noe (2017) develop a theory in which

[7] BHCs are averse to equity financing (Adrian and Shin (2010)). In addition, our sample of banks do not exhibit significant equity financing around the passage of GLB, and no higher than banks outside of our sample.

the parent and subsidiary both issue debt to minimize agency frictions associated with imperfectly enforceable debt contracts. In contrast, we do not aim to characterize the optimal subsidiary structure. Instead, we take as given the requirement of legal separation between banks and their GLB-enabled nonbank affiliates and study how bank funding is used to support investment banking and insurance affiliates. Similar to the existing literature (e.g. Boot and Ratnovski (2016)), we find that pairing banks with higher return/lesser regulated entities creates an incentive to transfer capital from the bank subsidiary to the parent via internal dividends.

A. Model Structure

A.1. Simple Bank Holding Company

Before the regulatory change, the parent holding company solves a simple static profit maximization function to fund itself and its banking subsidiary. The parent has an existing equity E and chooses to raise debt at the parent and the bank subsidiary levels, $\hat{D}_P$ and $\hat{D}_B$, respectively. The parent downstreams its equity to the bank subsidiary as an equity investment.[8] However, the parent may choose to retain T_0 of its equity at the parent level. This retention can also be thought as a simultaneous internal dividend payment by the bank subsidiary to the parent. The parent and its bank subsidiary interest cost of funds are c_P and $c_B = c_P - \Delta c$, respectively, where $\Delta c \geq 0$. The lower interest cost on bank debt can be the result of access to deposit markets, including insured deposits, or implicit government guarantees. In addition, the bank's return on investments is r_B and the parent's return on its own investments (i.e., those investments not made at the subsidiary bank) is r_P. For a simple bank holding company, we assume that the return on assets at the bank is at least as high as that of the parent $r_B \geq r_P$.

Capital regulation exists both at the bank and the consolidated BHC levels. Compliance costs are inversely proportional to capital ratios; they increase as the bank subsidiary or the

[8]This is consistent with regulatory treatment. Equity raised at the parent holding company level can be counted as equity at the bank level if the parent chooses to invest its equity proceeds into its bank subsidiary.

BHC increase leverage. Consistent with capital regulation, capital compliance for the parent is measured on a consolidated basis, netting out intracompany claims, rather than a legal entity basis. Regulatory compliance-cost of the BHC and the bank subsidiary are scaled by κ_P and κ_B, respectively.[9] We allow for the costs of multiple regulators to be arbitrarily small (i.e., κ_P may be arbitrarily close to zero). Compliance costs reflect that as leverage increases and the institution gets closer to the regulatory required capital ratio, costly supervisory scrutiny increases, such that there is an increasing marginal cost of using debt to fund the organization. Calculating capital on a consolidated entity basis implies that debt raised by the bank or the parent holding company counts toward the BHC capital ratio, while debt raised by the parent does not count toward the bank's capital ratio. In addition, internal dividends of capital from the bank to the parent affect the bank's capitalization ratio, but not the BHC's. The required capital ratios for the bank and the BHC are R_B and R_P, respectively. The parent chooses its debt, equity, and internal dividends levels (T_0) to maximize its profits, such that regulatory capital requirements are not breached. Specifically:

$$
\begin{aligned}
\Pi_0 \quad = \quad & \max_{\hat{D}_B \geq 0, \hat{D}_P, \geq 0, T_0, \geq 0} r_B(\hat{D}_B + E - T_0) + r_P(\hat{D}_P + T_0) - c_B\hat{D}_B \\
& -c_P\hat{D}_P - \kappa_B \frac{\hat{D}_B + E - T_0}{e_B} - \kappa_P \frac{\hat{D}_B + \hat{D}_P + E}{e_P}, \qquad (1)
\end{aligned}
$$

The first term $r_B(\hat{D}_B + E - T_0)$ represents the return on bank-subsidiary assets. The second term $r_P(\hat{D}_P + T_0)$ represents the return on parent assets. The terms $c_B\hat{D}_B$ and $c_P\hat{D}_P$ represent the total debt interest expense of the bank and the parent, respectively. The last terms represent the costs of capital regulation, where $e_B = E - T_0 - R_B(\hat{D}_B + E - T_0)$ and $e_P = E - R_P(\hat{D}_P + \hat{D}_B + E)$ denote the excess capital held at the bank and the consolidated level,

[9] Separate regulatory costs can emanate from bank subsidiaries and BHCs having different regulators. BHCs are exclusively regulated by the Federal Reserve Board (Fed) in the U.S., while subsidiary banks can be regulated by different agencies, such as the state regulators, the FDIC, the Fed and the OCC. As of December 2000, over 80 percent of all commercial banks, including more than 73 percent of those less than $100 million were part of a BHC. See https://www.fedpartnership.gov/bank-life-cycle/grow-shareholder-value/bank-holding-companies. Meanwhile, only 10 percent of banks had the Fed as their primary federal regulator at that time.

respectively. As the bank or the consolidated BHC exceeds the regulatory capital, the impact of κ_i, the parameter reflecting the relative compliance costs for entity i, lessens. We assume that parameters are such that for a simple BHC organization with just a parent and bank subsidiary,[10] we have an interior solution $(\bar{D}_B, \bar{D}_P)$.

The first result is that in the simple BHC, the parent holding company downstreams all its equity to the bank subsidiary or equivalently, the bank subsidiary does not transfer capital (pay dividends) to the parent

Proposition 1: *The parent BHC downstreams all of its equity to its bank subsidiary.* $T_0^* = 0$.

Proof in Appendix B. The result follows from weakly higher returns at the bank and the fact that capital held at the bank reduces capital compliance costs, without affecting the parent's capital compliance costs.

A.2. Gramm Leach Bliley

The Gramm-Leach-Bliley Act enabled BHC nonbank expansion into new types of nonbank subsidiaries, specifically, investment banking and insurance. At the time of the passage of GLB, we assume that BHCs were positioned to expand into investment banking, insurance agencies, or not. Consequently, we model the parent holding company's decision of how to fund the nonbank opportunities, taking as given the desire to expand at the first opportunity.

Our modelling provides a static comparison of the parent's choice of its debt in this new environment with that of the simple organization (i.e., without anticipation of future nonbank expansion opportunities). In this new setting, the parent chooses to optimize its debt, D_P to fund new nonbank investments. The parent can also raise additional debt D_B at its bank subsidiary beyond the $\bar{D}_B$. The parent can pull these funds from the bank subsidiary via internal dividends, T, and reallocate the funding to the nonbank subsidiary. The return on nonbank investments (r_N, $N \in \{IN, IB\}$) exceeds the bank return, $r_{IB} > r_{IN} \geq r_B$, where IB denotes the investment banking return and IN denotes the insurance subsidiary

[10] This assumption excludes corner solutions in which the bank or BHC take on no debt.

return. The difference between the bank and investment bank returns arise because of different regulatory environments. There exist explicit restrictions on bank investments relative to investment banks, a regulatory regime that imposes costs on investments, or higher linear costs of debt associated with bank capital regulatory compliance costs. We also allow insurance subsidiary and bank subsidiary returns to differ, though assume that differences are smaller due to similar regulatory restrictions. Thus, Δc represents the funding costs advantages of banks relative to its parent, while $\Delta r_N = r_N - r_B$ captures any differences in returns arising from a less constraining regulatory regime.[11] For simplicity, we assume that investment banks and insurance agencies are not subject to capital requirements. Capital requirements for nonbank subsidiaries adds complication to the model, without affecting the main model tradeoffs. In addition, nonbank investment return is greater than the parent's investment return (r_P), so that the parent has no incentive to make its own investments.

Assumption 1: *We assume that the return on the investment banking subsidiary is high and the return on the insurance subsidiary is low. In particular,* $r_{IB} > \frac{\kappa_B \bar{D}_B}{[(1-R_B)E - R_B \bar{D}_B]^2}$ *and* $r_{IN} < \frac{\kappa_B \bar{D}_B}{[(1-R_B)E - R_B \bar{D}_B]^2}$

The parent's objective is to choose the financing source of the nonbank expansion such that profit is maximized. Specifically:

$$\begin{aligned}\Pi \quad = \quad & \max_{T \geq 0, D_B \geq 0, D_P \geq 0} r_B(D_B + \bar{D}_B + E - T) + (r_B + \Delta r_N)(D_P + T) - c_B(D_B + \bar{D}_B) \\ & -c_P D_P - \kappa_B \frac{D_B + E - T}{e_B} - \kappa_P \frac{D_B + D_P + E}{e_P}, \end{aligned} \tag{2}$$

The first term represents the returns from the bank, the second term represents the returns at the nonbank, and the third and fourth terms represent the interest costs of debt at the bank and parent, respectively. The last two terms represent the cost of capital regulation at the bank and parent, respectively. Excess bank and parent capital are denoted by $e_B =$

[11] For simplicity, we use a partial equilibrium analysis and do not allow returns or costs of funds to change with the addition of nonbank expansion opportunities.

$(E - T) - R_B(D_B + \bar{D}_B + E - T)$ and $e_P = E - R_P(D_P + D_B + \bar{D}_B + E)$, respectively.[12]

Given the model assumptions, our second result is that the parent uses internal dividends to transfer capital from the bank to an investment banking subsidiary, but not an insurance subsidiary.

Proposition 2: *Bank subsidiary internal dividends are zero when the BHC expands into insurance underwriting . Bank internal dividends are strictly positive when the BHC expands into investment banking.*

Proofs in Appendix B

In addition, we show that internal dividends are weakly increasing in the Δr_{IB}.

Proposition 3: *Internal dividends are strictly positive for a BHC with an investment banking expansion opportunity, and increasing in the return of the investment bank. That is, internal dividends T are increasing in the return of the investment bank, $\partial T^*/\partial \Delta r_{IB} \geq 0$.*

Proof appears in Appendix B.

In sum, our model predicts that internal dividends to fund the parent are zero in a setting where GLB opportunities do not exist ($T_0^* = 0$) and are higher ($T^* > 0$) in a setting with GLB opportunities only if the BHC expands into investment bank activities. As a result, the capital position of the bank subsidiary is weakened, as the parent finds it optimal to use the bank to fund its lesser regulated investment bank affiliate.

