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ORIGINAL RESEARCH

Why do bank holding companies purchase bank-owned life insurance?

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Abstract
Bank-owned life insurance (BOLI) is life insurance purchased by bank holding companies (BHCs) for key employees, whose proceeds can be shared by the company and employees' heirs. We investigate reported benefits of purchasing BOLI to shed light on the dramatic increase in BOLI assets using a sample of 2040 firm-year observations from 2004 to 2013. We document that a BHC owning BOLI enjoys an average annual earnings increase of $12.5 million and an estimated annual tax shield of $3.4 million. This tax shield is nearly twice the size of average total CEO compensation. We provide empirical evidence that BOLI complements other forms of executive compensation. We empirically test potential agency costs associated with using BOLI as compensation but find no evidence of such costs. Further investigation shows that BHCs use BOLI to attract talented executives and benefit shareholders. We conclude that the significant benefits documented in this study provide convincing rationale for the increasing use of BOLI in recent years.

Keywords Corporate governance · Executive compensation · Bank-owned life insurance · Bank holding company · Bank holding company performance

JEL Classification G21 · G22 · G34

1 Introduction

Bank-owned life insurance (BOLI) is life insurance purchased by a financial institution to cover the loss incurred due to the death of a key employee by providing a financial cushion until a successor takes office. Because the financial institution typically owns the policy, it not only receives the death benefits, but also incurs investment risk and accrues investment income as the cash surrender value of the policy increases over time. In the past decade, the use of BOLI has increased significantly. Aggregate BOLI assets in our sample have

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almost quintupled from $25.8 billion in 2003 to $124.2 billion by year-end 2013.[1] Given the significant increase in the use of BOLI, the Office of the Comptroller of the Currency (OCC) and three other government regulatory agencies jointly issued a statement in 2004 that provided guidelines for purchasing BOLI. They identified multiple sources of potential risk associated with BOLI and recommended risk management strategies for BOLI usage (OCC 2004).[2] Davidson (2017) finds a positive relation between BOLI and liquidity risk, credit risk, and interest-rate risk, providing empirical evidence supporting the concerns of regulators. Given the concerns, it is not clear why BOLI use continues to grow so dramatically and what benefits BHCs attain from their purchase of BOLI beyond the death benefits. The goal of this study is to shed new light on these issues.

The OCC statement presents BOLI not only as a form of life insurance, but also as a form of executive compensation because the beneficiary can change from the company to the executive's heirs upon retirement, or the executive can name beneficiaries in addition to the company in a split-dollar arrangement.[3] Therefore, BOLI serves the interests of the company while also becoming a part of executives' total compensation packages. We find a statistically significant and positive relation between total compensation and BOLI, supporting the OCC's assertion that BOLI is another form of executive compensation. We also decompose total compensation into various components and find that BOLI is positively associated with both base salary and long-term pay. These results are robust to various measures of BOLI and compensation.

We then analyze how the use of BOLI as compensation affects BHC performance. In an investigation of bank characteristics associated with BOLI purchases, Davidson and Shelor (2014) find evidence supporting the hypothesis of an agency motive for the purchase of BOLI. Following the agency perspective of the managerial power hypothesis, if BOLI is used as another channel for entrenched executives to extract rents from the BHC, then BOLI should be negatively related to performance. However, if BOLI is used as part of a compensation package to attract, retain, and incentivize talented managers, consistent with the efficient contracting hypothesis, then BOLI should be positively related to performance as the BHC is well-managed and agency costs are reduced.

We provide evidence that increases in BOLI are associated with higher annual stock returns that benefit shareholders. This finding is robust to model specification and to various measures of BOLI. Our results are consistent with the view that BOLI provides BHC CEOs with incentives to work in the best interest of shareholders, supporting the efficient contracting hypothesis. We test this notion by examining the effect of BOLI on BHC risk and CEO turnover. We find no evidence that improved performance is driven by increased risk taking nor that BOLI affects future turnover, but we do find evidence that BOLI is used to attract a new CEO when turnover does occur.

The statement from the OCC further proposes that BOLI can be used as a tax shelter. When the executive's estate is the beneficiary of the policy, premiums are considered to be executive compensation expenses and are therefore paid before taxes, reducing taxable

[1] Our sample ends in 2013 because SNL no longer provides access to these historical compensation data. Aggregate BOLI continued to rise after our sample period. According to http://www.bolicoli.com/boli-fact-figures, BOLI amounts reached $167.8 billion by year end 2017 with 3570 banks reporting BOLI in their regulatory filings.

[2] See https://www.occ.treas.gov/news-issuances/bulletins/2004/bulletin-2004-56.html.

[3] Beneficiary data is not available so we are unable to differentiate potential benefits and costs of BOLI based on beneficiary of the policy.

income. When the bank is the beneficiary of the policy, the cash value is allowed to accumulate tax-free until the policy matures or is surrendered (Graham and Tucker 2006; Smith et al. 2006). Our measures suggest the tax-advantaged investment in BOLI has substantial benefits for BHCs. We document that a BHC owning BOLI enjoys an average annual increase in earnings of $12.5 million, which provides an estimated annual tax shield of $3.4 million. As a comparison, this tax shield is nearly twice the size of the average total CEO compensation in our sample. Summing across BHCs, BOLI adds an average of $2.4 billion to bank industry earnings each year and results in an average aggregate tax savings of $653 million per year. While economically beneficial, we find that earnings on BOLI assets are not statistically associated with annual stock returns and that results for the associated tax shield are mixed. Overall, the evidence indicates it is the purchase of BOLI to attract talented managers that improves BHC performance rather than the tax-advantaged earnings on BOLI or increased risk taking.

This study is related to four distinct strands of literature. First, we add to the literature on executive compensation in general and, specifically, to the literature on insurance as a form of compensation (e.g. Core 1997) and as a governance mechanism (Boyer and Tennyson 2015; Gillan and Panasian 2015). We document a positive relation between CEO compensation and BOLI purchases. Second, we contribute to the understanding of determinants of BHC performance by documenting that BOLI has a positive wealth effect for shareholders. Third, we provide evidence that BOLI serves as a form of non-traditional compensation used to attract new CEOs. Finally, our investigation adds to the existing literature on corporate-insurance purchases dating back at least to Cummins (1976). Relatively little is known about the effect of insurance on corporate performance due to a general lack of data on corporate insurance purchases (e.g., Regan and Hur 2007). We provide evidence that insurance can be value-enhancing.

The remaining of the paper is organized as follows. Section 2 discusses related literature and develops testable hypotheses. Section 3 describes the sample and methodology. Section 4 contains the empirical results and Sect. 5 provides concluding remarks.

2 Literature review and hypothesis development

2.1 Bank owned life insurance

Key employee life insurance in the banking industry is called bank-owned life insurance.[4] Permission to purchase life insurance on key employees is granted to national banks by 12 USC § 24, to federal savings associations by the Home Owner's Loan Act, and to state-chartered banks by individual state law (OCC 2004). Typically, BOLI is funded by a bank with a single initial premium paid to the insurer. The amount that could be realized by the BHC under the contract as of the balance-sheet date, i.e., the cash surrender value of the policy, is recorded on the balance sheet of a BHC as an asset (OCC 2004). BOLI may serve the interests of both the purchasing institution and the individual employee if the benefits are shared.[5] Benefits to the purchasing institutions include a tax-sheltered investment

[4] Eligible employees are defined by the Pension Protection Act of 2006 to include officers, directors, and highly compensated employees as defined by 26 U.S. Code § 414(q).

[5] See Davidson and Shelor (2014) for a more detailed discussion of the benefits and characteristics of BOLI.

vehicle because the cash value is allowed to accumulate tax-free until the policy matures or is surrendered (Graham and Tucker 2006; Smith et al. 2006), providing a financial buffer to offset the opportunity cost of the loss of leadership in the event of an executive's death, and as a tool to attract and retain key employees. Meanwhile, BOLI benefits a covered employee as a form of executive compensation if the executive's estate is named as a beneficiary of the policy.

However, the benefits of BOLI do not come without costs. Davidson (2017) finds that BOLI is positively associated with bank failure for smaller institutions and that various bank risks increase with BOLI purchases because liquid assets are used to purchase the long-term BOLI contracts, increasing liquidity risk and exposing banks to interest rate risk and counter party risk (i.e. credit risk). The increasing use of BOLI has caught the attention and concern of regulators who have called for a true understanding of the potential risks of BOLI (OCC 2004).

Regulators are most concerned with the credit risk that the insurer poses to the bank. The bank's premium is typically invested in the general account of the insurer, meaning if the insurer fails, the bank's investment is at risk of loss. The unique characteristics of BOLI can also create an agency problem. The potential personal benefits to covered executives can create an incentive for them to increase BOLI when their estate is a named beneficiary. Adapting the managerial-opportunism hypothesis of Chalmers et al. (2002) to BOLI, managers are incentivized to purchase more BOLI because their estate can fully benefit from the insurance, but the executives only pay for the insurance in proportion to their fractional ownership of the firm's equity. Purchasing BOLI above the amount needed for the purpose of risk management may reduce firm value.[6] Davidson and Shelor (2014) find preliminary evidence supporting this notion that managers may increase their own benefits through BOLI. Concerned about the aggressive use of BOLI, the OCC has provided guidelines for the oversight of BOLI. For example, the OCC has recommended that banks limit the cash surrender value of BOLI to 25% of capital (OCC 2004), which explicitly suggests excessive use of BOLI is not in the best interest of bank creditors.

We hypothesize that there is an optimal level of BOLI for each BHC. Improper use of BOLI, including both insufficient and excessive purchase of BOLI, may increase risk and agency costs, and hence destroy value. Empirical studies support this notion. For example, Davidson (2017) finds over and under investment in BOLI relative to similar size banks is associated with increased bank risk. If bank risks increase, bank performance can be affected negatively. Therefore, managers need to make tradeoffs between the benefits and costs of BOLI to determine a proper level of BOLI based on BHC-specific characteristics. We construct measures of BOLI based on the median of similar-sized BHCs and unexpected levels of BOLI based on BHC characteristics.

