Opaqueness and analysts' information environment: Evidence from US banks

Thesis

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Abstract

This paper examines the association between bank opacity and the information environment of analysts within US publicly listed banks. Focusing on bank holding companies (BHCs), it explores the impact of asset opacity on analyst forecast errors and disagreement, and the moderating role of corporate governance. The study uses data from 351 BHCs between 2012 and 2022, employing multiple regression models. Findings indicate that increased opacity does not necessarily correlate with larger forecast errors and greater disagreement among analysts. However, board independence does appear to mitigate the impacts of opacity on forecast errors. Further, different types of loans within a bank's portfolio show varying degrees of influence on the information environment, underscoring the need to consider loan composition when evaluating bank opacity. Despite these insights, the study acknowledges potential limitations and suggests further research. This research contributes to the understanding of bank opacity, outsider's information environment, and corporate governance, offering implications for analysts, investors, and regulatory bodies.

Key words: Bank opacity, Analyst forecasts, Information environment, Corporate governance, Bank Holding Companies (BHCs).

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1. Introduction

This paper undertakes an examination of the pervasive issue of information asymmetry between company insiders and investors, an issue that is especially prominent in the banking sector. The main research question guiding this study is: "To what extent is bank opacity associated with analysts' information environment among US publicly listed banks?" To comprehensively address this question, two sub-questions are also explored: 1) Which asset items are associated with bank opacity? and 2) How is the association between bank opacity and analysts' information environment moderated by corporate governance?

Historically, financial institutions have acted as intermediaries to mitigate information asymmetry, serving as monitors to streamline costs and facilitate asset transformation services (Bhattacharya and Thakor 1993; Ramakrishnan and Thakor 1984). However, this function has inadvertently created an inherent opacity within bank assets, triggering uncertainty, risk, and potential economic instability (Diamond 1983, 1984; Jacklin and Bhattacharya 1988). Regulatory efforts have not fully addressed this opacity, leaving it as a significant factor that contributes to bank instability (Flannery 1998; Grossman 1992; Morgan 2002; Samuel et al. 2017; Santos 2001; Wheelock and Kumbhakar 1995). While academic views on banking opacity vary, consensus agrees that assets within Bank Holding Companies (BHCs) can greatly differ in terms of opacity and associated risk, with certain assets such as loans and trading assets increasing uncertainty (Flannery et al. 2004; Greenspan 1996; Haggard and Howe 2007; Iannotta 2006; Jones et al. 2013; Morgan 2002). Consequently, this opacity impacts the information environment of analysts (Barron et al. 1998; Frankel et al. 2006; Mario et al. 2014).

This study seeks to illuminate the intricate relationship between bank opacity and the information environment accessible to investors, with implications for regulatory policy and investment decision-making. To do so, it presents two primary hypotheses. The first hypothesis posits that increased opacity leads to larger forecast errors and greater disagreement among analysts for US BHCs. Hypothesis 2 scrutinizes the moderating role of corporate governance practices, theorizing that enhanced independent board oversight could mitigate the positive association between bank opacity and forecasting challenges (Andres and Vallelado 2008; Cornett et al. 2009; Elbadry et al. 2015).

The research examines data from publicly listed US BHCs over a decade (2012-2022), adopting a quantitative approach using multiple regression models. The data, sourced from regulatory reports (FR Y9C), analyst earnings forecasts databases (IBES), and board independence data sources (BoardEx), comprises 351 BHCs and 8734 observations, with 339 BHCs and 7861 observations for the forecast disagreement sample.

The study does not uncover substantial empirical evidence to support that increased opacity in BHCs' assets correlates with greater forecast error and disagreement. This observation could potentially be explained through existing literature on herding behaviour among analysts operating within an opaque environment (Hong et al. 2000; Trueman 1994;

Scharfstein and Stein 1990). The variable of board independence serves a moderating function, altering the directionality of the variables of interest. This suggests that board independence may potentially mitigates the impact of opaque assets on the forecast characteristics. This leads to the acceptance of the second hypothesis positing that increased board independence weakens the positive association between bank opacity, manifested by an increase in Loans/Assets, and errors in analysts' earnings forecasts.

It is significant to note that Real Estate Loans, which often form a considerable portion of BHCs' loan portfolios, exert a statistically significant positive effect on forecast errors. This result is in alignment with Morgan's (2001) assertion about the inherent opacity of these types of loans. Other categories of loans, such as Commercial and Industrial (C&I) loans and Consumer Loans, also display a positive correlation with forecast errors and disagreement. However, these relationships do not reach a level of statistical significance, thereby limiting our ability to draw definitive conclusions regarding their impact on forecast. Intriguingly, a distinct pattern with Reserves and Unearned Interest is observed, where a negative correlation with forecast error and disagreement is apparent. A trend that might indicate higher levels of managerial discretion associated with these types of items (Robb 1998).