III. Data

A. Sources

Data for our analysis come predominantly from Reports of Condition and Income (Call Reports), Consolidated Financial Statements for Holding Companies filings (Y-9C), and the

[12] SR 00-13 argues that "Most of the concepts discussed in [the regulatory framework of FHCs] are already being applied by the Federal Reserve in the context of the consolidated supervision of BHCs." However, SR 00-13 also discusses the expanded role of the Federal Reserve under GLB. For simplicity, we assume that κ_P does not change with nonbank expansion opportunities.

Annual Report of Holding Companies (Y-6) and Report of Changes in Organizational Structure (Y-10). Federal Reserve Board calls the latter two as "structure data." In some analysis, we also rely upon Parent Company Only Financial Statements for Large Holding Companies (Y-9LP), which are financial statements of all bank holding companies within the organization structure for large BHCs, filed at the legal entity level (in contrast to a consolidated level).

Using the structure data, we identify BHCs that converted to FHCs as of year-end 2000, the first year during which they could do so. To remain consistent across changes to reporting requirements, we require that consolidated BHC assets are greater than $150 million through the sample period. We exclude foreign banking organizations. Two reasons exist for this exclusion. The top Y-9C filer does not correspond to the ultimate parent within the holding company and measurements of dividends at the Y-9C level are themselves internal distributions to the foreign parent. We also follow Benartzi, Michaely, and Thaler (1997) and use annual rather than quarterly data. We focus on the six years surrounding the establishment of FHCs, 1997 through 2002.

Our analysis relies upon the classification of bank and nonbank subsidiaries into two identifiable segments of a BHC. Over time, the organizational structures of BHCs have become extremely complex, and data sources for various subsidiaries and the parent holding company itself are dispersed across a number of regulatory filings (Avraham, Selvaggi, and Vickrey (2012)). Typically, a BHC can have three types of subsidiaries: an insured bank, a nonbank, and a subsidiary BHC. The subsidiary BHC can have a similar types of subsidiaries, resulting in a complex vertical organizational structure. In Appendix A, we explain this complex structure and various regulatory filings that we use to construct the data and the sample.

From the structure data, we classify nonbank subsidiaries into industry type using their reported primary NAICS code. For each NAICS code, we use a binary classification for each BHC-year equal to one if there is a nonbank subsidiary in their organizational structure with that NAICS code as of December 31 of that year. The number of NAICS digits we use varies across subsidiaries to retain a meaningful number of observations for various nonbank types.

Although we can identify which nonbanks affiliate with which BHC from the structure data, detailed financial data at the individual nonbank level is not available. Not all nonbank subsidiaries report financial data at the legal entity level. We do not observe financial data by nonbank activity (i.e. in terms of NAICS codes), such as assets or revenues of the investment banking or insurance affiliates in the BHC. As a result, we use aggregate information on cash flows and parent investments in nonbank and BHC subsidiaries available in the Y-9LP filings to construct the nonbank affiliate variables. Another complication is that a subsidiary BHC can also have nonbank subsidiaries. To obtain the nonbank financial data for the entire holding company organization, we aggregate income and investments across all BHCs within the structure. Consequently, each nonbank dollar of income or assets is counted only once, corresponding to the lowest level of BHC owner. Finally, we subtract any thrift data (available from Call Reports) from the nonbank segment where appropriate because nonbanks include thrifts in the Y-9LP definition.

B. Summary Statistics

We begin by documenting the nonbank subsidiaries into which FHCs expanded after the passage of GLB. Table I reports the proportion of BHC-years in which a BHC owned a nonbank subsidiary by NAICS code for FHCs and non-FHCs, for pre-GLB (1997-1999) and post-GLB (2000-2002). We sort the table in descending order by the change in the proportion of BHC-years after GLB took effect for FHCs and report only those industries for which there is an increase in the proportion of FHCs with the nonbank type.[13] At the top of the list appear Insurance Agencies (NAICS 5242), followed by Fund, Trusts, and Other Financial Vehicles (525), and Investment Banking and Securities Dealings (NAICS 52311). FHCs expanded investment banking and insurance activities by 17.6 and 8.4 percentage points, respectively. In both cases, the increase in the proportion of FHCs owning these subsidiaries is notably greater than the increase of non-FHCs owning these subsidiaries. Despite an increase in the proportion of Funds, Trusts, and Other Financial Vehicles following GLB for FHCs (13 percentage points), non-FHCs experienced an even larger increase (18 percentage point),

[13] All other nonbank subsidiary affiliations are nonfinancial and experienced a decline after the passage of GLB.

suggesting that the expansion into Fund, Trusts, and Other Financial Vehicles subsidiaries was independent of BHCs taking advantage of the law's passage. Thus, consistent with the text of the law, GLB had a meaningful impact on the expansion of insurance and investment banking activities for FHCs.

We use a difference-in-differences analysis to test our hypotheses. Our treated group consists of BHCs that elected to become FHCs with investment banking or insurance subsidiaries. We view these FHCs to be constrained in their ability to expand their nonbank activities under Glass-Steagall restrictions and the passage of GLB to have removed those constraints. The control group consists of BHCs that elected to become FHCs but did not establish insurance or investment banking subsidiaries.

We construct two treated groups: investment banking FHCs and insurance FHCs. Those that were FHCs according to the National Information Center (NIC) with an investment banking subsidiary in 2000 constitute the investment banking treated group. Those FHCs that had insurance subsidiaries in 2000 constitute the insurance treated group.[14] Consistent with Floyd, Li, and Skinner (2015), we drop observations with negative income because calculation of payout ratio becomes problematic.[15] In addition, we restrict attention to FHCs with data both before and after the passage of GLB. There are 261 FHC conversions in total by the end of 2000. Of these, 6 FHCs have only investment banking, 26 have investment banking and insurance, and 80 have only insurance subsidiaries as of the end of 2000. The remaining 149 FHCs had neither investment banking nor insurance subsidiaries. In the reported regressions, the investment banking treated group includes 32 FHCs, 26 of which have investment banks and insurance subsidiaries. The control group constitutes 229 FHCs that have no investment banking. The insurance treated group has 106 FHC that have an insurance subsidiary and the control group consists of 155 FHCs that did not have an insurance subsidiary. In unreported analysis, we find that our results are robust to alternative definitions of control groups. For example, in one alternative specification we use a common control group of 149 FHC and use

[14] Including FHCs that took on both investment bank and insurance agency subsidiaries after 2000 from the control group does not materially change the results.

[15] Two FHCs from the control group are dropped as a result of this restriction.

32 treated FHCs for investment banking and 106 treated FHCs for insurance.

In Table II, we report summary statistics for our treated groups and the group that had neither investment banks nor insurance subsidiaries as of 2000 for pre- and post GLB periods. The focal variable in Table II is the payout ratio, expressed as the ratio of bank dividends to bank income. Because the denominator can tend toward zero causing the expression to go to infinity, we winsorize the payout ratio at the 99th percentile. We observe that prior to GLB, the average bank payout ratio was 52.8% for FHCs that did not expand into investment banking and insurance activities and remained at that level following GLB. For the bank subsidiaries of FHCs with investment banks, the average payout ratio rose significantly from 58.0% pre-GLB to 74.7% post-GLB. This increase is significantly different from FHCs that did not expand into investment banks or insurance. The dividends to bank assets ratio shows similar results to the payout ratio. In contrast, bank subsidiaries of FHCs with insurance subsidiaries show a slight increase in payouts but the increase is not statistically significant. The univariate observations provide the initial evidence that FHCs that expand to investment banking pulled significant capital from their bank subsidiaries, while this is not the case for FHCs with insurance subsidiaries.

IV. Analysis

In this section, we first examine the changes in the internal dividends of bank subsidiaries following the passage of GLB. Next, we examine how the parent used internal dividends within the BHC.

A. Bank Funding: Difference-in-Differences

We use the passage of GLB in 1999 as the identifying event for the causality of nonbank expansion on internal dividends of bank subsidiaries. The costs of nonbank acquisition, such as integration of these new entities into the organization and funding needed to relieve the target nonbanks' possible financial constraints, all increased demand for financing. Our model predicts that BHC would use bank resources if expanding into investment banking activities and avoid this source if expanding into insurance activities. Thus, evidence of a jump in the bank internal dividends following the passage of GLB for BHCs with investment banking subsidiaries but not insurance subsidiaries supports the hypothesis that nonbank expansion caused the internal dividends of bank subsidiaries to increase.

The difference-in differences specification is as follows:

$$Payout_{jt} = \gamma_1 Treated_j + \gamma_2 Post_t + \gamma_3 Post_t * Treated_j + \Gamma Controls_{jt} + \epsilon_{jt}, \tag{3}$$

where j and t denote banking organization and the time, respectively. *Payout* is the aggregate bank subsidiary dividends to earnings ratio.

The variable *Treated* equals one for the treated sample and zero for the control sample. *Post* is equal to one for post-GLB period and zero for pre-GLB period. The difference-in-differences estimator, γ_3, is the coefficient on the product of the *Treated* and *Post* variables.

Depending on the specification, the vector *Controls* contains either BHC fixed effects or financial variables that are correlated with the internal dividend decisions. Financial variables include: logarithm of the aggregate bank subsidiaries asset size, profitability measured by the aggregate bank subsidiary return on assets (ROA), and external dividend payouts. Dividend studies generally find size to be a determinant of payout policy (e.g., Brown, Liang, and Weisbenner (2007)). Higher profitability makes it easier for the banking organization to pay higher dividends without attracting regulatory scrutiny. Finally, the external dividend decision can affect how much cash the holding company extracts from the subsidiaries

Table III presents the regression results for the difference-in-differences analysis for the investment bank treated group. Column 1 reports estimates from the pooled regression approach, treating each BHC-year as a separate observation. The coefficient of interest on the interaction term shows that the bank-subsidiary payout ratios for the treated group rose by 18.1 percentage points in the post-GLB period relative to the control group, significant at the 1 percent threshold.

Bertrand, Duflo, and Mullainathan (2003) argue that the standard errors of a pooled difference-in-differences estimator are generally understated. To address this concern, they recommend aggregating each firm's pre- and post-treatment data into a single pre- and single post-observation. Using this approach, we construct the three-year payout ratio for each BHC in the pre- and post-GLB periods.[16] We show in Column 2 that the payout ratios for treated BHCs rose by 15.5 percentage points relative to the control group, significant at the 5 percent level.