2.2 Literature review and development of testable hypotheses

2.2.1 Executive compensation and BOLI

On page 9 of the OCC's 2004 Bulletin on BOLI, regulators specifically raise the issue of excessive executive compensation associated with the purchase of BOLI:

[6] Loadings to the fair price of insurance make corporate purchase of insurance a negative NPV investment, destroying shareholder value.

> Before an institution enters into a split-dollar arrangement or otherwise purchases insurance for the benefit of an officer, director, or employee, the institution should identify and quantify its compensation objective and ensure that the arrangement is consistent with that objective. The compensation provided by the split-dollar or other insurance arrangement should be combined with all other compensation provided to the insured to ensure that the insured's total compensation is not excessive. Excessive compensation is considered an unsafe and unsound banking practice.

Excessive executive compensation has been the target of media stories, especially for financial firms during the recent financial crisis (e.g. Karmin 2009), and caught the attention of politicians. In 2010, President Obama signed into law the Dodd-Frank Act, which includes several sections (Sections 951, 952, 954, 955, and 972) addressing the issue of executive compensation and making executive compensation the forefront of the recent corporate governance reform. For example, the Dodd-Frank Act scrutinizes bank executive pay by advocating shareholders' right to "say-on-pay," requires that the compensation committee be composed of independent directors, and mandates that publicly traded firms implement and report claw back policies. Some argue that the popular press gives the public an impression that bank executives are excessively paid. However, empirical studies document that bank CEOs have lower pay, measured in a variety of ways, than CEOs in non-financial firms (Houston and James 1995; Adams and Mehran 2003; Adams 2012). These empirical findings suggest that banks have governance involving CEO pay that is at least no worse than non-financial firms.

If bank executives perceive that they receive lower pay than their counterparts in non-financial firms, it may create an incentive for them to increase BOLI purchases to boost the wealth of their estate. However, well governed firms do not overpay their CEOs. For example, Core et al. (1999) find that CEOs in firms with weak governance structures receive greater compensation. Even though bank executives have the incentive to increase their benefits via BOLI, they may not be able to do so under close scrutiny of the board and institutional investors. Also, if executives receive high pay, indicating the firm's corporate governance structure is weak, executives may be able to further increase their personal benefits through BOLI.

Two hypotheses dominate executive compensation research: efficient contracting and managerial power. The efficient contracting hypothesis states that executive compensation is determined by a competitive market for managerial talent in which firms attempt to attract high-quality executives to optimize firm value (Murphy 2012). BOLI could be another tool to attract and retain talented managers. Also, in the event of an executive's death, losses to the bank are positively related to the value of the executive. If CEO compensation reflects the quality of a CEO, as in the efficient contracting theory, a bank with a valuable CEO should purchase more BOLI to cover the greater potential loss, resulting in a positive relation between BOLI and CEO compensation. Conversely, the managerial power hypothesis maintains that executive compensation is the outcome of negotiations between executives and a captured board (Frydman and Jenter 2010; Murphy 2012). If high CEO compensation reflects the greater bargaining power of an entrenched CEO, as in the managerial power hypothesis, then the institution may purchase more BOLI as another channel through which the CEO can extract excess rents from the firm. Following this line of reasoning, it is possible that BOLI increases with CEO compensation since both capable and entrenched CEOs are able to increase this type of compensation. In other words, both theories predict a positive, or complementary, relation between executive compensation and BOLI.

However, firms may adjust executive compensation to mitigate public outrage over executive compensation and to avoid criticism of their executive compensation practices. For example, Henderson et al. (2010) document that firms reduce CEO bonus compensation and increase equity-based compensation as layoffs intensify and this phenomenon is more pronounced for less powerful CEOs. The level of executive pay became a more sensitive issue during the 2007–2009 financial crisis. Using a less noticeable form of compensation ("stealth" compensation in the words of Frydman and Jenter (2010)) to substitute for a more visible compensation component could help protect the executives' total welfare and simultaneously help the BHC avoid becoming the target of public outrage. In addition, the 2004 OCC Bulletin on BOLI warns BHCs that it treats excessive executive pay as "safety and soundness" concern, which might lead companies to treat BOLI and other forms of executive compensation as substitutes. Given the increased scrutiny of executive compensation from both internal (board of directors and institutional investors) and external (regulators, media, and general public) sources, BHCs may adjust executive compensation by reducing common forms of compensation and adding BOLI to the total compensation package. In other words, BHCs may replace other forms of compensation with BOLI. If BOLI is used as a substitute for other forms of executive compensation, then we would expect a negative relation between executive pay and BOLI. The existence of the two competing hypotheses makes the relation between BOLI and executive compensation an empirical question. Specifically, we test:

H_{1a} Executive (CEO) total, non-BOLI compensation is positively related to BOLI (complementary hypothesis).

H_{1b} Executive (CEO) total, non-BOLI compensation is negatively related to BOLI (substitution hypothesis)

2.2.2 BOLI and performance

The structure of executive compensation at BHCs affects management risk-taking behavior (Chen et al. 2006; Hagendorff and Vallascas 2011; DeYoung et al. 2013), firm performance (Mehran 1995; Cornett et al. 2009; Minnick et al. 2011), asset mix (Liu and Mauer 2011; Livne et al. 2013), and stability (Bai and Elyasiani 2013). If BOLI is a part of an executive-compensation package, even unofficially, then we should see that BOLI affects managerial efforts and risk-taking, and, hence, performance. We empirically test the link between BOLI and BHC performance to determine if BOLI benefits or hurts BHC shareholders. BOLI could destroy shareholder value, given that BOLI is associated with greater bank risk (Davidson 2017).[7] The managerial power hypothesis predicts BOLI negatively affects performance as an entrenched CEO is able to extract excess rents to the detriment of shareholders.[8] Similarly, if executives receive high pay, indicating the firm's corporate governance structure is weak (Core et al. 1999), executives may be able to further increase

[7] Other types of insurance have also been shown to be associated with greater risk (Boyer and Tennyson 2015; Gillan and Panasian 2015) and higher cost of capital (Chen et al. 2016).

[8] BOLI is only one of many channels through which entrenched CEOs can extract rents from shareholders. Excessive perquisite consumption, trading on inside information (Fried 1998), and share repurchases (Jategaonkar 2013; Fried 2000) are examples of other channels. In this paper, we focus on BOLI.

their personal benefits through BOLI. This potential agency cost of BOLI could negatively affect BHC performance.

On the other hand, the efficient contracting hypothesis predicts BOLI should increase BHC value as another incentive vehicle to help attract, retain, and motivate high quality managers.[9] High compensation through BOLI is indicative of a high-quality CEO who is able to increase shareholder wealth. Further, the use of BOLI could help increase firm value as a risk-management tool that compensates a BHC after the death of a key employee. Ultimately, the direction of the relation between BOLI and BHC performance is an empirical question. We test the following opposing hypotheses:

H_{2a} BOLI affects BHC performance positively as a risk-management tool and as a managerial incentive.

H_{2b} BOLI affects BHC performance negatively because of agency costs and its association with greater risk.

3 Sample selection, data, and methodology

3.1 Variable descriptions

3.1.1 Measurement of BOLI

BOLI is reported on the balance sheet in the FR Y-9C as an asset and is defined as 'the cash surrender value of life insurance that could be realized as of the balance sheet date'.[10] We are unable to classify BOLI based on the type of BOLI policy (whole life, universal life, or variable life, and general account or separate account). Additionally, we are unable to determine how many executives are covered under BOLI policies, the relative size of these individual BOLI policies, and if the BHC is the sole beneficiary or if the executive's estate is also a beneficiary in a split-dollar arrangement.

We utilize three measures of BOLI assets for the regression analysis. The first measure is the change in the ratio of the dollar amount of BOLI to the dollar amount of total assets (*ΔBOLI/Assets*). We scale BOLI by total assets both to mitigate concerns about heteroskedacity and to control for BHC size because larger BHCs have, on average, larger dollar amounts of BOLI. We use the change in the ratio to aid in the identification of causation rather than merely correlation. We follow the approach used by Benson et al. (2011) and Davidson (2017) to compute additional measures of BOLI assets. Our second measure is the change in the deviation from the size-adjusted median ratio of BOLI to assets.[11] We use size thresholds of $2.5 billion and $10 billion to split the sample into small, medium, and large BHCs. Our size thresholds are consistent with Black and Hazelwood (2013). We compute the median ratio of BOLI to assets separately for BHCs in each of the three size

[9] As part of the total compensation package, BOLI is only one of many possible ways that a firm can attract and retain high-quality managers. We include non-BOLI compensation in our analysis to control for other incentives.

[10] Source and detailed construction of all variables can be found in "Table 10 in the Appendix".

[11] Results are consistent using the deviation from size-adjusted mean BOLI to assets ratio.

groups. *DMBOLI* is then computed as the deviation from the median BOLI to total assets ratio of BHCs in the same size category. *DMBOLI* is positive (negative) for BHCs with above (below) median BOLI to assets. The change in *DMBOLI* (*ΔDMBOLI*) is positive (negative) for BHCs that increase (decrease) the BOLI to assets ratio relative to the median BOLI to assets ratio. Our final measure of BOLI assets is the change in the amount of BOLI that is unexplained (*ΔunexBOLI*) by bank characteristics shown by Davidson and Shelor (2014) to influence BOLI purchases. *unexBOLI* is the residuals, $\epsilon_{i,t}$, from estimating the following equation using ordinary least squares with standard errors clustered by BHC:[12]

$$BOLI_{i,t} = \alpha + \gamma_1 Ln(Assets)_{i,t} + \gamma_2 ETR_{i,t} + \gamma_3 Salary_{i,t} + \gamma_4 Loss_{i,t} + \sum \gamma_y (Year) + \epsilon_{i,t} \quad (1)$$

where t*he dependent variable is the dollar amount of BOLI scaled by the dollar amount of total assets. Size is measured by the natural logarithm of total assets (Ln(Assets)). We derive the effective tax rate (ETR) as in Brown (2011) by dividing income taxes paid by earnings before taxes (EBT). ETR is set equal to 1 if the ratio is greater than 100% and to 0 if the ratio is negative (Brown 2011). Salary is salary and benefits expense of all BHC employees as reported on the income statement divided by the number of full-time equivalent employees. Loss is an indicator variable equal to 1 if the bank has negative EBT and 0 otherwise. Finally, year dummy variables (Year) are included to control for unobserved differences through time. unexBOLI* is positive (negative) for BHCs that have a larger (smaller) BOLI to assets ratio than predicted by BHC characteristics. The change in *unexBOLI* (*ΔunexBOLI*) is positive (negative) when BHCs increase (decrease) the BOLI to assets ratio relative to predicted values.