These distinctive patterns across different loan types underscore the importance of considering the composition of a bank's loan portfolio when evaluating the external information environment. The variances observed across different loan types contribute to a more nuanced understanding of how different assets within a bank's portfolio can influence the information environment, thereby affecting analysts' ability to predict future performance. Ultimately, these findings highlight the need for analysts, investors, and regulatory bodies to consider not just the overall opacity of a bank's assets, but also the specific types of loans that make up its portfolio.

This research contributes to the understanding of the dynamic interplay between bank opacity, outsider's information environment, and corporate governance. It not only underscores how BHCs' opacity affects the quality of analyst forecasts but also how board independence can moderate this effect. Despite these insights, several limitations must be acknowledged, including the limited scope of the sample, potential data inaccuracies, and possible multicollinearity among variables, suggesting further research avenues.

The remaining paper unfolds as follows. Section 2 reviews the existing literature on the topic. Section 3 delineates the reasoning behind the hypotheses. Section 4 describes the research design, and Section 5 presents the empirical results and subsequent analysis. Section 6 offers a conclusion.

2. Literature Review

The literature on the degree of information asymmetry between insiders and investors has long highlighted the information superiority of insiders (Akerlof 1970; Rothschild and Stiglitz 1976). The separation of ownership and control in the principal-agent relationship generates agency costs, according to Jensen and Meckling (1976), who define monitoring expenditures by the principal as part of the agency costs. Financial intermediaries play a critical role in addressing information asymmetry. According to Ramakrishnan and Thakor (1984), there would be a duplication of information production between investors and firms without financial intermediaries. In modern banking theory, financial intermediaries reduce transaction costs and provide qualitative asset transformation services (Bhattacharya and Thakor 1993). Diamond (1984) claims that financial intermediaries can act as delegated monitors to minimize the cost of monitoring information. Banks raise funds from depositors, and lend out to entrepreneurs. Depositors delegate their monitoring of borrowers to banks, thereby explaining the asset side of banks' balance sheets. However, banks' illiquid and informationally opaque assets can trigger bank runs if depositors demand liquidity (Jacklin and Bhattacharya 1988). Banks are vulnerable if depositors cannot distinguish between healthy and troubled banks. Diamond (1983) shows that bank runs can cause serious economic problems because of loan recall and cut short on productive investments. This leads to one of the justifications for regulating banks: the risk of a systemic crisis (Flannery 1998; Santos 2001). However, if banks are as transparent as any other firms, deposit insurance and other safety nets should not be necessary (Morgan 2002).

Academic studies have examined the opaqueness of the banking industry, with mixed empirical findings. Morgan (2002) finds that banks and insurance firms are more opaque than other firms, as bond ratings split more often and lopsidedly over financial intermediaries. By studying European banks and their non-bank counterparts, Iannotta (2006) confirms that the banks have a higher predicted probability of split bond ratings than comparable firms, although fewer bank split ratings are found. On the other hand, Flannery et al. (2004) find only evidences that small bank holding companies (BHC) are more opaque than their non-bank counterparts, while the larger BHCs closely resemble their control firms. They also find that a BHC's assets differ in the extent of their opacity and risks. Using forecast error and dispersion to proxy uncertainty, Flannery et al. (2004) find that loans increase uncertainty and the proportion of BHC's assets in commercial bank subsidiaries reduces uncertainty. Moreover, using bond spreads to gauge risks, Morgan (2001) shows that as banks shift cash into commercial and industrial loans, their bond spreads increase significantly, consistent with the theory that bank loans are a source of bank opacity and risks.

Despite the presence of regulations and government safety nets, the impact of bank opaqueness remains significant, as evidenced by existing literature. Jones et al. (2013) argue

that opaque assets inherently carry higher risk and should, therefore, yield higher returns and be discounted more heavily by investors. However, if the discount is not sufficient to offset the increased marginal risk, banks are incentivized to invest more in opaque assets. This creates a loop where managers increase their investment in such assets and are rewarded for doing so. Furthermore, while deposit insurance can reduce the likelihood of bank runs, it can also subsidize risky behaviour and lead to moral hazard (Grossman 1992; Wheelock and Kumbhakar 1995). Therefore, bank opacity has also been examined for its impact on bank risk-taking in the US and Europe. Samuel et al. (2017) observe that bank opacity negatively associates with bank stability, as bank default risk increases with opacity. In their analysis of European banks, Mario et al. (2014) find that the ability of analysts to identify risk is negatively associated with bank idiosyncratic risks. This finding raises questions about the efficacy of analysts in market discipline processes.

Barron et al. (1998) propose a model that links the properties of analysts' forecasts to the quality of their information environment. They establish that forecast dispersion and error in mean forecast can be used as proxies for the quality of public and private information available to analysts. An implicit assumption using these proxies for research is that forecasts reflect analysts' private information unbiasedly. However, Trueman (1994) highlights that the assumption may not always be valid, as analysts tend to herd. He supports it by showing that, the probability of an analyst releasing a forecast that is similar to announced forecasts by other analysts is higher than justified by his own information. Leece and White (2017) confirm this tendency in more opaque information environments proxied by transient ownership, where analysts engage in reputational herding as capable analysts act first and others follow, consistent with Trueman (1994)'s findings. Robb (1998) adds to this discussion by demonstrating that banking managers use discretionary accruals to reach market expectations when analysts reach consensus in their forecasts, leading to a lower level of mean forecast error.