In Columns 3 and 4, we show that the magnitude and statistical significance persist after including control variables and BHC fixed effects, respectively. In Columns 5 and 6, we control for an insurance treatment effect. We find effects of similar magnitude and statistical significance, which shows that an insurance treatment effect does not drive our estimates of internal dividends of banks with investment banks. An implicit assumption of this specification is that the effects of investment banks and insurance subsidiaries are separable. In Columns 7 (no BHC fixed effects) and 8 (with BHC fixed effects) we relax this assumption and allow an additional treatment effect for FHCs with both investment banking and insurance subsidiaries. We find that the investment-banking-only effect drives our results (43 percentage points, statistically significant at the 1 percent level), though this is estimate is driven by the six observations of investment-bank-only FHCs. In Appendix C Table C.1 we report results of regressions using bank dividends to bank assets as the independent variable, with similar results.

In Table IV, we undertake the differences-in-difference analysis for the investment bank treated group using the nearest-neighbor propensity score matching with replacement (with a 0.03 caliper match). The pre-GLB matching variables are log assets, bank level capitalization, return on assets (ROA) and capital ratio, BHC level external dividends and ROA. Panel A shows the unmatched sample whereas Panel B reports the pre-GLB differences in the treated and control groups for the matched samples. The last column reports the difference-

[16] When averaging over years in the collapsed sample, ratios (e.g., *Payout*) are calculated as the sum of the numerator over the sum of the denominator for the pre- and post-periods.

in-differences between the variables. In Panel A, we find statistically significant difference-in-differences for all variables except for the bank subsidiary ROA and capital ratio. Consistent with Table III, Column 2, we observe that the dividend payout of the unmatched treated banks increased 15.3 percent on average post-GLB.

To eliminate this possibility, In Panel B, we compare the financial variables for the matched investment-bank treated and its control group. Matching results in the pre-GLB financial variables to show only a weak statistical difference for only one variable (BHC ROA). Notably, the differences in size are eliminated through the matching procedure. For the investment-bank treated group, the bank-subsidiary payout-ratio rose by 18.85 percentage points following GLB. For the control group, the bank-subsidiary payout-ratio fell by 7.48 percentage points. The difference between the differences of the treated and control groups, 26.3 percentage points, is statistically significant at the 5 percent level.[17] Despite the small sample size to match the control group to FHCs with investment banking subsidiaries, this finding suggests that our results are driven by the measurable pre-GLB differences of the BHCs that elected to become FHCs versus those that did not.

In Table V Columns 1 through 4, we report the results of difference-in-differences specifications for the insurance treated group. Columns 1-4 show that bank subsidiaries in these FHCs did not increase their payout ratios. This finding is in stark contrast with the findings in Table III where we report significant increase in internal dividends of FHCs that expand into investment banking. These findings support our model predictions.

In Columns 5 through 7 we present the difference-in-difference results for the changes in external dividends post GLB. This is important because the observed increase in investment-bank treated group's internal dividends could be related to the increase in dividends to shareholders. We observe no significant change in external dividends post GLB in each of the pooled sample (Column 5), collapsed sample (Column 6) and collapsed sample with BHC fixed effects (Column 7), allowing us to conclude that GLB affected the internal allocation of

[17] Alternative matching variables and specifications generally produce a matched sample estimator larger than our baseline regression. However, statistical significance is somewhat sensitive to the specific matched algorithm given the small sample size.

capital within the organization. These results collectively show that the FHCs that expand into investment banking taxed their banks upon the passage of the GLB.

B. *Validity of Difference-in-Differences Estimator: Parallel Trends*

To examine the validity of the difference-in-differences estimator, we provide evidence in favor of the parallel trends assumption necessary for identification. In the case of our sample firms, Figure 1 plots the difference in payout ratios for FHCs with investment banking subsidiaries (treated) and control BHCs. The estimates and the 95 percent confidence intervals are estimated using a regression with year fixed effects and yearly interaction terms. In the years prior to GLB, the differences between treated and control BHCs remained fairly flat. Meanwhile, in the years following GLB, the payout ratios are consistently higher than in 1999 with the largest increases in 2000 and 2001 relative to the control group. We note that there is some lift in in 1999, which may reflect the part of the year that fell between the passage of the bill in November 1999 and the incorporation of the nonbank affiliates in the FHC structure in March of 2000, leading to some anticipatory effects. In addition, we note that in 2002 differences in FHC begin to converge to pre-GLB differences. Both of these observations would be anticipated to dampen the difference-in-differences estimator in our baseline regression in Table III, Column 4. Our estimates of the difference-in-differences regression using only 1997-1998 as a pre-GLB period and 2000-2001 as the post-GLB period show that the results from our baseline specification are robust to the narrower timeframe.

We formally test pre-GLB trend differences in variables in Table VI, which reports the differences in annual variable trends for the three years before GLB on the *treated* variable, regressing variable trends against the *treated* variable (investment banks) and clustering standard errors at the BHC. We do not find differences in bank payout trends prior to GLB using payout ratios (Column 1), dividends to assets (Column 2), log dividends (Column 3). In addition, we do not find differences in pre-GLB trends for bank return on assets between treated and control BHCs.

C. Nonbank Investments

Given that the bank subsidiaries that are newly affiliated with investment banks increased their internal dividends and external dividends did not increase, it remains to be shown how the parents used the funds. In this section, we provide evidence that FHCs with investment banks used the increases in their banks' internal dividends to support nonbank investments.

We obtain data on parent investments in nonbank subsidiaries from the Y-9LP data, which segregates bank and nonbank financial investments and cash flows across all BHCs within the organization. Unfortunately, the data are not reported granular enough to track parent investment in specific nonbanks or nonbank types (e.g., investment banking or insurance subsidiaries). Therefore, we assess whether the change in bank subsidiary internal dividends from investment banking and insurance treated groups are related to changes in their aggregate nonbank investments. To measure aggregate nonbank investment, we sum across the organization all equity and debt holdings of BHCs in their subsidiary nonbanks each period. We define nonbank investment as the change in these holdings less the aggregate nonbank income. Nonbank income is calculated as the sum of undistributed income of nonbank subsidiaries plus their internal dividends.[18]

We estimate the following cross-sectional regression of FHC investments on the change in average annual dividends in the post-GLB period relative to the pre-GLB period.

$$NonbankInv_{i,Post} = \beta_1 Dividend_{i,Post} + Controls + \epsilon_i \tag{4}$$

where each variable is measured as an average level in the post-GLB period (level regressions). In an alternative specification, we calculate variables as the difference between the average pre-GLB level and the average post-GLB level (difference regressions). All variables are scaled by average bank assets in the post-GLB period. These cross-sectional regressions assess whether

[18]Items BHCP1275 and BHCP3147 on the Y-9LP forms, respectively. We subtract thrift income and equity from the calculations using Call Report data, where it is applicable. Our results are robust to subtracting only undistributed income.

those FHCs that increased dividends also increased nonbank investment post-GLB.

In Table VII, we report the results of the estimation of Equation 4 for FHCs with insurance subsidiaries (odd columns) and FHCs with investment banks (even columns). We report regression results scaling nonbank investments by assets (Columns 1 through 4) and by income (Columns 5 through 8). Columns 1, 2, 5, and 6 report results of level regressions whereas Columns 3, 4, 7 and 8 report the results of difference regressions.

In each specification using the sample of FHCs with insurance subsidiaries, we find no relationship between bank subsidiary internal dividends and FHC nonbank investments. That is, higher internal dividends for FHCs with insurance subsidiaries following GLB are not associated with higher nonbank investments at those FHCs. In contrast, we find a strong correlation between internal dividends and nonbank investments for FHCs with investment banks. These results show that the FHCs with investment banks did transfer bank capital to nonbanks, which is consistent with the predictions of our model.

V. Bank-Funding Cost Advantage

Central to our model is that the banks within the BHC have a lower cost of funds than the alternate funding options within the organization, namely, the nonbank affiliate and the parent. Toward this end, we first compare the credit spread of new debt issues of investment banks, insurance companies and BHCs at the consolidated level during pre-GLB. In addition, we compare the cost structure of within BHCs by comparing credit spreads at issuance for the parent holding company and their bank subsidiaries during the same period. We use data from Mergent Fixed Income Security Database on fixed-rate nonconvertible bond issues of banking (NAICS =5221), investment banking and security broker dealers (NAICS = 52311), and insurance (NAICS = 524).

We use the following credit-spread model that is standard in the literature (Flannery and Sorescu (1996), Gande, Puri, and Saunders (1999), Penas and Unal (2004)). The model specifies a bond's credit spread to be determined by bond- and firm-specific factors:

$$SPREAD_{it} = c_1 FI\_TYPE_{it} + c_2 MAT_{it} + c_3 JN_{it} + c_4 IS_{it} + c_5 PUT_{it} + \lambda_t + RAT_{it} + \epsilon_{it} \quad (5)$$

where $SPREAD_{it}$ is the difference between the yield of the benchmark treasury issue and the issue's offering yield expressed in basis points (calculated by Mergent) for issuer i at time t. FI_TYPE_{it} is a variable (or vector, depending on the specification) that indicates the type of financial institution issuing the debt. When we compare BHCs, investment banks, and insurance firms we take the issues at the consolidated level as reported in Mergent. However, when we compare debt issues of parent holding company and its bank subsidiaries, parent and subsidiary issues need to be hand separated as reported in Mergent. MAT_{it} is the time to maturity. JN_{it} is a binary variable that takes the value one if the issue has junior standing. PUT_{it} is a binary variable equal to one if the issue is puttable. We add issue size (IS) as a proxy for differences in liquidity. Hancock and Kwast (2001) show that issue size positively affects liquidity. RAT_{it} is either a vector of binary variables indicating the bond rating at issuance or a linearization of bond ratings (i.e. AAA=1, AA+=2,...,B-=17). When using linearization of ratings, we also include a quadratic term. We include time-quarter fixed effects.