BHCs also report the earnings on the cash surrender value of BOLI on the income statement.[13] We use this to create two additional variables used in the analysis. The first one is the earnings on the cash surrender value of BOLI contracts divided by total assets (*BOLI_Earn/Assets*), which gives a scaled dollar return on the investments underlying the BOLI contracts. As described in Sect. 2.1, a tax shield is created because these returns are not taxed until the BOLI policies mature. We estimate the dollar amount of the annual tax shield (*TaxBenefit*) by multiplying BOLI earnings times the effective tax rate (*BOLI_Earn* * *ETR*) and then scale by total assets (*TaxBenefit/Assets*).

3.1.2 Compensation, performance, and control variables

We use multiple proxies for CEO compensation. *Base* is the base cash salary. *Bonus* is the cash bonus. *Long Term* is the long-term compensation and equals *TComp* minus the sum of *Base* and *Bonus*. *TComp* is total, non-BOLI compensation and is equal to the sum of Base, Bonus and long-term compensation. We scale all CEO compensation variables by total assets in the analysis. *Return* is the continuously compounded annual return in excess of the CRSP value-weighted portfolio return calculated using monthly returns from CRSP.[14]

[12] This is similar in spirit to Core (1997) and Gillan and Panasian (2015) in the examination of directors' and officers' insurance.

[13] See Memoranda item 6 (BHCKC014) in Schedule HI (Consolidated Income Statement) of the FR-Y9C Reporting Form for bank holding companies.

[14] Results are unchanged if returns are calculated in excess of the CRSP equal-weighted portfolio or the S&P 500.

Primary control variables are constructed as follows. *ROA* is earnings before taxes divided by total assets and is used to control for profitability. *Ln(Assets)* is the natural logarithm of total assets and is used to control for bank size. *Loans/Assets* is total loans and leases, net of unearned income divided by total assets and is included to control for asset mix. We use the total equity to total assets ratio (*Equity/Assets*) to control for leverage. We control for equity volatility with *StdReturn* constructed as the 1-year standard deviation of monthly stock returns. We include fees paid to directors for attendance at board and committee meetings divided by total assets to control for director incentives.[15] We control for BHC liquidity with the sum of cash and marketable securities divided by total assets (*CashSec/Assets*). *Nonperf/Assets* is the nonperforming assets to total assets ratio and controls for BHC asset quality and credit risk. Nonperforming assets is constructed as the sum of assets 90 or more days past due, assets in nonaccrual status, and other real estate owned. We proxy for interest rate risk with *Gap/Assets* calculated as the 1 year gap divided by total assets. We use the net risk-weighted assets to total assets ratio (*RWAssets/Assets*) to control for overall asset risk. Net risk-weighted assets is gross risk-weighted assets (*BHCKA223*) minus any excess allowance for loan and lease losses (*ALLL*). Finally, we control for the liquidity of BHC equity with *Amihud* defined as:

$$Amihud = Average\left(\frac{Return_t}{Volume_t}\right) \tag{2}$$

where *Return* is the daily stock return on day *t*, *Volume* is the dollar volume on day *t*, and the average is calculated over all positive volume days in the year (Amihud 2002).

3.2 Sample selection

We obtain compensation variables from SNL Financial (SNL) which covers the universe of publicly traded U.S. BHCs. Balance sheet and income statement variables are obtained from the fourth quarter *Consolidated Financial Statements for Bank Holding Companies* (Form FR Y-9C) from the Federal Reserve Bank of Chicago to match the annual frequency of the compensation data. Stock market data is obtained from the Center for Research in Security Prices (CRSP).[16] The use of BHC data is necessary because the compensation data provided by SNL is at the BHC level as opposed to the bank level. BOLI is first reported on the FR Y-9C in 2003, but we utilize the change in variables of interest which are missing in 2003 by construction. Our access to historical compensation data from SNL ends in 2013, so our complete dataset ranges from 2004 to 2013. We merge data from the FR Y-9Cs, SNL, and CRSP to produce 2040 firm-year observations on 271 unique BHCs that have complete CEO compensation, stock price, and accounting data.[17]

[15] Our measure of director pay (BHCK4136) is a lower bound because BHCs are only required to report fees paid that are greater than $25,000 and greater than 3% of 'other noninterest expense'.

[16] We merge FR Y-9C data with CRSP using the 2017 CRSP-FRB link provided by the Federal Reserve Bank of New York (https://www.newyorkfed.org/research/banking_research/datasets.html).

[17] We conduct additional analysis using annual median compensation of all executives' compensation reported by SNL. Results are qualitatively the same. BHCs only report the earnings on BOLI if it is greater than $25,000 and exceeds 3% of noninterest income. This causes some missing values for the *BOLI_Earn* and *TaxBenefit* variables in our sample. We do not limit our sample to non-missing observations of these variables because they are of secondary importance to the study. However, restricting the sample does not qualitatively change the results.

Figure 1 displays the time series of the average BOLI assets to total assets, the average BOLI earnings to total assets, and the average total compensation to total assets over the sample period, for all BHCs in the sample. The lines retain the same general shape but are shifted higher on the graph if only BHCs with positive amounts of BOLI are included.[18] BOLI increased relative to total assets every year during the sample period except 2008 and 2009. Presumably BHCs reduced BOLI purchases in response to the financial crisis, but the trend over recent history is that BOLI assets increased faster than total assets. The average compensation to total assets continued to grow during the sample period except 2008 and 2009, presenting a similar pattern to the average BOLI to assets ratio. Visually, *BOLI/Assets* and *TComp/Assets* are positively correlated, providing a preliminary indication that BOLI is related to executive compensation. BOLI earnings increased considerably relative to total assets prior to the financial crisis, decreased slightly during the crisis, and have remained relatively flat afterward. Visually, *BOLI_Earn/Assets* does not show as similar a pattern to *BOLI/Assets* or *TComp/Assets* as the latter do with each other.

Summary statistics of the full sample are shown in Table 1 Panel A. BOLI averages $431 million, which for context is similar in magnitude to the untabulated average of brokered deposits ($471 million) and *ALLL* ($526 million) in our sample. BOLI varies across institutions with a range from zero to $22.8 billion. On average, BOLI comprises 1.3% of BHC assets (again comparable to the untabulated brokered deposits and *ALLL* ratios of 1.9% and 1.1% respectively), but is as large as 6.1% of BHC assets. The average BHC has a smaller BOLI to assets ratio than the median BHC in the same size group as can be seen by the negative mean value of *DMBOLI*. Similarly, the negative mean value of *unexBOLI* indicates the average BHC has a smaller BOLI to assets ratio than predicted by fundamentals.

Earnings on BOLI and the associated tax benefits are substantial. *BOLI_Earn* averages $10.8 million and ranges from a $156 million loss to an $808 million gain. To put this in context, the average earnings on BOLI would cover the average total CEO compensation more than 5 times over, and the average CEO base salary more than 21 times over. Although not displayed in Table 1, only 4 observations of *BOLI_Earn* are negative, while 1322 are positive. There are 714 observations of zero *BOLI_Earn* and only 273 observations of zero BOLI, which implies there are 441 observations of BHCs that own BOLI assets which produced zero earnings. The number of observations of positive earnings far outweighs the number of non-positive-earnings observations. Earnings on BOLI ranges from −0.14 to 0.38% of BHC assets and averages approximately 0.04% of assets. The sum of BOLI earnings across BHCs in our sample has an average (median) value of $2.4 billion ($3.4 billion) per year.

The gains on BOLI assets produce an average tax savings of $2.9 million per year which is a savings of approximately 0.01% of BHC assets. Our estimate of the average tax savings covers the average total CEO compensation more than 1.5 times over and covers the average CEO base salary more than 5 times over. The sum of tax savings from BOLI across BHCs in our sample has an average (median) value of $653 million ($782 million) per year.

Annual excess stock return averages 5.5% and ranges from −92.77 to 2060%. Average BHC size is $45.7 billion in total assets and average CEO total compensation is nearly $1.9 million. Averages for components of compensation are $508,000 in base

[18] We do not present the graph for only BHCs with positive amounts of BOLI to save space.

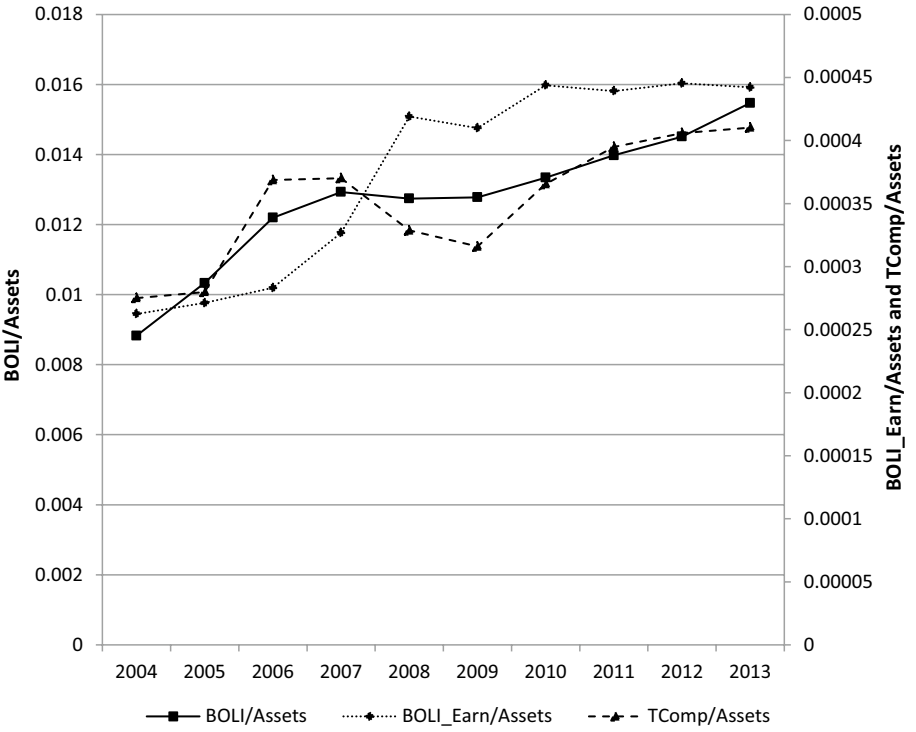

Fig. 1 Time series of BOLI, earnings on BOLI, and compensation. The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. The solid line displays average BOLI/Assets (left axis). The dotted line displays the average of earnings on BOLI assets scaled by total assets (right axis). The dashed line displays average total compensation to total assets ratio (right axis)

compensation, $160,000 in bonuses, and $1299,000 in long-term compensation. Total compensation averages 0.04% of BHC assets. We identify 169 CEO turnovers in our sample. The average BHC in the sample has ROA of 0.9%, total equity to total assets equal to 9.8%, monthly standard deviation of stock returns of 8.9%, director fees equivalent to 0.01% of total assets each year, cash plus securities to total assets of 25.6%, non-performing asset ratio of 1.84%, a 1-year gap ratio of 16.3%, a risk weighted assets to total assets ratio of 73%, an Amihud liquidity measure of 0.98, and an effective tax rate of 27.5%.

We present summary statistics for the 1767 observations with positive amounts of BOLI in Table 1 Panel B. As expected, the mean values of all BOLI-related variables are larger than the mean values for the full sample of BHCs. BHCs that own BOLI have average annual earnings on BOLI of $12.5 million that provides an estimated annual tax shield of $3.4 million. This tax shield is nearly twice the size as the average total CEO compensation. Mean total compensation and mean excess return are larger for the full sample of BHCs, but the total compensation to total assets ratio is larger for the subsample of BHCs with positive BOLI.

Table 1 Summary statistics

Variable	Mean	Standard error	Minimum	Maximum
Panel A: All BHCs				
BOLI ($T)	431,380	47,689	0	22,800,000
BOLI/Assets (%)	1.2963	0.0205	0.0000	6.1029
ΔBOLI/Assets (%)	0.0682	0.0072	− 2.5796	2.6668
DMBOLI (%)	− 0.0471	0.0201	− 1.7844	4.4831
ΔDMBOLI (%)	− 0.0268	0.0078	− 2.7054	2.4593
unexBOLI (%)	− 0.0032	0.0197	− 1.9888	4.4804
ΔunexBOLI (%)	− 0.0028	0.0077	− 2.6404	2.4637
BOLI_Earn ($T)	10,818	1463	− 155,925	808,000
BOLI_Earn/Assets (%)	0.0385	0.0009	− 0.1435	0.3791
TaxBenefit ($T)	2917	523	− 32,278	765,277
TaxBenefit/Assets (%)	0.0096	0.0003	− 0.0546	0.1924
Return (%)	5.5060	1.8619	− 92.7678	2060.0720
Assets ($T)	45,700,000	5,321,815	195,290	2,420,000,000
CEO variables				
TComp ($T)	1889	81.2	0.0010	39,066
Base ($T)	507.98	7.96	0	5600
Bonus ($T)	159.41	18.06	0	14,500
Long Term ($T)	1299	73.96	0	37,439
TComp/Assets (%)	0.0357	0.0006	< 0.0001	0.2186
Base/Assets (%)	0.0192	0.0003	0	0.0893
Bonus/Assets (%)	0.0029	0.0001	0	0.0705
Long Term/Assets (%)	0.0143	0.0004	0	0.1832
ΔTComp/Assets (%)	0.00,002	0.0004	− 0.2362	0.1617
ΔBase/Assets (%)	− 0.0003	0.0001	− 0.0456	0.0733
ΔBonus/Assets (%)	− 0.0005	0.0001	− 0.0705	0.0295
ΔLong Term/Assets (%)	0.0009	0.0004	− 0.2189	0.1462
Turnover	0.0828	0.0061	0	1
Control variables				
ROA (%)	0.9231	0.0295	− 10.4534	5.9953
Ln(Assets) ($T)	15.1146	0.0368	12.1822	21.6053
Loans/Assets (%)	66.1904	0.2769	4.6450	96.2113
Equity/Assets (%)	9.7570	0.0504	0.5859	19.0569
StdReturn (%)	8.9342	0.1364	1.5381	63.4247
DirFee/Assets (%)	0.0091	0.0004	0	0.1641
CashSec/Assets (%)	25.6285	0.2595	1.8527	79.8491
Nonperf/Assets (%)	1.8360	0.0438	0	16.4311
Gap/Assets (%)	16.3176	0.2885	0.0005	86.3973
RWAssets/Assets (%)	73.0458	0.2544	25.3441	120.0306
Amihud	0.9821	0.0752	0.00,001	56.8048
ETR (%)	27.5283	0.3186	0	100
Panel B: BHCs with Positive BOLI				
BOLI ($T)	498,028	54,888	35	22,800,000
BOLI/Assets (%)	1.4966	0.0197	0.0006	6.1029

Table 1 (continued)

Variable	Mean	Standard error	Minimum	Maximum
DMBOLI (%)	0.1358	0.0197	− 1.6931	4.4831
unexBOLI (%)	0.1759	0.0194	− 1.6380	4.4804
BOLI_Earn ($T)	12,486	1685	− 155,925	808,000
BOLI_Earn/Assets (%)	0.0442	0.0009	− 0.1435	0.3791
TaxBenefit ($T)	3367	602.71	− 32,278	765,277
TaxBenefit/Assets (%)	0.0111	0.0003	− 0.0546	0.1924
TComp ($T)	1864	84.32	0.0010	39,066
TComp/Assets (%)	0.0360	0.000	< 0.0001	0.2186
Return (%)	4.5878	1.7033	− 92.767	1472.3870

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Panel A displays summary statistics of key variables for the full sample of bank holding companies (BHCs), and Panel B displays mean values of key variables for BHCs with positive amounts of BOLI (1767 observations). The following variables are obtained from the FR Y-9C reports, unless stated otherwise. *BOLI* is BOLI assets reported on the balance sheet and *Assets* is total assets. The *Δ* prefix indicates change. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). *BOLI_Earn* is the earnings on the cash surrender value of BOLI contracts reported on the income statement. *TaxBenefit* is the estimated BOLI tax shield. *Return* is the excess stock return using data from CRSP. All CEO compensation variables are obtained from SNL Financial. *TComp* is total compensation. *Base* is the base salary. *Bonus* is the cash bonus. *Long Term* equals *TComp* minus *Base* and *Bonus*. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Loans* is total loans and leases, net of unearned income. *Equity* is total equity. *StdReturn* is the 1 year standard deviation of monthly stock returns obtained from CRSP. *DirFee* is the fee paid to directors. *CashSec* is cash plus securities. *Nonperf* is nonperforming assets. *Gap* is the 1-year gap. *RWAssets* is risk-weighted assets. *Amihud* is the Amihud liquidity measure (Amihud 2002). *ETR* is the effective tax rate

3.3 Statistical method

3.3.1 Compensation

In our primary investigation of the effect of executive compensation on BOLI, we use a series of regressions that contain year and BHC fixed-effects with standard errors clustered by BHC that take the following form:

$$BOLI_{i,t} = \beta_0 + \beta_1 Comp_{i,t} + \beta_2 Turnover_{i,t} + \sum \beta_k Control_{k,i,t-1} + \sum \beta_t Year + \sum \beta_i BHC_i + \varepsilon_{i,t} \quad (3)$$

where BOLI is one of the three measures of BOLI discussed in Sect. 3.1.1 (*ΔBOLI/Assets*, *ΔDMBOLI*, or *ΔunexBOLI*). *Comp* is a measure of CEO compensation. We control for changes in CEO that may affect BOLI purchases with an indicator variable (*Turnover*) equal to one for observations with CEO turnover and equal to zero otherwise. All other control variables are lagged 1 year relative to *BOLI*. Control variables include *ROA* to control for profitability, *Ln(Assets)* to control for BHC size, *Equity/Assets* to control for leverage, and *DirFee/Assets* to control for director compensation. Finally, we include time (*Year*) and BHC (*BHC*) fixed-effects.

3.3.2 Performance

We investigate the effect of BOLI on BHC performance with a series of regressions that contain year and BHC fixed-effects with standard errors clustered by BHC that take the following form:

$$Return_{i,t} = \beta_0 + \beta_1 BOLI_{i,t} + \sum \beta_k Control_{k,i,t-1} + \sum \beta_t Year + \sum \beta_i BHC_i + \varepsilon_{i,t} \quad (4)$$

where *Return* is the continuously compounded annual stock return in excess of the CRSP value-weighted portfolio returns. The independent variable of interest is the change in one of the three measures of BOLI discussed in Sect. 3.1.1 (*ΔBOLI/Assets*, *ΔDMBOLI*, or *ΔunexBOLI*). Other independent variables include a vector of control variables (*Control*) and time (*Year*) and BHC (*BHC*) fixed-effects. Primary control variables include *ROA* to control for profitability, *Ln(Assets)* to control for BHC size, *Loans/Assets* to control for differences in BHC business, *Equity/Assets* to control for leverage, *StdReturn* to control for the volatility of returns, *DirFee/Assets* to control for director compensation, *TComp/Assets* to control for the CEO's incentives, *CashSec/Assets* to control for liquidity, *Nonperf/Assets* to control for asset quality, *Gap/Assets* to control for interest rate risk, *RWAssets/Assets* to control for asset risk, and *Amihud* to control for stock liquidity.

4 Results

4.1 BOLI and compenstaion

4.1.1 BOLI and total CEO compensation

We investigate the effect of CEO total compensation on BOLI by estimating Eq. (3) using the three measures of BOLI defined in Sect. 3.1.1. Table 2 displays the results using the full sample of BHCs. The change in the total compensation to assets ratio is positively related to the change in all three BOLI measures.[19] BHCs that increase CEO compensation relative to assets also increase BOLI relative to other assets, increase BOLI relative to similar sized BHCs, and increase BOLI relative to predictions based on BHC characteristics. The evidence in all specifications supports the complementary hypothesis that BOLI is provided to executives in addition to conventional forms of compensation rather than replacing other forms of compensation, consistent with both the efficient contracting and managerial power hypotheses.