In Table VIII, we report summary statistics for our main regression variables. In Panel A, we report summary statistics for issuances at BHCs, investment banks, and insurance firms. We observe that bond issuances at BHCs have lower treasury spreads (82 bps) than insurance firms (121 bps), though comparable spreads to investment banks (90 bps). Average BHC bond terms at issuance (134 months) are similar to those at investment banks (116 months), though shorter than terms at insurance firms (221 months). In addition, bonds at BHCs are more likely to be subordinated than at investment banks and insurance firms. Average BHC issue amounts are also smaller ($280 thousand) than those at investment banks ($494 thousand), but similar to insurance firms ($256 thousand). The differences in bond characteristics suggests that it is important to control for the other bond features that might allow bank costs of funding to be lower. Average ratings of bonds at issuance are worse for

BHCs than investment banks by approximately one notch, though similar to those of insurance firms.

In Panel B, we report sample statistics at organizations with both bank and parent holding company bond issuances. We identify a subset of firms that have bond issuance data at both the parent and bank subsidiaries within the organization using the ISSUER_NAME field to classify parents and banks within the same BHC and verifying those links in the structure data. In Appendix Table C.2, we list the hand-matched BHC and bank subsidiary names used in the analysis. We observe that on average, the subsidiary-bank bond issuances have lower treasury spreads compared to parent bond issuances (48 bps to 94 bps) and are better rated (lower number) than the parent bond issuances (0.81 notch difference). Note that Mergent does not report treasury spreads for all bond issuances, which accounts for the differences in the number of observations between variables. Meanwhile, bank bond issuances have shorter maturities (35 months versus 86 months), and are less likely to be junior (2% versus 6%). Bond issuance size for subsidiary banks and their parent holding companies are approximately the same.

In Table IX we report the regression results. For Columns 1 and 2, the focal variables are IBank and Insurance, which take the value of one if the bond issues are by investment banks and insurance firms, respectively, and zero otherwise. In Column 1, we compare credit spreads on BHC debt to investment banks and insurance firms. We find that BHCs enjoy yields of 13 bps lower than investment banks and 18 bps lower than insurance firms after controlling for credit ratings and bond characteristics. In Column 2, we find comparable results using a quadratic specification of ratings rather than binary variables for each rating category. Results are similar.

In Columns 3 and 4, we report regression results using the parent holding company and its bank-subsidiary matched sample. The variable of interest *Parent* and in both specifications include bond characteristics, BHC fixed effects and year fixed effects.[19] In Column 3, we show that parent holding company ratings are on average 0.8 notches worse (higher) than

[19] We do not use quarter fixed effects due to the smaller sample size relative to using all BHCs with bond issuances.

their bank subsidiary bond issuances. In Column 4, we show that treasury spreads are 41 bps points lower for bond issuance at the bank subsidiary than for the parent holding company bond issuance. Together, our results show using bond issuance spreads, the assumption of our model holds with regard to the funding costs of bank subsidiaries to be lower relative to the rest of the BHC.

VI. Conclusion

In this paper, we evaluate the funding decisions of BHCs for their nonbank subsidiaries. In a simple model, we show that BHCs have the incentive to pull funding from banks through internal dividends and downstream capital to the nonbank affiliates. The model predictions are such that bank funding cost advantages are a necessary but not sufficient condition to use the bank as a source of funds. Capital regulation limits the extent to which the BHC can use the bank as a source of funding, so the returns on nonbank investments must be sufficiently high to warrant the internal transfer of capital. We predict that following the passage of GLB, BHCs use internal dividends to fund lesser regulated investment bank subsidiaries via bank internal dividends, but not the more highly regulated insurance affiliates. Using a difference in differences framework, we show that the passage of GLB triggers a significant increase in bank-subsidiary dividends for BHCs that expanded into investment banks. We find that this set of BHCs did not increase its external dividends and instead increased their nonbank investments, consistent with the model. Our findings are contrary to the prevailing view in the banking literature and regulations that the BHC serves as a "source of strength" for the subsidiary banks. The underlying principle of this view is the expectation that BHCs should serve as a source of managerial and financial strength for their subsidiary banks. However, our findings show that the BHC may also rely on its bank as a source of strength to fund lesser regulated nonbank affiliates.

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Table I: Proportion of BHCs with Nonbank Subsidiaries by Nonbank Subsidiary Type. Nonbank types limited to those in which the proportion of FHCs increased from 1997-1999 to 2000-2002. The column Difference shows the difference in differences in BHC-years with particular nonbank subsidiaries.

	BHC-years with at least one nonbank subsidiary, by NAICS										
Subsidiary NAICS Code	Non-FHCs					FHCs					
	1997-1999		2000-2002		Change	1997-1999		2000-2002		Change	Difference
	mean	count	mean	count		mean	count	mean	count		
Insurance Agencies, Brokerage (5242)	14.7%	2443	19.3%	3652	4.6%	23.8%	651	41.4%	805	17.6%	13%
Funds, Trusts, Other Financial Vehicles (525)	6.8%	2443	21.3%	3652	14.5%	17.4%	651	30.6%	805	13.2%	-1%
Investment Banking and Sec. Dealing (52311)	0.5%	2443	0.5%	3652	0.1%	3.1%	651	11.4%	805	8.4%	8%
Other Financial Investment Act. (5239)	9.9%	2443	10.9%	3652	1.0%	22.6%	651	29.1%	805	6.5%	6%
Professional, Scientific, and Technical Services (54)	13.3%	2443	13.7%	3652	0.4%	17.8%	651	22.1%	805	4.3%	4%
Insurance Carriers (5241)	5.0%	2443	4.9%	3652	-0.1%	18.9%	651	21.6%	805	2.7%	3%
Direct Insurance (52412)	0.1%	2443	0.3%	3652	0.2%	2.2%	651	4.0%	805	1.8%	2%
Nondepository Cred. Interm. (5222)	19.0%	2443	17.0%	3652	-2.0%	31.5%	651	33.3%	805	1.8%	4%
All Other Finance and Insurance (Excl. Banks)	0.0%	2443	0.0%	3652	0.0%	0.3%	651	1.0%	805	0.7%	1%
Lessors of Real Estate (5311)	15.3%	2443	14.5%	3652	-0.8%	30.9%	651	31.3%	805	0.4%	1%
Real Estate and Rental and Leasing (53)	16.8%	2443	16.1%	3652	-0.7%	33.2%	651	33.4%	805	0.2%	1%
Activities Related to Cred. Interm. (5223)	7.6%	2443	4.9%	3652	-2.7%	16.6%	651	14.7%	805	-1.9%	1%

Table II: Summary statistics based on collapsed pre- and post-GLB values for each BHC. Panel A shows financial variables for BHCs that converted to FHCs, but did not have investment bank or insurance subsidiaries for the pre-GLB (1997-1999) and post-GLB (2000-2002). Panel B shows financial variables for BHCs that converted to FHCs and also had an investment bank subsidiary as of yearend 2000. Panel C shows financial variables for BHCs that converted to FHCs and also had an insurance subsidiary as of year end 2000. 26 of the 32 FHCs with an investment bank also had an insurance subsidiary. In each Panel, $Diff$ represents the mean difference in pre- and post-GLB values and $*$ denotes that the change is statistically significant at the 5 percent level. In Panels B and C, we denote means that are statistically different from means in Panel A at a 5 percent level with $^+$. In Panels B, we denote means that are statistically different from means in Panel C at a 5 percent level with †.

Panel A: FHCs, No IBank, No Insurance

	1997-1999				2000-2002				Diff
	mean	p50	sd	count	mean	p50	sd	count	
Bank Dividend/Income	52.8%	44.8%	42.4%	149	52.8%	44.6%	36.6%	149	-0.01%
Bank Dividend/Asset	0.7%	0.5%	0.6%	149	0.6%	0.5%	0.6%	149	-0.03%
Bank Assets	0.7	0.3	1.3	149	0.9	0.4	1.7	149	0.23^*
BHC Dividend/Asset	0.31%	0.24%	0.31%	149	0.38%	0.31%	0.40%	149	0.06%
Bank Income/Asset	1.3%	1.2%	1.4%	149	1.2%	1.1%	0.7%	149	-0.13%
Bank Capital Ratio	9.2%	8.6%	4.9%	149	9.2%	8.6%	3.6%	149	0.06
BHC Asset	0.7	0.3	1.3	149	0.9	0.4	1.7	149	0.24^*
BHC Capital Ratio	9.3%	8.9%	5.3%	149	9.4%	8.7%	5.4%	149	0.09%

Panel B: IBank FHCs

	1997-1999				2000-2002				Diff
	mean	p50	sd	count	mean	p50	sd	count	
Bank Dividend/Income	58.0%	64.5%	27.9%	32	$74.7\%^{+\dagger}$	78.1%	31.6%	32	$16.7\%^{*+\dagger}$
Bank Dividend/Asset	0.8%	0.8%	0.4%	32	$0.9\%^{+}$	0.9%	0.5%	32	$0.2\%^{*+}$
Bank Assets	$80.0^{+\dagger}$	41.5	117.0	32	$116.0^{+\dagger}$	66.8	171.0	32	$35.9^{*+\dagger}$
BHC Dividend/Asset	$0.5\%^{+}$	0.54%	0.24%	32	$0.5\%^{+}$	0.51%	0.23%	32	$-0.01\%^{+}$
Bank Income/Asset	2.9%	1.3%	9.4%	32	1.3%	1.3%	0.6%	32	-1.6%
Bank Capital Ratio	8.4%	8.5%	1.5%	32	$8.5\%^{+}$	8.5%	1.3%	32	0.0%
BHC Asset	$89.1^{+\dagger}$	42.7	140.0	32	$137.0^{+\dagger}$	67.3	234.0	32	$47.9^{*+\dagger}$
BHC Capital Ratio	$8.2\%^{+}$	7.7%	1.9%	32	$8.4\%^{+}$	8.2%	1.3%	32	0.2%