Control variables are generally consistent across specifications. BOLI, measured by *ΔBOLI/Assets* and *ΔunexBOLI*, is higher in years of CEO turnover, providing evidence that BOLI may be used to attract new CEOs. The change in all BOLI measures decreases in BHC profitability and increases with BHC size. *DirFee/Assets* and *Equity/Assets* are not significantly related to any measure of BOLI.

[19] The change in the total compensation to assets ratio is also positively related to the change in all three BOLI measures in unreported univariate tests.

4.1.2 BOLI and components of executive compensation

Given the different functions of each component of compensation, we further examine which types of executive compensation drive the relation between BOLI and compensation. Table 3 displays the results of estimating Eq. (3) with CEO total compensation replaced with CEO base salary, cash bonus, and long-term compensation. The relation between the level of compensation and the level of BOLI appears to be driven by base salary and long-term compensation. The change in the base salary to assets ratio and the change in the long-term compensation to assets ratio are positively related to the change in all BOLI measures, indicating that BHCs that increase base salary or long-term compensation also increase BOLI. CEO bonuses are unrelated to BOLI in all specifications. These findings are intuitive because base salary, forms of long-term salary, and BOLI are typically negotiated as part of a CEO's appointment. On the other hand, the realized value of a bonus is highly dependent upon the CEO's ability to meet performance metrics and is therefore less likely to be related to the negotiated amount of BOLI. Control variables are generally consistent with previous results.

4.1.3 BOLI and deviation from median compensation

In our final analysis of the relation between compensation and BOLI, we address how deviation from median compensation is related to BOLI. Do BHCs that increase compensation relative to other BHCs also increase BOLI relative to other BHCs? We address this question by estimating Eq. (3) and replacing the CEO total compensation ratio with the deviation from the median total compensation ratio (*DMTComp/Assets*). We compute the median CEO total compensation to assets ratio separately for BHCs in each size group to obtain the size-adjusted median total compensation ratio. *DMTComp/Assets* is then calculated as the deviation from the median total compensation to assets ratio of BHCs in the same size category. *DMTComp/Assets* is positive (negative) for BHCs with above (below) median total compensation to assets. Δ*DMTComp/Assets* captures changes in the total compensation level relative to similar size BHCs and is positive (negative) for BHCs that increase (decrease) relative compensation.

Results displayed in Table 4 indicate that BHCs that increase CEO compensation compared to BHCs of similar size also increase relative amounts of BOLI. The change in *DMTComp/Assets* is positively related to all measures of BOLI. We interpret this as further evidence that BOLI is a complement to other forms of compensation rather than a substitute. The effect of control variables on BOLI is consistent with previous results.

4.2 BOLI and Performance

4.2.1 BOLI and BHC performance

Having documented the complementary association between BOLI and CEO compensation, we investigate the effect of BOLI purchases on BHC performance. If the efficient contracting hypothesis dominates, we would expect a positive effect of BOLI on performance because high compensation is indicative of a high-quality CEO that is able to benefit shareholders. Conversely, if the managerial power hypothesis dominates, we would expect BOLI

Table 2 BOLI and total compensation

Explanatory variables	(1) ΔBOLI/Assets	(2) ΔDMBOLI	(3) ΔunexBOLI
ΔTComp/Assets	1.482*** [<0.001]	1.290*** [0.001]	1.798*** [<0.001]
Turnover	0.001* [0.098]	0.0004 [0.264]	0.001* [0.068]
ROA	−0.014** [0.032]	−0.015** [0.028]	−0.027*** [<0.001]
Ln(Assets)	0.002*** [0.001]	0.002*** [<0.001]	0.001*** [0.005]
Equity/Assets	−0.002 [0.762]	0.001 [0.816]	−0.004 [0.516]
DirFee/Assets	−0.762 [0.365]	−1.352 [0.124]	−0.911 [0.293]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.045	0.089	0.021

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Regression results are obtained by estimating Eq. (3) with BHC and year fixed-effects and standard errors clustered by BHC. The dependent variable is one of the three measures of BOLI. The *Δ* prefix indicates change. *BOLI* is BOLI assets reported on the balance sheet and *Assets* is total assets, both from the FR Y-9C reports. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). From SNL Financial, *TComp* is total CEO compensation, and *Turnover* is equal to one for observations with CEO turnover and zero otherwise. The following variables are obtained from the FR Y-9C reports and are lagged 1 year. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. Coefficients for the constant term and bank and year dummy variables are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

to negatively affect performance as an entrenched CEO is able to extract excess rents at the detriment of shareholders.

The results of estimating Eq. (4) shown in column (1) of Table 5 indicate that the change in the BOLI to assets ratio is positively related to annual excess stock return, suggesting that performance improves for BHCs that increase BOLI relative to other assets. Similarly, *ΔDMBOLI* is positively related to annual excess return in column (2), meaning BHCs that increase the BOLI to assets ratio relative to similar sized BHCs perform better. Column (3) shows that *ΔunexBOLI* is not significantly related to annual excess return.[20] Overall, the results show that BOLI has a positive effect on BHC performance, which is consistent with the efficient contracting hypothesis.[21] We initially conclude that BOLI serves as a risk management tool and is used to attract, retain, and incentivize talented executives, but we explore this possibility more directly in Sect. 4.2.3.

[20] All three findings confirm unreported univariate tests.

[21] We investigate the possibility that BOLI affects BHC performance through indirect channels by adding additional control variables to Eq. (4). We find that results are not driven by choice of stock exchange, and BOLI does not affect performance differently at different levels of CEO compensation. Untabulated results are available upon request.

Table 3 BOLI and components of compensation

Explanatory variables	(1) ΔBOLI/Assets	(2 ΔDMBOLI	(3) ΔunexBOLI
ΔBase/Assets	5.249*** [< 0.001]	5.590*** [< 0.001]	4.532*** [0.006]
ΔBonus/Assets	− 0.642 [0.803]	− 0.495 [0.846]	− 0.262 [0.920]
ΔLong-term/Assets	1.302*** [0.001]	1.137*** [0.010]	1.641*** [< 0.001]
Turnover	0.001** [0.023]	0.001* [0.071]	0.001** [0.024]
ROA	− 0.013 [0.047]	− 0.014** [0.044]	− 0.027*** [< 0.001]
Ln(Assets)	0.002*** [0.002]	0.002*** [< 0.001]	0.001*** [0.007]
Equity/Assets	− 0.002 [0.775]	0.001 [0.796]	− 0.004 [0.521]
DirFee/Assets	− 0.702 [0.403]	− 1.308 [0.134]	− 0.833 [0.336]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.048	0.092	0.022

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Regression results are obtained by estimating Eq. (3) with BHC and year fixed-effects and standard errors clustered by BHC. The dependent variable is one of the three measures of BOLI. The *Δ* prefix indicates change. *BOLI* is BOLI assets and *Assets* is total assets, both obtained from the FR Y-9C reports. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). CEO variables are obtained from SNL Financial. *Base* is the base salary. *Bonus* is the cash bonus. *Long-term* is long-term compensation and is formed by subtracting base salary and bonus from total compensation. *Turnover* is equal to one for observations with CEO turnover and zero otherwise. The following variables are obtained from the FR Y-9C reports and are lagged 1 year. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. Coefficients for the constant term and bank and year dummy variables are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

Control variables are generally consistent across specifications. *Ln(Assets)* is negatively related to return, implying an inverse relation between BHC size and return. BHCs with higher director pay (*DirFee/Assets*) and risk-weighted asset (*RWAssets/Assets*) ratios also perform worse.

4.2.2 Endogeneity

Interpretation of the main findings may be difficult due to the potential for endogeneity in the data and self-selection bias in the choice to purchase BOLI. This concern is partly diminished because we investigate how changes in BOLI affect changes in BHC value. However, it is important to fully address this issue so we implement the two-step consistent Heckman procedure (Heckman 1979). The first-stage uses a probit model to analyze the

Table 4 BOLI and deviation from median compensation

Explanatory variables	(1) ΔBOLI/Assets	(2) ΔDMBOLI	(3) ΔunexBOLI
ΔDMTComp/Assets	1.319*** [<0.001]	1.2817*** [0.001]	1.657*** [<0.001]
Turnover	0.001* [0.099]	0.0003 [0.262]	0.001* [0.068]
ROA	−0.014** [0.033]	−0.015** [0.026]	−0.028*** [<0.001]
Ln(Assets)	0.002*** [0.001]	0.002*** [<0.001]	0.001*** [0.004]
Equity/Assets	−0.002 [0.788]	0.002 [0.780]	−0.004 [0.549]
DirFee/Assets	−0.782 [0.353]	−1.373 [0.118]	−0.936 [0.280]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.044	0.089	0.020

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Regression results are obtained by estimating Eq. (3) with BHC and year fixed-effects and standard errors clustered by BHC. The dependent variable is one of the three measures of BOLI. The *Δ* prefix indicates change. *BOLI* is BOLI assets reported on the balance sheet and *Assets* is total assets, both from the FR Y-9C reports. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). CEO variables are obtained from SNL Financial. *DMTComp/Assets* is the deviation from the median CEO compensation to total assets ratio. *Turnover* is equal to one for observations with CEO turnover and zero otherwise. The following variables are obtained from the FR Y-9C reports and are lagged 1 year. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. Coefficients for *ROA*, *Ln(Assets)*, *Equity/Assets*, *DirFee/Assets*, the constant term, and bank and year dummy variables are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

determinants of BOLI purchase adapted from Davidson and Shelor (2014) and takes the following form:

$$BOLI_{i,t} = \beta_0 + \beta_1 Ln(Assets)_{i,t} + \beta_2 ETR_{i,t} + \beta_3 Mutual_{i,t} + \beta_4 Equity/Assets_{i,t} + \beta_5 TComp/Assets_{i,t} + \beta_6 Loss_{i,t} + \varepsilon_{i,t} \quad (5)$$

where *BOLI* is an indicator variable equal to one for positive BOLI and equal to zero otherwise. *Mutual* is an indicator equal to one for mutually organized BHCs and equal to zero otherwise. Other variables are as previously defined, and ε is an error term. The second stage regression takes the following form:

$$Return_{i,t} = \beta_0 + \beta_1 BOLI_{i,t} + \beta_2 \lambda_{i,t} + \sum \beta_k Control_{k,i,t} + \sum \beta_t Year + \varepsilon_{i,t} \quad (6)$$

where λ is the inverse Mill's ratio of the first-stage probit regression, and other variables are as previously defined.

Results are displayed in Table 6 and support our previous conclusions. All three measures of BOLI are positively related to BHC annual excess return, indicating this relation is not caused by endogeneity nor self-selection bias.

Table 5 BOLI and BHC performance

Explanatory variables	(1) Return	(2) Return	(3) Return
ΔBOLI/Assets	6.646* [0.093]		
ΔDMBOLI		6.095* [0.088]	
ΔunexBOLI			− 0.250 [0.975]
ROA	− 4.521 [0.244]	− 4.524 [0.244]	− 4.572 [0.242]
Ln(Assets)	− 0.380** [0.022]	− 0.382** [0.023]	− 0.370** [0.020]
Loans/Assets	1.864 [0.150]	1.865 [0.149]	1.870 [0.148]
Equity/Assets	− 2.449 [0.245]	− 2.464 [0.242]	− 2.445 [0.248]
StdReturn	1.395 [0.103]	1.393 [0.104]	1.415* [0.093]
DirFee/Assets	− 338.960* [0.085]	− 335.692* [0.087]	− 343.779* [0.086]
TComp/Assets	− 96.573 [0.3978]	− 99.684 [0.382]	− 107.473 [0.320]
CashSec/Assets	0.936 [0.262]	0.937 [0.262]	0.943 [0.259]
Nonperf/Assets	6.201 [0.216]	6.198 [0.215]	6.243 [0.211]
Gap/Assets	0.146 [0.429]	0.149 [0.419]	0.146 [0.435]
RWAssets/Assets	− 1.123** [0.013]	− 1.127** [0.013]	− 1.150** [0.014]
Amihud	0.033 [0.271]	0.033 [0.270]	0.033 [0.269]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.142	0.142	0.142

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Regression results are obtained by estimating Eq. (4) with BHC and year fixed-effects and standard errors clustered by BHC. The dependent variable is the excess stock return (*Return*) using data from CRSP. The *Δ* prefix indicates change. The following variables are obtained from the FR Y-9C reports, unless stated otherwise. *BOLI/Assets* is BOLI assets divided by total assets. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). The following control variables are lagged 1 year. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Loans* is total loans and leases, net of unearned income. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. *StdReturn* is the 1 year standard deviation of monthly stock returns obtained from CRSP. *TComp/Assets* is CEO total compensation to total assets ratio obtained from SNL Financial. *CashSec* is cash plus securities. *Nonperf* is non-performing assets. *Gap* is the 1-year gap. *RWAssets* is risk-weighted assets. *Amihud* is the Amihud liquidity measure (Amihud 2002). Coefficients for the constant term and bank and year dummy variables are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

Table 6 Heckman second-stage regression of BOLI and BHC performance

Explanatory variables	(1) Return	(2) Return	(3) Return
ΔBOLI/Assets	9.226* [0.051]		
ΔDMBOLI		8.078* [0.067]	
ΔunexBOLI			11.317** [0.013]
ROA	11.571*** [< 0.001]	11.555*** [< 0.001]	11.685*** [< 0.001]
Ln(Assets)	− 0.015 [0.441]	− 0.016 [0.412]	− 0.018 [0.377]
Loans/Assets	− 0.049 [0.913]	− 0.071 [0.874]	− 0.046 [0.920]
Equity/Assets	− 3.109*** [0.006]	− 3.126*** [0.006]	− 3.470*** [0.005]
StdReturn	3.862*** [< 0.001]	3.867*** [< 0.001]	3.823*** [< 0.001]
DirFee/Assets	70.285 [0.477]	74.009 [0.454]	68.720 [0.497]
TComp/Assets	− 106.033 [0.305]	− 105.397 [0.309]	− 132.387 [0.231]
CashSec/Assets	− 0.217 [0.614]	− 0.231 [0.590]	− 0.214 [0.626]
Nonperf/Assets	− 2.028* [0.075]	− 2.012* [0.077]	− 2.049* [0.079]
Gap/Assets	0.030 [0.826]	0.026 [0.846]	0.032 [0.812]
RWAssets/Assets	− 0.085 [0.732]	− 0.077 [0.757]	− 0.081 [0.750]
Amihud	− 0.009* [0.051]	− 0.009* [0.053]	− 0.010* [0.051]
Lambda	− 0.634 [0.104]	− 0.642* [0.100]	− 0.804* [0.055]
# Observations	2040	2040	2040
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Results displayed are from the second stage regression (Eq. (6)) of the Heckman two-step procedure. The dependent variable is the excess stock return (*Return*) using data from CRSP. The *Δ* prefix indicates change. The following variables are obtained from the FR Y-9C reports, unless stated otherwise. *BOLI/Assets* is BOLI assets divided by total assets. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Loans* is total loans and leases, net of unearned income. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. *StdReturn* is the 1 year standard deviation of monthly stock returns obtained from CRSP. *TComp/Assets* is CEO total compensation to total assets ratio obtained from SNL Financial. *CashSec* is cash plus securities. *Nonperf* is non-performing assets. *Gap* is the 1 year gap. *RWAssets* is risk-weighted assets. *Amihud* is the Amihud liquidity measure (Amihud 2002). *Lambda* is the inverse Mills ratio from the first-stage regression. Coefficients for the constant terms, year dummy variables, and first-stage regression are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

Table 7 BOLI and BHC risk

Explanatory variables	(1) Δ(Equity/Assets)	(2) Δ(Equity/Assets)	(3) Δ(Equity/Assets)
Panel A: leverage risk			
ΔBOLI/Assets	0.331*** [0.002]		
ΔDMBOLI		0.284*** [0.002]	
ΔunexBOLI			0.370*** [< 0.001]
ROA	0.124*** [0.003]	0.124*** [0.003]	0.131*** [0.001]
Ln(Assets)	− 0.001 [0.580]	− 0.001 [0.561]	− 0.001 [0.601]
Loans/Assets	− 0.012 [0.454]	− 0.012 [0.457]	− 0.011 [0.477]
Equity/Assets	− 0.467*** [< 0.001]	− 0.468*** [< 0.001]	− 0.466*** [< 0.001]
StdReturn	0.009 [0.297]	0.009 [0.299]	0.009 [0.301]
DirFee/Assets	− 1.503 [0.638]	− 1.366 [0.669]	− 1.396 [0.660]
TComp/Assets	− 0.071 [0.979]	− 0.250 [0.928]	0.049 [0.986]
CashSec/Assets	− 0.020 [0.153]	− 0.020 [0.154]	− 0.019 [0.169]
Nonperf/Assets	− 0.034 [0.314]	− 0.034 [0.314]	− 0.031 [0.362]
Gap/Assets	0.002 [0.617]	0.002 [0.590]	0.002 [0.602]
RWAssets/Assets	− 0.002 [0.870]	− 0.002 [0.847]	− 0.001 [0.905]
Amihud	− 0.0002 [0.256]	− 0.0002 [0.273]	− 0.0002 [0.255]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.252	0.251	0.255
Explanatory variables	(1) σROA	(2) σROA	(3) σROA
Panel B: future earnings risk			
ΔBOLI/Assets	0.016 [0.717]		
ΔDMBOLI		− 0.016 [0.705]	
ΔunexBOLI			0.028 [0.498]
ROA	0.110** [0.011]	0.110** [0.011]	0.111*** [0.010]
Ln(Assets)	0.001 [0.337]	0.001 [0.310]	0.001 [0.344]

Table 7 (continued)

Explanatory variables	(1) σROA	(2) σROA	(3) σROA
Loans/Assets	−0.005 [0.647]	−0.005 [0.643]	−0.005 [0.648]
Equity/Assets	0.019 [0.373]	0.018 [0.378]	0.019 [0.365]
StdReturn	−0.006 [0.158]	−0.006 [0.162]	−0.006 [0.162]
DirFee/Assets	−0.860 [0.605]	−0.885 [0.594]	−0.847 [0.610]
TComp/Assets	−0.715 [0.602]	−0.732 [0.594]	−0.707 [0.607]
CashSec/Assets	0.001 [0.955]	0.001 [0.956]	0.001 [0.950]
Nonperf/Assets	0.020 [0.526]	0.020 [0.530]	0.020 [0.519]
Gap/Assets	0.001 [0.679]	0.001 [0.671]	0.00123 [0.680]
RWAssets/Assets	0.013 [0.144]	0.013 [0.149]	0.014 [0.140]
Amihud	−0.00004 [0.500]	−0.00004 [0.500]	−0.00004 [0.503]
Fixed-Effects	Year and BHC	Year and BHC	Year and BHC
# Observations	2040	2040	2040
Adjusted R-Squared	0.222	0.222	0.222

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Regression results are obtained by replacing BHC performance with measures of BHC risk as the dependent variable in Eq. (4). BHC and year fixed-effects are included, and standard errors are clustered by BHC. Leverage risk in Panel A is measured by the change in the equity to assets ratio from year t−1 to year t (*Δ(Equity/Assets)*). Future earnings risk in Panel B is measured by the standard deviation of ROA (*σROA*) in years t+1, t+2, and t+3. The *Δ* prefix indicates change and the σ prefix indicates standard deviation. The following variables are obtained from the FR Y-9C reports, unless stated otherwise. *BOLI/Assets* is BOLI assets divided by total assets. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). The following control variables are lagged 1 year. *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Loans* is total loans and leases, net of unearned income. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. *StdReturn* is the 1 year standard deviation of monthly stock returns obtained from CRSP. *TComp/Assets* is CEO total compensation to total assets ratio obtained from SNL Financial. *CashSec* is cash plus securities. *Nonperf* is non-performing assets. *Gap* is the 1-year gap. *RWAssets* is risk-weighted assets. *Amihud* is the Amihud liquidity measure (Amihud 2002). Coefficients for the constant term and bank and year dummy variables are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

4.2.3 Channel of BOLI's effect on performance

Thus far, our results indicate BOLI is a complimentary form of compensation and its use is associated with improved BHC performance. We now investigate if this is: (1) due to increased risk taking, (2) because BOLI is used to attract, retain, and incentivize talented executives as suggested by the efficient contracting hypothesis, or (3) if the large documented tax shield is the primary source of improved performance.