Panel C : Insurance FHCs

	1997-1999				2000-2002				Diff
	mean	p50	sd	count	mean	p50	sd	count	
Bank Dividend/Income	58.7%	60.8%	30.2%	106	$63.7\%^{+}$	63.1%	30.0%	106	5.0%
Bank Dividend/Asset	0.8%	0.7%	0.4%	106	$0.8\%^{+}$	0.8%	0.5%	106	0.1%
Bank Assets	25.4^{+}	0.9	72.9	106	36.9^{+}	1.4	106.0	106	11.5^{*+}
BHC Dividend/Asset	$0.4\%^{+}$	0.4%	0.3%	106	0.4%	0.4%	0.3%	106	$0.04\%^{*}$
Bank Income/Asset	1.8%	1.2%	5.2%	106	1.3%	1.2%	0.4%	106	-0.5%
Bank Capital Ratio	8.4%	8.3%	1.3%	106	$8.4\%^{+}$	8.4%	1.2%	106	0.1%
BHC Asset	28.2^{+}	1.0	86.1	106	43.3^{+}	1.4	141.0	106	15.1^{*+}
BHC Capital Ratio	8.6%	8.3%	1.8%	106	8.6%	8.4%	1.7%	106	-0.03%

Table III: Difference in Differences in Bank Dividends to Income. This table reports results from difference in differences regressions using Equation 3. Treated holding companies are BHCs that convert to FHCs during the first year of eligibility (2000) under GLB with an investment banking subsidiary. The control group consists of BHCs that convert during the first year of eligibility (2000), but do not include an investment bank subsidiary. Post is an indicator variable equal to zero before 2000 and one after. Column 1 reports results from a pooled regression over the three-year period surrounding GLB, 1997-2002. Column 2 collapses each of pre- and post-periods into a single observation for each BHC, taking the cumulative three-year payout ratios for the pre- and post-periods. Column 3 adds entity financial variables. Column 4 adds BHC fixed effects to the Column 2 specification. Column 5 uses the Column 2 specification, allowing for insurance subsidiary treatment effects. Column 6 uses the Column 2 specification, allowing for insurance subsidiary treatment effects with BHC fixed effects. Column 7 uses the Column 2 specification, allowing for insurance subsidiary treatment effects and a joint investment bank-insurance treatment effect. Column 8 uses the Column 2 specification, allowing for insurance subsidiary treatment effects and joint investment bank-insurance treatment effect with BHC fixed effects. Column 9 uses the Column 2 specification, defining 1997-1998 as the pre-GLB period and 2000-2001 as the post-GLB period.

VARIABLES	(1) $\frac{Div}{Inc}$	(2) $\frac{Div}{Inc}$	(3) $\frac{Div}{Inc}$	(4) $\frac{Div}{Inc}$	(5) $\frac{Div}{Inc}$	(6) $\frac{Div}{Inc}$	(7) $\frac{Div}{Inc}$	(8) $\frac{Div}{Inc}$	(9) $\frac{Div}{Inc}$
Post*IBank	0.181***	0.155**	0.160**	0.155**	0.155**	0.155**	0.433***	0.433***	0.227**
	(0.0665)	(0.0617)	(0.0623)	(0.0616)	(0.0653)	(0.0652)	(0.158)	(0.157)	(0.0985)
IBank	0.0433	0.0337	-0.118*		0.00517		-0.0801		-0.0127
	(0.0536)	(0.0553)	(0.0686)		(0.0580)		(0.151)		(0.0671)
Post*Ins					-0.000305	-0.000305	0.0305	0.0305	
					(0.0478)	(0.0477)	(0.0490)	(0.0489)	
Ins					0.0615		0.0521		
					(0.0475)		(0.0499)		
IBankIns							0.110		
							(0.162)		
Post*IBankIns							-0.360**	-0.360**	
							(0.169)	(0.169)	
Post		0.0121	-0.0224	0.0121	0.0122	0.0122	0.00141	0.00141	0.0177
		(0.0261)	(0.0259)	(0.0261)	(0.0355)	(0.0354)	(0.0361)	(0.0360)	(0.0344)
Ln(Asset)			0.0271**						
			(0.0112)						
BHC Div/Asset			41.01***						
			(7.931)						
Bank ROA			-1.270***						
			(0.306)						
Observations	1,452	522	522	522	522	522	522	522	474
R-squared	0.020	0.017	0.180	0.023	0.023	0.023	0.028	0.038	0.018
REG	Pool	Coll	Coll	Coll	Coll	Coll	Coll	Coll	Coll
YEAR FE	YES	NO	NO	NO	NO	NO	NO	NO	NO
BHC FE	NO	NO	NO	YES	NO	YES	NO	YES	NO

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table IV: Difference-in-Differences of Payout Ratios for Matched Sample. Treated holding companies are BHCs in 1999 that convert to FHCs during the first year of eligibility (2000) under GLB with an investment banking subsidiary. Control BHCs are those that do not have an investment banking subsidiary. Treated and control firms are matched on size, bank-ROA, bank capitalization, BHC ROA and external payout using 1999 data. BHCs are matched using a nearest neighbor propensity score matching with replacement and a tolerance of 0.03.

	Control			Treated			Difference
Variable	Mean	Std Dev	Obs	Mean	Std Dev	Obs	
				Panel A: Unmatched			
Log Bank Asset	13.13	1.16	228	17.01	2.15	32	3.88***
Bank ROA	1.30%	1.15%	228	2.90%	9.37%	32	1.60%
Bank Capital	8.70%	4.00%	228	8.38%	1.62%	32	-0.33%
BHC Div/BHC Asset	0.36%	0.34%	228	0.46%	0.22%	32	0.10%**
BHC ROA	1.17%	0.65%	228	1.34%	0.37%	32	0.17%**
Δ Bank Div/Bank Asset	-0.01%	0.58%	228	0.19%	0.51%	32	0.21%**
Δ Bank Div/Bank Income	1.41%	39.38%	228	16.70%	31.98%	32	15.30%**
				Panel B: Matched			
Log Bank Asset	16.24	2.18	18	16.17	2.10	18	-0.07
Bank ROA	1.09%	0.25%	18	1.17%	0.30%	18	0.08%
Bank Capital	7.78%	1.78%	18	8.36%	1.43%	18	0.58%
BHC Div/BHC Asset	0.48%	0.31%	18	0.41%	0.24%	18	-0.07%
BHC ROA	1.05%	0.30%	18	1.25%	0.37%	18	0.20%*
Δ Bank Div/Bank Asset	-0.16%	0.50%	18	0.16%	0.40%	18	0.33%**
Δ Bank Div/Bank Income	-7.48%	37.42%	18	18.85%	35.00%	18	26.33%**

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$

Table V: Difference in Differences. This table reports results from regressions using Equation 3. In Columns 1 through 4, the outcome variable is the bank-level payout ratios and treated holding companies are BHCs that convert to FHCs during the first year of eligibility (2000) under GLB with an insurance subsidiary. The control group are BHCs that convert during the first year of eligibility (2000), but do not include an insurance subsidiary. In Columns 5 through 8, the outcome variable is the BHC-level payout ratios and treated holding companies are BHCs that convert to FHCs during the first year of eligibility (2000) under GLB with an investment banking subsidiary. The control consists of BHCs that convert during the first year of eligibility (2000), but do not include an investment banking subsidiary. Columns 1 and 5 report results from a pooled regression over the three-year period surrounding GLB, 1997-2002. Columns 2 and 6 collapse each of pre- and post-periods into a single observation for each BHC, taking the cumulative three-year payout ratios for the pre- and post-periods. Column 3 adds entity financial variables to the previous column's specification. Column 4 and 7 add BHC fixed effects to the Column 2 and Column 6 specifications, respectively. Errors clustered at the BHC level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
VARIABLES	Div/Inc	Div/Inc	Div/Inc	Div/Inc	BHC Div/Inc	BHC Div/Inc	BHC Div/Inc
Post*Insurance	0.0489	0.0317	0.0331	0.0317			
	(0.0429)	(0.0455)	(0.0463)	(0.0455)			
Insurance	0.0835**	0.0626	-0.00318				
	(0.0405)	(0.0448)	(0.0428)				
Post*IBank					0.0331	0.00226	0.00226
					(0.0472)	(0.0353)	(0.0352)
IBank					0.107***	0.105***	
					(0.0341)	(0.0306)	
Post		0.0182	-0.0144	0.0182		0.0572***	0.0572***
		(0.0357)	(0.0358)	(0.0357)		(0.0103)	(0.0103)
Ln(Asset)			0.0209***				
			(0.00730)				
BHC Div/Asset			40.76***				
			(7.891)				
Bank ROA			-1.386***				
			(0.278)				
Observations	1,448	522	522	522	1,446	522	522
R-squared	0.020	0.014	0.175	0.008	0.036	0.041	0.114
REG	Pool	Coll	Coll	Coll	Pool	Coll	Coll
YEAR FE	YES	NO	NO	NO	YES	NO	NO
BHC FE	NO	NO	NO	YES	NO	NO	YES

Robust standard errors in parentheses
*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Table VI: Parallel Trends. This table reports results from parallel trend regressions for the "treated" FHCs relative to non-FHCs. *Treated* is defined as BHCs that converted to FHCs in the first year of eligibility (2000) with an investment bank subsidiary (NAICS 52311), while the control group are FHCs that converted but did not include an investment bank subsidiary. By definition, this requires that all FHCs in the sample are in existence at year end 2000. We report trends at the annual level for flow variables 1996 to 1999 and at a cumulative level for stock variables. Column 1 reports differences in trends for treated and control BHCs for payout ratios. Column 2 reports differences in trends for dividend to asset ratios. Column 3 reports differences in trends for nominal dividend growth. Column 4 reports differences in bank income to asset. Column 5 reports differences in cumulative asset growth 1996 to 1999. Column 6 reported differences in cumulative capitalization ratios 1996 to 1999.