It is possible the documented increase in BHC performance surrounding BOLI purchases is driven by increased risk taking. While shareholder attitudes towards this scenario would vary by level of risk aversion, regulators would likely be apprehensive. We have reason to believe that CEOs may increase risk to maximize short term performance, with the possibility of future detriment, based on both empirical findings and theory. Davidson (2017) documents increased risk taking associated with BOLI, and the managerial power hypothesis is founded on the notion of a CEO maximizing his/her compensation at the expense of the shareholders.

We therefore begin our search for the source of improved performance by comparing BOLI to BHC risk measures. Specifically we adapt Eq. (4) and replace *Return* as the dependent variable with two measures of BHC risk that could account for the improved stock performance. First, we use the change in the equity to assets ratio as an inverse measure of leverage risk to test if leverage is being used to amplify returns. Second, we use the standard deviation of ROA over the future 3 years to test if current earnings are being managed, leading to an increase in future earnings volatility. Results are displayed in Table 7 and do not provide evidence of either of these channels for improved performance. All three measures of BOLI are positively related to the change in the equity to assets ratio in Panel A, indicating BOLI is associated with a reduction in leverage. Panel B displays that no measure of BOLI is associated with future earnings volatility. We find no evidence that improved performance is a result of increased risk taking.

We adopt the CEO turnover model of Jenter and Kanaan (2015) to test the second possible channel for improved performance. The two-stage process decomposes BHC performance into a firm-specific portion and a systematic portion to control for CEO skill versus the possibility of a CEO who appears to have skill but is simply lucky because of good performance industry-wide. The first-stage is an OLS regression that takes the following form:

$$Return_{i,t-1} = \beta_0 + \beta_1 PeerReturn_{i,t-1} + \varepsilon_{i,t-1} \tag{7}$$

where *Return* is the continuously compounded annual return, and *PeerReturn* is the equal-weighted mean return of BHCs in the same size category, and ε is an error term. ε can be considered the firm-specific source of the return since it captures BHC return unexplained by *PeerReturn*. The second stage is a probit estimation of the following equation:

$$Turnover_{i,t} = \gamma_0 + \gamma_1 \widehat{Return}_{i,t-1} + \gamma_2 \hat{\varepsilon}_{i,t-1} + \gamma_3 BOLI_{i,t-1} + \epsilon_{i,t} \tag{8}$$

where *Turnover* is an indicator variable that equals one for observations with CEO turnover and zero otherwise. $\widehat{Return}_{i,t-1} = \hat{\beta}_0 + \hat{\beta}_1 PeerReturn_{i,t-1}$, the estimated systematic portion of return that is attributable to peer BHC return rather than CEO ability. $\hat{\varepsilon}$ is the estimated

firm-specific return. Controlling for outside factors (systematic return) and inside factors (idiosyncratic return) that would affect CEO turnover allows us to test if BOLI influences turnover. As Jenter and Kanaan (2015) point out, this two-step procedure is effectively an instrumental variable estimation with the return of similarly sized BHCs' serving as the instrument for BHC performance.

Table 8 Panel A presents the results of estimating Eq. (8) to assess if BOLI is used to help retain CEOs. We lag *BOLI* 1 year relative to *Turnover* to determine if past amounts of BOLI influence current turnover. A negative coefficient on *BOLI* would indicate BOLI helps BHCs retain CEOs because there is less likely to experience turnover in the future. This is not the case. None of the three measures of BOLI are significantly related to CEO turnover. We next alter Eq. (8) slightly so that *BOLI* is contemporaneous with *Turnover* to test if BOLI is used to attract new CEOs. The results in Table 8 Panel B show that all three measures of BOLI are positively related to contemporaneous CEO turnover, indicating that turnover is more likely to occur in years when BOLI is increased.[22] This is consistent with the perspective that BHCs purchase BOLI to attract a new CEO in the turnover year.

As discussed in Sect. 3.2, the earnings on BOLI assets and the associated tax shield are substantial. We test if these benefits of BOLI drive the positive relation between BOLI and performance by using $\Delta BOLI\_Earn/Assets$ or $\Delta TaxBenefit/Assets$ in place of the other BOLI measures in the performance specifications. We begin with the fixed-effects regression of Eq. (4) and report the results in Columns 1 and 2 of Table 9. The change in BOLI earnings is unrelated to BHC performance, but the change in the BOLI tax benefits is positively related to performance. We next estimate the two-step Heckman model shown in Eqs. (5) and (6) due to endogeneity concerns and report the results in Columns 3 and 4 of Table 9. The change in the BOLI tax benefits is no longer significantly related to performance, however the inverse Mills ratio is also insignificant which suggests endogeneity is not a concern and the fixed-effects results are valid. Nonetheless, we interpret the positive effect of the BOLI tax shield on performance cautiously. Given the mixed results in Table 9, it appears more likely that BOLI is beneficial for BHCs because it helps BHCs attract talented executives who are able to increase shareholder value.

5 Conclusions

BOLI is intended as a risk-management tool that provides a financial cushion for purchasing institutions in the event of the death of a key employee or director. According to the OCC (2004), BOLI may also serve as an incentive vehicle to attract and retain employees or as a tax-deferred investment. The misuse of BOLI may not be in the best interest of a BHC or its shareholders. In the face of corporate scandals in the early 2000s and the recent financial crisis, regulators and corporate reformers have developed many guidelines intended to improve compensation practices and promote prudent use of BOLI.

In this paper, we explore potential benefits of BOLI to BHCs to help explain the dramatic increase in BOLI. We use multiple measures of BOLI and CEO compensation and find BOLI is positively related to total compensation, base compensation and long-term

[22] Both findings confirm univariate tests. Measures of BOLI are larger for BHCs with CEO turnover than BHCs without CEO turnover in the year of the turnover, and measures of BOLI are not statistically different for BHCs with and without turnover in the year prior to the turnover.

Table 8 BOLI and CEO turnover

Explanatory variables	(1) Turnover	(2) Turnover	(3) Turnover
Panel A: Lagged BOLI			
ΔBOLI/Assets	0.968 [0.945]		
ΔDMBOLI		−8.523 [0.500]	
ΔunexBOLI			−7.178 [0.592]
Idiosyncratic Return	−0.214 [0.184]	−0.215 [0.184]	−0.211 [0.190]
Systematic Return	0.007 [0.977]	0.006 [0.980]	0.006 [0.982]
# Observations	1743	1743	1743
Panel B: contemporaneous BOLI			
ΔBOLI/Assets	29.932*** [0.008]		
ΔDMBOLI		18.142* [0.096]	
ΔunexBOLI			27.940*** [0.009]
Idiosyncratic Return	−0.248 [0.101]	−0.258* [0.088]	−0.250* [0.098]
Systematic Return	−0.057 [0.786]	0.041 [0.843]	−0.007 [0.974]
# Observations	2040	2040	2040

The sample consists of an unbalanced panel of 2040 annual observations from 2004 to 2013. Results displayed are obtained from probit regressions of Eq. (8). The dependent variable (*Turnover*) is equal to one for observations of CEO turnover and equal to zero otherwise using data from SNL Financial. The *Δ* prefix indicates change. The following BOLI variables are obtained from the FR Y-9C reports. *BOLI/Assets* is BOLI assets divided by total assets. *DMBOLI* is the deviation from the median BOLI to total assets ratio. *unexBOLI* is the unexpected BOLI to assets ratio as measured by the residuals from Eq. (1). Panel A uses measures of BOLI lagged 1 year compared to *Turnover* which results in fewer observations. Panel B uses contemporaneous measures of BOLI and *Turnover*. Return variable are calculated using data obtained from CRSP. *Systematic Return* is BHC return estimated to be driven by the returns of similarly sized BHCs. *Idiosyncratic Return* is BHC return estimated to be driven by firm-specific factors. Coefficients for the constant term is not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

compensation. We further document that increases in the use of BOLI benefit shareholders. Specifically, we find that changes in BOLI are positively related to annual stock performance. While economically large, earnings from BOLI investments is not statistically related to performance, and the results for the associated tax benefits are mixed. We find BOLI increases in years when there is CEO turnover, suggesting BOLI is used to attract

Table 9 BOLI earnings, tax benefits, and BHC performance

Explanatory variables	Fixed-effects		Heckman 2-step	
	(1) Return	(2) Return	(3) Return	(4) Return
ΔBOLIearnings/Assets	43.676 [0.241]		22.514 [0.706]	
ΔTaxBenfits/Assets		106.501* [0.072]		192.003 [0.187]
ROA	−4.270 [0.284]	−4.294 [0.283]	11.248*** [<0.001]	11.439*** [<0.001]
Ln(Assets)	−0.452** [0.016]	−0.449** [0.016]	−0.014 [0.490]	−0.018 [0.464]
Loans/Assets	1.752 [0.168]	1.761 [0.166]	−0.076 [0.871]	−0.087 [0.870]
Equity/Assets	−2.585 [0.260]	−2.581 [0.261]	−3.157** [0.011]	−3.557** [0.017]
StdReturn	1.374 [0.129]	1.372 [0.129]	3.942*** [<0.001]	3.951*** [<0.001]
DirFee/Assets	−366.170 [0.119]	−368.949 [0.112]	61.495 [0.551]	57.331 [0.628]
TComp/Assets	−116.921 [0.310]	−117.095 [0.311]	−94.127 [0.387]	−119.108 [0.356]
CashSec/Assets	0.827 [0.363]	0.831 [0.363]	−0.233 [0.604]	−0.241 [0.639]
Nonperf/Assets	6.467 [0.190]	6.492 [0.189]	−1.891 [0.104]	−1.894 [0.157]
Gap/Assets	0.147 [0.487]	0.151 [0.477]	−0.021 [0.884]	−0.020 [0.902]
RWAssets/Assets	−1.174** [0.014]	−1.177** [0.014]	−0.069 [0.792]	−0.061 [0.841]
Amihud	0.033 [0.272]	0.033 [0.268]	−0.009* [0.056]	−0.010* [0.086]
Lambda			−0.709 [0.152]	−0.911 [0.129]
Fixed-Effects	Year and BHC	Year and BHC	Year	Year
# Observations	1884	1884	1884	1884
Adjusted R-Squared	0.142	0.142	–	–