	(1)	(2)	(3)	(4)	(5)	(6)
VARIABLES	Δ Div/Inc	Δ Div/Asset	Δ Ln(Div+1)	Δ Bank ROA	Δ Ln(Asset)	Δ Eq/Asset
Treated	-0.0221	-0.000109	-0.0660	0.00889	-0.123	-0.00733
	(0.0283)	(0.000404)	(0.153)	(0.00879)	(0.108)	(0.00518)
Observations	606	606	606	606	174	174
R-squared	0.002	0.001	0.001	0.013	0.015	0.017
REG	OLS	OLS	OLS	OLS	OLS	OLS
YEAR FE	YES	YES	YES	YES	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VII: Nonbank Investment and Bank Segment Internal Dividends. Columns 1 through 4 reports results of regressions of nonbank investments as a proportion of bank subsidiary assets in the post-GLB period (2000-2002). Columns 5 through 8 report results using nonbank investments as a proportion of bank income in the post-GLB period. Odd columns report results for FHCs with insurance subsidiaries. Even columns report results for FHCs with investment banking subsidiaries. Columns 1, 2, 5, and 6 report results using variables measured as the average level in the post-GLB period (e.g. Bank Div is the average annual post-GLB bank internal dividend, Bank Asset is the average year end value of bank assets in the post-GLB period). In Columns 3, 4, 7 and 8, the numerators of the independent variables are calculated as the difference between the average pre-GLB level (1997-1999) and the average post-GLB level of the variable.

	Nonbank Inv/Bank Assets				Nonbank Inv/Bank Income			
	Ins	IB	Ins	IB	Ins	IB	Ins	IB
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Bank Div/Bank Asset	0.306	0.745***			17.04	57.16***		
	(0.197)	(0.174)			(14.32)	(15.24)		
Bank Inc/Bank Asset	-0.126	-0.371**			16.58	17.57		
	(0.0797)	(0.153)			(14.21)	(22.15)		
Bank Eq/Bank Asset	-0.0158	-0.00452			0.290	3.782		
	(0.0148)	(0.0180)			(1.779)	(2.644)		
BHC Div	-0.0831	-0.298			-27.53	-88.51*		
	(0.118)	(0.348)			(20.26)	(50.86)		
Δ Bank Div/Bank Asset			0.242	0.708**			11.39	54.61**
			(0.188)	(0.270)			(13.43)	(20.35)
Δ Bank Inc/Bank Asset			-0.0439	-0.416*			19.57	17.80
			(0.0636)	(0.205)			(12.11)	(28.09)
Δ Bank Eq/Bank Asset			-0.0150	0.0208			-0.455	3.663
			(0.0167)	(0.0332)			(1.818)	(2.921)
Δ BHC Div/Bank Asset			-0.138	-0.306			-27.47	-68.06
			(0.0968)	(0.182)			(17.87)	(42.55)
Observations	106	32	106	32	106	32	106	32
R-squared	0.172	0.513	0.119	0.376	0.152	0.494	0.125	0.377
Adj R^2	0.139	0.441	0.0845	0.283	0.118	0.419	0.0906	0.284

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table VIII: Bond Issuance Statistics of Parent-BHC and Bank Subsidiaries. Data source is Mergent Fixed Income Security Database. $TREASURY\_SPREAD$ is the difference between the yield of the benchmark treasury issue and the issue's offering yield expressed in basis points (calculated by Mergent). MAT is the time to maturity. JN is a binary variable that takes the value one if the issue has junior standing. PUT is a binary variable equal to one if the issue is puttable. $OFFERING\_AMT$ is the offering amount expressed in thousands and IS is the natural log of that amount. RAT is a linearization of bond ratings (i.e. AAA=1, AA+=2,...,B-=17). In Panel A, $^{+}$ and † indicate a difference with investment banking firms and insurance firms, respectively, at the 5% level. In Panel B, * indicates a difference with the parent at the 5% level.

Panel A: Parent BHC versus Bank Subsiary

Variable	BHC Issuance				IBank Issuance				Insurance Issuance			
	mean	p50	sd	count	mean	p50	sd	count	mean	p50	sd	count
TREASURY_SPREAD	$82.33^{\dagger}$	74.50	54.76	312	$90.31^{\dagger}$	80.50	36.18	72	121.34	102.00	72.15	84
MAT (month)	$134.43^{\dagger}$	120.10	119.31	312	$116.07^{\dagger}$	84.28	96.01	72	220.99	120.23	208.56	84
MAT	$8.02^{\dagger}$	8.20	0.78	312	$7.94^{\dagger}$	7.85	0.64	72	8.46	8.20	0.84	84
IS	12.27^{+}	12.43	0.81	312	$12.87^{\dagger}$	12.77	0.64	72	12.28	12.21	0.59	84
OFFERING_AMT	280.39^{+}	250.00	218.23	312	$494.10^{\dagger}$	350.00	428.71	72	256.28	200.00	163.68	84
PUT	0.04	0.00	0.19	312	0.03	0.00	0.17	72	0.02	0.00	0.15	84
JN	$0.25^{+\dagger}$	0.00	0.44	312	0.01	0.00	0.12	72	0.02	0.00	0.15	84
RATING (linear)	6.12^{+}	6.00	2.05	312	$5.43^{\dagger}$	6.00	1.53	72	6.37	6.00	2.38	84

Panel B: Parent BHC versus Bank Subsiary

Variable	Bank Issuance				Parent Issuance			
	mean	p50	sd	count	mean	p50	sd	count
TREASURY_SPREAD	47.75*	21.00	43.50	34	94.18	86.50	35.92	42
MAT	6.67*	6.59	0.68	315	7.40	7.37	0.96	320
MAT (month)	35.42*	24.03	48.07	315	85.89	52.31	91.16	320
IS	11.33*	11.51	1.17	315	11.15	10.89	1.21	320
OFFERING_AMT	148.30	100.00	167.25	315	140.66	53.50	189.57	320
PUT	0.00	0.00	0.06	315	0.02	0.00	0.14	320
JN	0.02*	0.00	0.14	315	0.06	0.00	0.24	320
RATING (linear)	4.77*	5.00	1.46	315	5.58	5.00	1.57	320

Table IX: Differences in Cost of Funds for BHC versus Nonbank and Parent versus Bank Subsidiaries. Mergent Fixed Income Security Database is the data source.Panel A, Columns 1 and 2 compare treasury spreads at consolidated BHCs and nonbank institutions (investment banks and insurance. Column 1 includes 13 binary rating indicator variables (BB- through AAA). Column 2 uses a linearization and quadratic term for credit ratings rather than separate indicators. Panel B, Columns 3 and 4 compare bond ratings and treasury spreads, respectively, at parent BHCs and their subsidiary banks.

	Panel A BHC to Nonbanks		Panel B Parent to Bank Sub	
	(1)	(2)	(3)	(4)
VARIABLES	Spread	Spread	Rating-Notch	Spread
Parent			0.783***	40.93***
			(0.131)	(12.83)
IBank	13.07***	14.03***		
	(3.028)	(2.986)		
Insurance	18.39***	17.55***		
	(5.762)	(5.823)		
MAT	29.32***	28.44***	0.232***	10.48*
	(2.452)	(2.648)	(0.0812)	(5.840)
IS	4.541*	4.288*	-0.0190	14.71**
	(2.480)	(2.427)	(0.0284)	(5.629)
PUT	-43.36***	-45.74***	-0.846***	-51.27***
	(3.985)	(4.501)	(0.201)	(17.79)
JN	-2.091	0.422	0.441**	20.99***
	(3.495)	(3.710)	(0.181)	(6.991)
rat_lin		-12.40***		
		(2.782)		
rat_lin^2		2.020***		
		(0.225)		
Observations	468	468	536	75
R-squared	0.821	0.778	0.767	0.748
Rating FE	YES	NO	NO	NO
QTR FE	YES	YES	NO	NO
YEAR FE	NO	NO	YES	YES
BHC FE	NO	NO	YES	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

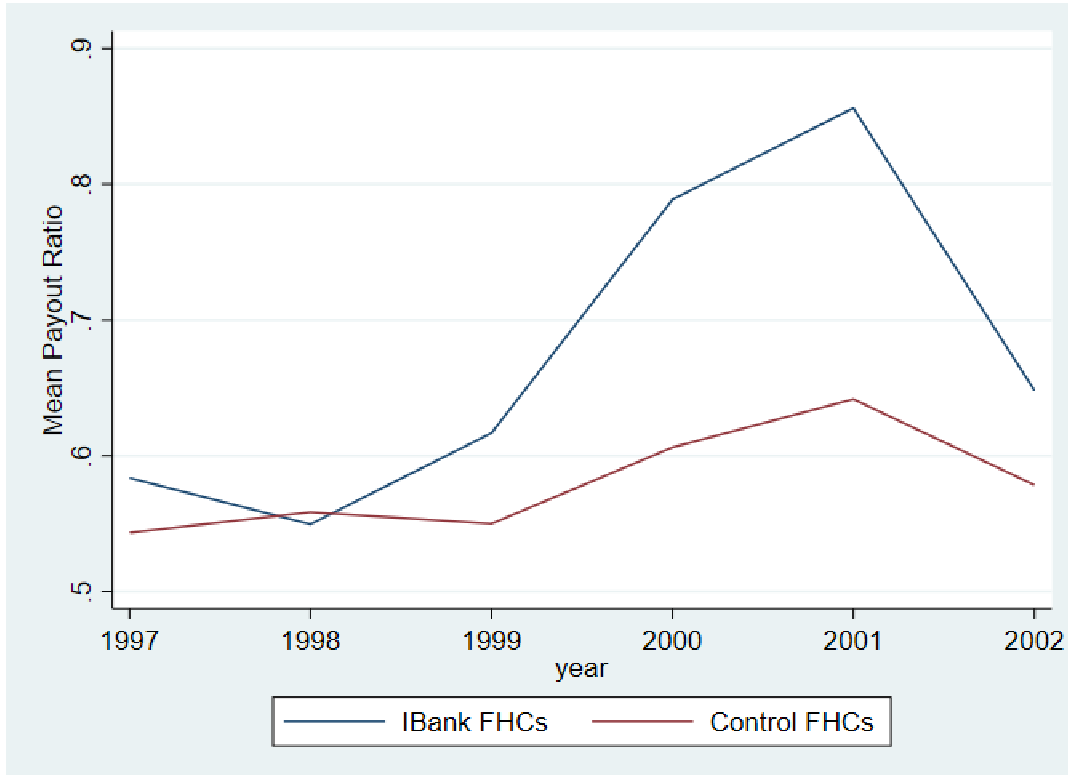

Figure 1: Average bank-subsidiary payout ratios for the treated and control groups surrounding the passage of GLB and the election to become FHCs with an investment bank subsidiary. BHCs could first elect to become FHCs in March 2000. Treated BHCs are those that elected to become FHCs during that first year and have a subsidiary with a NAICS code 52311. Control BHCs are those that did not elect to become FHCs with an investment banks subsidiary.

Appendix A. Bank and nonbank classification, sample construction, and data sources

Bank and nonbank classification Figure A.1 displays a stylized structure of a bank holding company (BHC). Four major types of subsidiaries exist in this BHC: bank (and/or savings and loan), intermediate BHC, intermediate nonbank holding company, and nonbank. Subsidiaries in each of these categories can further expand vertically by owning other subsidiaries. These major categories can be divided into domestic and foreign subsidiaries, creating an extremely complex structure for a BHC, although our analysis focuses only on domestic subsidiaries. In this structure the parent is often referred to as the top-tier holder or high-holder. All top-tier holding companies must file annual reports (FR Y-6, FR Y-7) that explain their organizational structure. In addition, top-tier holding companies must also file a report (FR Y-10) on any changes in their organizational structures within 30 days of a reportable event.

We use the structure data (FR Y-6, FR Y-7, and FR Y-10) to separate banks from nonbanks within the organization. In particular, we define banks to be the legal entity filing a Call Report, which may include nonbank subsidiaries held within the bank. Each bank within a BHC is necessarily owned by a holding company (which may be intermediate or top-tier).

We define "nonbanks" as those that have a BHC parent and are not thrifts (entities "F" and "H" in Figure A.1). We use this definition because nonbank activity is measureable from the Y-9LP filings and because we wanted to avoid double counting income and dividends in the BHC. For example, suppose subsidiary "I" in Figure A.1 made $1 of income and up-streamed it to its parent "F," who then up-streamed it to the top-tier ("A"). Both the dollar of income and the dividend would be recorded on the filings of both "I" and "F." Counting only the income and dividends from "F" avoids this problem.

We use this classification to form aggregate bank and nonbank subsidiaries. We aggregate income and dividend variables of bank and nonbank subsidiaries within each BHC to establish these flow variables for the bank and nonbanks of the BHC. We also sum assets across subsidiaries and calculate asset-weighted capital ratios for bank and nonbank affilates. In the context of Figure A.1, the bank subsidiary variables are created by combining data from entities “C” and “G,” and the nonbank variables are created by combining data from entities “F” and “H.”

Data Sources

Our study requires financial statement data for banks, nonbanks, and the higher-holder operations on a stand-alone basis. We use a number of regulatory filings to compile our data. Looking at Figure A.1, the set of filings in the analysis are those filed by the entities with the thick outlines. This set includes banks (entities “C” and “G”), Y-9LP filings of intermediate BHCs (“D”), and the high-holder (“A”).

For the higher-holder operations, we use the Parent Company Only Financial Statement (FR Y-9LP) that large parents ($150 million or more) must file with the Federal Reserve System (Fed). In addition, we use the Consolidated Financial Statement for Holding Companies (FR Y-9C) that the holding companies with total consolidated assets of $150 million or more have to file with the Fed.[20] This consolidated report represents on- and off-balance sheet activities of all subsidiaries in the BHC.

For bank subsidiaries, we use the Consolidated Reports of Condition and Income (FFIEC 031/041 or simply Call Report) that each federally insured depository institution (denoted as bank) with branches and subsidiaries in the United States must file with the FDIC or the Fed. This is a detailed report of on- and off-balance sheet items as well as income statements of the consolidated bank operations. Because a depository institution can have its own subsidiaries, the reporting is done on a consolidated basis.

[20]. Before 2006, the reporting threshold was $150 million.

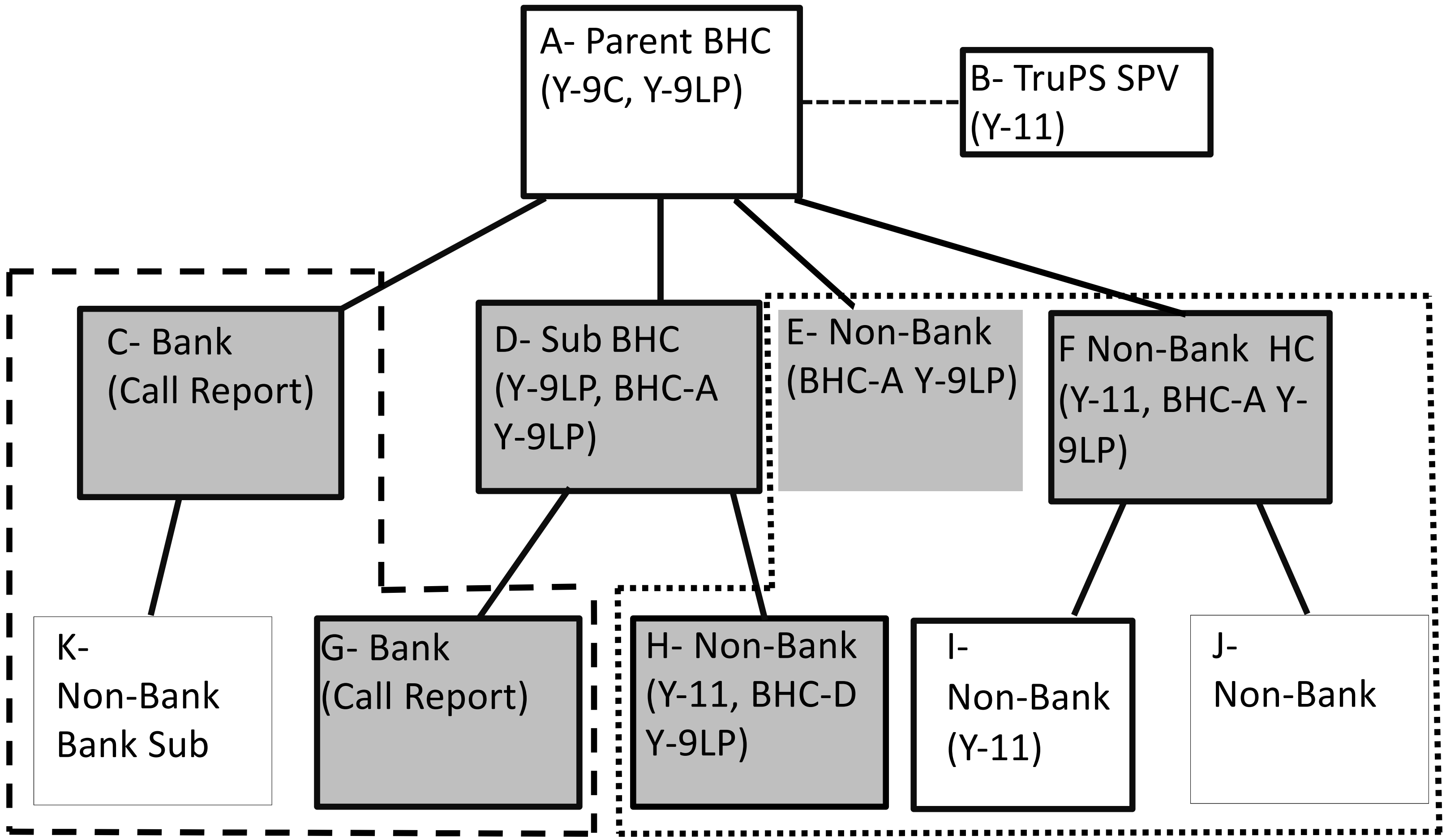

Figure A.1: Stylized Structure of a Bank Holding Company. The bank subsidiary in the paper combines data from Banks C and G. The nonbanks combine data from Nonbanks E, F, and H, measured indirectly from Y-9LP data. Subsidiaries that can be measured directly have a thick outline. Subsidiaries that can be measured indirectly through their direct parent are shaded. The top Parent is A. Subsidary level bank and nonbank income and dividend variables are obtained by summing over all BHCs within the organization.

Appendix B. Proofs

Proof Proposition 1

Proof. First, consider the FOCs:

$$\frac{\partial \Pi_0}{D_B} = r_B - c_B - \frac{\kappa_B E}{\bar{e}_B^2} - \frac{\kappa_P E}{\bar{e}_P^2} = 0 \tag{A.1}$$

$$\frac{\partial \Pi_0}{D_P} = r_P - c_P - \frac{\kappa_P E}{\bar{e}_P^2} = 0 \tag{A.2}$$

Suppose not, such that $T_0^* = \tau > 0$, and consider that the parent downstreams ϵ capital to the bank. Doing so results in an increase in bank subsidiary returns $r_B\epsilon$ and a decrease in parent returns $r_P\epsilon$, for a net return of $(r_B - r_P)\epsilon >\geq 0$. Note, downstreaming capital from the parent to the bank has no effect on the parent capital compliance costs. However, the transfer reduces the bank compliance cost by $\kappa_B * MC(T_0)\epsilon > 0$, where MC is the first derivative of the compliance cost function with respect to T_0. Thus, the ϵ transfer strictly increases profits, a contradiction. □

Proof Proposition 2

Proof. The first order conditions for optimal debt and internal dividends (D_B^*, D_P^*, T^*) of the objective function after some simplifications are (equality holds for interior solutions):

$$\frac{\partial \Pi}{\partial T} = \Delta r_N - \frac{\kappa_B (D_B^* + \bar{D}_B)}{e_B^2} \leq 0 \tag{A.3}$$

$$\frac{\partial \Pi}{\partial D_B^*} = r_B - c_B - \frac{\kappa_B (E - T^*)}{e_B^2} - \frac{\kappa_P E}{e_P^2} \leq 0 \tag{A.4}$$

$$\frac{\partial \Pi}{\partial D_P} = r_N - c_P - \frac{\kappa_P E}{e_P^2} \leq 0 \tag{A.5}$$

From the first order condition on T,

$$\Delta r_N \leq \frac{\kappa_B (D_B^* + \bar{D}_B)}{[(1 - R_B)(E - T^*) - R_B (D_B^* + \bar{D}_B]^2} \tag{A.6}$$

The RHS of the inequality is strictly increasing in D_B^* as the numerator is increasing in D_B^* and the denominator is decreasing in D_B^*. In addition, the RHS of the inequality is increasing in T^*. Consequently, the RHS of the inequality is bounded below by:

$$\frac{\kappa_B \bar{D}_B}{[(1-R_B)E - R_B\bar{D}_B]^2}$$

Therefore, the FOC can only hold with equality if $\Delta r \geq \frac{\kappa_B \bar{D}_B}{[(1-R_B)E-R_B\bar{D}_B]^2}$.