The sample consists of an unbalanced panel of 1884 annual observations from 2004 to 2013. Regression results are obtained by estimating Eq. (4) with BHC and year fixed-effects and standard errors clustered by BHC in columns (1) and (2). Estimates in columns (3) and (4) are obtained from Heckman two-step estimates of Eqs. (5) and (6). The dependent variable is the excess stock return (*Return*) using data from CRSP. The *Δ* prefix indicates change. The following variables are obtained from the FR Y-9C reports, unless stated otherwise. *BOLIearnings* is the earnings on BOLI assets. T*axBenefits* is *BOLIearnings* times the effective tax rate (*ETR*). The following control variables are lagged 1 year in columns (1) and (2) and are contemporaneous in columns (3) and (4). *ROA* is earnings before taxes divided by total assets. *Ln(Assets)* is the natural logarithm of total assets. *Loans* is total loans and leases, net of unearned income. *Equity/Assets* is the total equity to total assets ratio. *DirFee/Assets* are the fees paid to directors divided by total assets. *StdReturn* is the 1 year standard deviation of monthly stock returns obtained from CRSP. *TComp/Assets* is CEO total compensation to total assets ratio obtained from SNL Financial. *CashSec* is cash plus securities. *Nonperf* is non-performing assets. *Gap* is the 1 year gap. *RWAssets* is risk-weighted assets. *Amihud* is the Amihud liquidity measure (Amihud 2002). *Lambda* is the inverse Mills ratio from the first-stage regression. Coefficients for the constant terms, year dummy variables, and first-stage regression are not displayed to conserve space. Coefficients are shown with *p* values below in brackets. Asterisks indicate statistical significance at the 0.01 (***), 0.05 (**), and 0.10 (*) levels

new CEOs, and the incentive effects of BOLI to attract and retain high quality executives outweigh the potential agency costs of BOLI. Increased risks documented by Davidson (2017) do not hurt shareholders for our sample of firms.

We add to the growing literature on bank governance and risk management, and our results have implications for regulators in providing guidelines on BOLI. BOLI is a non-standard benefit and should be evaluated on its economic value, not just the potential risks. We suggest that a more detailed classification of the BOLI policies on the FR Y-9C reports may provide a better or more complete picture on how BOLI relates to executive compensation and how each type of policy contributes to the enhancement of shareholder wealth. Future work may address these issues.

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Availability of data and material Data and material are available upon request.

Code availability Code is available upon request.

Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest to declare that are relevant to the content of this article.

Appendix

See Table 10.

Table 10 Variable definitions and sources

Variable name	Mnemonic	Description
BHC variables	FR-Y9C	
BOLI	2003–2010: BHCKC009; 2011–2013: sum (BHCKK201, BHCKK202, BHCKK270)	Life insurance assets
BOLI earnings	BHCKC014	Earnings on/increase in value of cash surrender value of life insurance
Assets	BHCK2170	Total assets
Income taxes paid	BHCK4302	Income taxes paid
Earnings before taxes	BHCK4301	Earnings before taxes and extraordinary items
Salary expense	BHCK4135	Salary expense
Employees	BHCK4150	Number of full-time equivalent employees
Loans	BHCK2122	Total loans
Cash	BHCK0081	Non-interest bearing
	BHCK0395	Interest-bearing domestic
	BHCK0397	Interest-bearing foreign
Securities	BHCK1754	Securities held to maturity
	BHCK1773	Securities available for sale
Equity	BHCK3210	Total equity capital
PD90	BHCK5525	Loans past due 90 or more days and still accruing interest
Nonaccrual	BHCK5526	Non-accrual loans
OREO	BHCK2150	Other real estate owned
Risk weighted assets	BHCKA223	Total risk-weighted asset
ALLL	BHCK3123	Allowance for loan and lease loss
Gap	abs(sum (BHCK3197)-sum(BHCK3296, BHCK3298, BHCK3408, BHCK3409))	Difference between assets and liabilities that reprice or mature within 1 year
Directors' fees	BHCK4136	Directors' fees
Brokered deposits	BHCKA243	BD with maturity less than 1 year
	BHCKA164	BD with maturity more than 1 year
CEO variables	SNL Financial	

Table 10 (continued)

Variable name	Mnemonic	Description
Tcomp	TOTAL_COMP	Total compensation
Base	BASESALARY	Base salary
Bonus	BONUS	Bonus
Long term	LONG_TERM_COMP	Long-term compensation
Turnover	NAME	Turnover equals 1 if the CEO name has changed, and equals 0 if CEO name is the same
Stock market variables	CRSP	
Return	RET	Holding period return
Volume	VOL	Share volume
Value-weighted return	VWRETD	Value-weighted return

References

Adams RB (2012) Governance and the financial crisis. Int Rev Finance 12(1):7–38

Adams R, Mehran H (2003) Is corporate governance different for bank holding companies? Econ Policy Rev 9(1):123–142

Amihud Y (2002) Illiquidity and stock returns: cross-section and time-series effects. J Financ Mark 5(1):31–56

Bai G, Elyasiani E (2013) Bank stability and managerial compensation. J Bank Financ 37(3):799–813

Benson BW, Davidson WN, Wang H, Worrell DL (2011) Deviations from expected stakeholder management, Firm Value, and Corporate Governance. Financ Manag 40(1):39–81

Black LK, Hazelwood LN (2013) The effect of TARP on bank risk-taking. J Financ Stab 9(4):790–803

Boyer MM, Tennyson S (2015) Directors' and officers' liability insurance, corporate risk and risk taking: new panel data evidence on the role of directors' and officers' Liability Insurance. J Risk Insur 82(4):753–791

Brown JL (2011) The spread of aggressive corporate tax reporting: a detailed examination of the corporate-owned life insurance shelter. Acc Rev 86(1):23–57

Chalmers JMR, Dann LY, Harford J (2002) Managerial opportunism? Evidence from directors' and officers' insurance purchases. J Finance 57(2):609–636

Chen CR, Steiner TL, Whyte AM (2006) Does stock option-based executive compensation induce risk-taking? An analysis of the banking industry. J Bank Financ 30(3):915–945

Chen Z, Li OZ, Zou H (2016) Directors′ and officers′ liability insurance and the cost of equity. J Acc Econ 61(1):100–120

Core JE (1997) On the corporate demand for directors' and officers' insurance. J Risk Insur 64(1):63–87

Core JE, Holthausen RW, Larcker DF (1999) Corporate governance, chief executive officer compensation, and firm performance. J Financ Econ 51(3):371–406

Cornett MM, McNutt JJ, Tehranian H (2009) Corporate governance and earnings management at large U.S. bank holding companies. J Corp Finance 15(4):412–430

Cummins JD (1976) Risk management and the theory of the firm. J Risk Insur 43(4):587–609

Davidson TR (2017) Bank-owned life insurance and bank risk. Financ Rev 52(3):459–498

Davidson TR, Shelor RM (2014) An empirical Investigation of the demand for bank-owned life Insurance. Financ Mark Inst Instrum 23(5):303–321

DeYoung R, Peng EY, Yan M (2013) Executive compensation and business policy choices at U.S. commercial banks. J Financial Quant Anal 48(1):165–196

Fried JM (1998) Reducing the profitability of corporate insider trading through pretrading disclosure. S Cal L Rev 71(2):303–392

Fried JM (2000) Insider signaling and insider trading with repurchase tender offers. Univ Chic Law Rev 67(2):421–477

Frydman C, Jenter D (2010) CEO compensation. Annu Rev Financ Econ 2:75–102

Gillan SL, Panasian CA (2015) On lawsuits, corporate governance, and directors' and officers' liability insurance. J Risk Insur 82(4):793–822

Graham JR, Tucker AL (2006) Tax shelters and corporate debt policy. J Financ Econ 81:563–594

Hagendorff J, Vallascas F (2011) CEO pay incentives and risk-taking: evidence from bank acquisitions. J Corp Finance 17(4):1078–1095

Heckman JJ (1979) Sample selection bias as a specification error. Econometrica 47(1):153–161

Henderson BC, Masli A, Richardson VJ, Sanchez JM (2010) Layoffs and chief executive officer (CEO) compensation: Does CEO power influence the relationship? J Acc Audit Finance 25(4):709–748

Houston JF, James C (1995) CEO compensation and bank risk: Is compensation in banking structured to promote risk taking? J Monet Econ 36(2):405–431

Jategaonkar SP (2013) If it's good for the firm, it's good for me: insider trading and repurchases motivated by undervaluation. Financ Rev 48:179–203

Jenter D, Kanaan F (2015) CEO turnover and relative performance evaluation. J Finance 70(5):2155–2183

Karmin C (2009) Shareholders renew push to regulate executive pay. Wall Street Journal Eastern Edition, Feb 13, C.1

Liu Y, Mauer DC (2011) Corporate cash holdings and CEO compensation incentives. J Financ Econ 102(1):183–198

Livne G, Markarian G, Mironov M (2013) Investment horizon, risk, and compensation in the banking industry. J Bank Financ 37(9):3669–3680

Mehran H (1995) Executive compensation structure, ownership, and firm performance. J Financ Econ 38(2):163–184

Minnick K, Unal H, Yang L (2011) Pay for performance? CEO compensation and acquirer returns in BHCs. Rev Financ Stud 24(2):439–472

Murphy KJ (2012) Executive compensation: where we are, and how we got there. In: Constantinides G, Harris M, Stulz R (eds) Handbook of the economics of finance. Elsevier, Amsterdam

Office of the Comptroller of the Currency, Board of Governors of the Federal Reserve System, Federal Deposit Insurance Corporation, and Office of Thrift Supervision (2004) Interagency Statement on the Purchase and Risk Management of Life Insurance. OCC 2004-56 Attachment: 1–28

Regan L, Hur Y (2007) On the corporate demand for insurance: the case of Korean nonfinancial firms. J Risk Insur 74(4):829–850

Smith BW, Angelovska-Wilson A, Solomon A (2006) Developments in the risk management of bank-owned life insurance. Bank Acc Finance 19(6):17–23