□

Proof Proposition 3

To show this, we first present a lemma. Assuming that $r_{IB} - r_B$ is sufficiently large such that A.3 holds with equality.

Lemma 1: *Either $D_B^* > 0$ and $D_P^* = 0$ or $D_B^* = 0$ and $D_P^* > 0$.*

Proof Lemma 1

Proof. First, we show that either $D_B^* > 0$ or $D_P^* > 0$. From $r_N > r_P$ and Equations A.2 and A.5, it must be the case that:

$$\frac{\kappa_P E}{[(1-R_P)E - R_P(D_B^* + \bar{D}^B + D_P^*)]^2} \geq \frac{\kappa_P E}{[(1-R_P)E - R_P(\bar{D}_P + \bar{D}_B)]^2} \tag{A.7}$$

Thus, $D_B^* + D_P^* \geq \bar{D}_P > 0$.

Next, we show that either $D_P^* = 0$ or $D_B^* = 0$. Suppose not, so that Equations A.4 and A.5 hold with equality. Taking the difference between them, and also taking the difference between Equations A.2 and A.1 yield:

$$\Delta c - (r_N - r_B) = \frac{\kappa_B(E-T^*)}{[(1-R_B)(E-T^*) - R_B(D_B^* + \bar{D}_B)]^2} \tag{A.8}$$

$$\Delta c - (r_P - r_B) = \frac{\kappa_B E}{[(1-R_B)E - R_B\bar{D}_B]^2} \tag{A.9}$$

$$\Rightarrow \frac{\kappa_B(E-T^*)}{[(1-R_B)(E-T^*) - R_B(D_B^* + \bar{D}_B)]^2} < \frac{\kappa_B E}{[(1-R_B)E - R_B\bar{D}_B]^2} \tag{A.10}$$

Define the LHS of the inequality as Ψ. Note that $\partial\Psi/\partial D_B^* > 0$. In addition:

$$\frac{\partial \Psi}{\partial T^*} = \frac{-\kappa_B[(1-R_B)(E-T^*)-R_B(D_B^*+\bar{D}_B)]^2+2(1-R_B)[(1-R_B)(E-T^*)-R_B(D_B^*+\bar{D}_B)]\kappa_B(E-T^*)}{[(1-R_B)(E-T^*)-R_B(D_B^*+\bar{D}_B)]^4} \quad \text{(A.11)}$$

$$= \frac{\kappa_B}{[(1-R_B)E-R_B\bar{D}_B]^2} > 0 \quad \text{(A.12)}$$

Together, $\partial\Psi/\partial T^* > 0$ and $\partial\Psi/\partial D_B^* > 0$ contradict inequality A.10. □

Given the proof of Lemma 1, we now prove Proposition 3.

Proof. From Lemma 1 either $D_P^* = 0$ or $D_B^* = 0$.

Case 1: $D_B^* = 0$ and $D_P^* > 0$.

From Equation A.3, $\Delta r_N = \frac{\kappa_B \bar{D}_B}{[(1-R_B)(E-T^*)-R_B\bar{D}_B]^2}$. The implicit function theorem immediately yields the result.

Case 2: $D_P^* = 0$ and $D_B^* > 0$

Suppose there is some $\Delta r'$ where $D_B^*(\Delta r') > 0$ and some $\Delta r'' = \Delta r' + \epsilon$, $\epsilon > 0$ and let letting (T'', D_B'') denote the optimal allocation under $\Delta r''$ and similarly for $\Delta r'$. For each allocation to be optimal, it must be the case that profits under the optimal funding are greater than those in the alternative:

$$\Pi(T'', D_B''|\Delta r'') \geq \Pi(T', D_B'|\Delta r'') \quad \text{(A.13)}$$

$$\Pi(T', D_B'|\Delta r') \geq \Pi(T'', D_B''|\Delta r') \quad \text{(A.14)}$$

Summing the LHS and RHS, respectively of the inequalities yields: $\epsilon(T'' - T') \geq 0$. Therefore, if $\epsilon > 0$ it must be that $T'' > T'$.

□

Table C.1: Difference in Differences in Bank Dividends to Bank Assets. This table reports results from regressions using Equation 3. Treated holding companies are BHCs that become FHCs during the first year of eligibility (2000) under GLB with a previously restricted activity. In Columns 1 through 4, we defined treated FHCs as those holding an investment banking subsidiary (NAICS 52311). In Columns 5 through 8, we defined treated FHCs as those holding an insurance subsidiary (NAICS 5242). In Columns 9 and 10, we allow for both treatment groups. The control group are BHCs that convert during the first year of eligibility (2000), but do not include a subsidiary of the restricted activity. *Post* is an indicator variable equal to zero before 2000 and one after. Column 1 reports results from a pooled regression over the three-year period surrounding GLB, 1997-2002. Column 2 collapses each of pre- and post-periods into a single observation for each BHC, taking the cumulative three-year payout ratios for the pre- and post-periods. Column 3 adds entity financial variables. Column 4 adds BHC fixed effects to the Column 2 specification. Column 5 reports results from a pooled regression over the three-year period surrounding GLB, 1997-2002. Column 6 collapses each of pre- and post-periods into a single observation for each BHC, taking the cumulative three-year payout ratios for the pre- and post-periods. Column 7 adds entity financial variables. Column 8 adds BHC fixed effects to the Column 2 specification. Column 9 reports a regression with collapsed pre- and post-periods. Column 10 adds FHC fixed effects to the specification in Column 9.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
VARIABLES	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset	Div/Asset
Post*IBank	0.00187**	0.00208**	0.00268***	0.00208**					0.00189**	0.00197**
	(0.000873)	(0.000965)	(0.000875)	(0.000964)					(0.000947)	(0.000866)
IBank	0.000519	0.000579	-0.00273***						0.000139	
	(0.000809)	(0.000811)	(0.000945)						(0.000867)	
Post*Ins					0.000763	0.000803	0.000957	0.000803	0.000414	0.000962*
					(0.000666)	(0.000667)	(0.000657)	(0.000666)	(0.000652)	(0.000581)
Insurance					0.00102*	0.000978	-0.000245		0.000949	
					(0.000616)	(0.000625)	(0.000557)		(0.000670)	
Post		-0.000171	-0.000810**	-0.000171		-0.000242	-0.000807	-0.000242	-0.000315	-0.000548
		(0.000386)	(0.000382)	(0.000386)		(0.000538)	(0.000559)	(0.000538)	(0.000542)	(0.000496)
Ln(Asset)			0.000477***				0.000274**			
			(0.000168)				(0.000123)			
BHC Div/Asset			0.825***				0.822***			
			(0.144)				(0.143)			
Bank ROA			0.00759				0.00539			
			(0.0179)				(0.0185)			
Observations	1,452	522	522	522	1,452	522	522	522	522	522
R-squared	0.008	0.014	0.301	0.014	0.013	0.017	0.293	0.005	0.024	
REG	Pool	Coll	Coll	Coll	Pool	Coll	Coll	Coll	Coll	Coll
YEAR FE	YES	NO	NO	NO	YES	NO	NO	NO	NO	NO
BHC FE	NO	NO	NO	YES	NO	NO	NO	YES	NO	YES

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table C.2: Banking Organizations with Bond Issuances at the Parent and Bank Levels 1997-2002. Org is an ID variable created to group banks and parent BHCs within a single organization. $PROSPECTUS_ISSUER_NAME$ is the name of the issuer as it appears in the Mergent data. BHC is a binary variable taking on the value one if it is issued by the parent and zero if it is issued by the bank. Notes indicates whether the issuer ID appears in the pre- or post-GLB periods.

Org.	$PROSPECTUS_ISSUER_NAME$	BHC	Notes	Org.	$PROSPECTUS_ISSUER_NAME$	BHC	Notes
1	BANK AMER CORP	1		10	MBNA AMER BK NATL ASSN	0	
1	BANK AMER N A CHARLOTTE N C	0		10	MBNA CORP	1	
2	BANK ONE CORP	1		11	NATIONSBANK CHARLOTTE N C N A	0	Pre GLB
2	BANK ONE N A	0		11	NATIONSBANK CORP	1	Pre GLB
3	BANKBOSTON CORP	1	Pre GLB	12	OLD NATL BANCORP IND	1	
3	BANKBOSTON N A	0	Pre GLB	12	OLD NATL BK	0	
4	CAPITAL ONE BK	0		13	PNC BK N A PITTSBURGH PA	0	
4	CAPITAL ONE FINL CORP	1		13	PNC FDG CORP	1	
5	CHASE MANHATTAN BK USA	0	Pre GLB	14	U S BANCORP	1	
5	CHASE MANHATTAN CORP	1	Pre GLB	14	U S BANCORP DE	1	
5	CHASE MANHATTAN CORP NEW	1	Pre GLB	14	U S BANCORP ORE	1	
6	FLEET FINL GROUP INC	1		14	U S BK NATL ASSN	0	
6	FLEET NATL BK	0		14	U S BK NATL ASSN CINCINNATI OHIO	0	
6	FLEET NATL BK PROVIDENCE R I	0		14	U S BK NATL ASSN MINNEAPOLIS	0	
6	FLEETBOSTON FINL CORP	1		14	U S BK NATL ASSN N D FARGO	0	
7	HUNTINGTON BANCSHARES INC	1		15	WACHOVIA BK N C N A	0	
7	HUNTINGTON BANKSHARES INC	1		15	WACHOVIA CORP	1	
7	HUNTINGTON NATL BK	0		15	WACHOVIA CORP NEW	1	
7	HUNTINGTON NATL BK COLUMBUS	0		16	WELLS FARGO & CO	1	
8	J P MORGAN CHASE & CO	1	Post GLB	16	WELLS FARGO & CO NEW	1	
8	J P MORGAN CHASE BK	0	Post GLB	16	WELLS FARGO & COMPANY	1	
9	KEY BK N A	0		16	WELLS FARGO BK NA	0	
9	KEYCORP	1					