Although greater bank opacity might be expected to lead to increased forecast error and disagreement, empirical studies suggest that this assumption may not always hold. In opaque information environments, analysts may exhibit herding behaviour, and banks may engage in earnings management, which can counteract the negative effects of opacity. Frankel et al.'s (2006) finding that the informativeness of analyst earning reports decreases with information processing costs supports this idea. Therefore, the relation between bank opacity and the investor's information environment is not straightforward. While theoretical arguments suggest a negative association, there may be a positive association or no significant relation at all. That highlight the need for further research into this complex subject. Understanding the underlying mechanisms that affect outsider's information environment can inform regulatory policies and improve investor decision-making.

3. Hypothesis Development

Based on the theoretical and empirical evidence, this study hypothesizes that bank opacity is associated with the properties of analysts' forecasts, which can proxy for the investor information environment. The theoretical basis for this hypothesis is rooted in the fact that banks' assets are inherently opaque and difficult to value, as Greenspan (1996, p.1) noted: "Bank loans are customized, privately negotiated agreements that, despite increases in availability of price information and in trading activity, still quite often lack transparency and liquidity. This unquestionably makes the risks of many bank loans rather difficult to quantify and to manage." The percentage of asset classes can be used to proxy for bank opacity, as prior literature suggests that opacity increases with loans and trading assets, and decreases with premises and fixed assets (Haggard and Howe 2007; Iannotta 2006; Morgan 2002). While greater opacity can make it harder for outsiders to accurately assess the fundamental value of banks, its impact on the accuracy and disagreement of analysts' forecasts is ambiguous.

On the one hand, opaque assets leave room for managerial earnings management, and more herding behaviour among analysts operating in an opaque environment. Alternatively, greater opacity can also incentivize analysts to conduct more rigorous and independent research, as their experience, reputational concerns and ability are related to the quality of their forecasts (Hong et al. 2000; Trueman 1994; Scharfstein and Stein 1990). To further investigate the impact of bank opacity on the accuracy and disagreement of analyst's forecasts, this study will test the following hypothesis:

H1. Greater opacity leads to greater errors and disagreement in analysts' earnings forecasts in US bank holding companies.

Previous studies have suggested that corporate governance mechanisms can improve the information environment of firms. For instance, Elbadry et al. (2015) find that greater board independence decreases measures of asymmetric information. In this study, board independence will be used as a moderator to test its effect on the relation between bank opacity and the properties of analysts' forecasts. Board independence refers to the extent to which a BHC's board of directors consists of independent members who are not affiliated with the management. Higher levels of board independence are typically associated with more effective monitoring of management practices (Andres and Vallelado 2008). Cornett et al. (2009) find that board independence has a mitigating effect on earnings management among public BHCs. Therefore, higher levels of board independence may lead to greater forecast accuracy, as earnings management is reduced. However, it is also possible that limited management tools to meet analysts' expectations could result in a higher level of forecast error in the presence of a more independent board. Despite the potential impact of the corporate governance moderator, the direction of the relation between bank opacity and forecast accuracy and dispersion remains unclear. The second hypothesis with moderator will be tested:

H2. With more independent board oversight, the positive association between bank opacity and errors and disagreement in analysts' earnings forecasts will be weaker.

Overall, these hypotheses aim to investigate the relation between bank opacity and the accuracy and disagreement of analysts' forecasts, as well as the moderating effect of board independence. Testing these associations will contribute to a better understanding of the information environment of BHCs, and how corporate governance mechanisms can affect the information available to investors.

4. Research Design

4.1 Sample selection

This research complies comprehensive financial statement data from FR Y-9C regulatory reports submitted quarterly by US BHCs. The study focuses on public BHCs whose common stocks have been listed on US exchanges over the past decade, from 2012 to 2022. Data on analysts' earnings forecasts is obtained from Institutional Brokers' Estimate System (IBES), a database that supplies earnings estimates from analysts covering US BHCs. To align with the reporting cycle and to reduce the uncertainty inherent in longer-term forecasts, this study utilizes forecasts projecting earnings for a single quarter ahead. For the dependent variable-forecast disagreement, observations with fewer than two forecast estimates are excluded. Quarterly stock price information for BHCs is derived from Center for Research in Security Prices (CRSP). Additionally, board independence data is collected from BoardEx, which provides annual information on the percentage of independent directors serving on the board.

The final dataset consists of 351 BHCs with 8734 observations for studying the relation with forecasts error, and 339 BHCS with 7861 observations for the forecast disagreement dependent variable. The observations are evenly spread throughout the sample period. Table 1 illustrates the sampling procedures. Table 2 details summary statistics on the sample. The average BHC in the sample possess over 50 billion dollars in assets, with loans constituting the main component, accounting for an average of 65.45%. Interestingly, despite the mean Trading Assets/Assets figure standing at only 0.73%, the standard deviation of 3.58% and range maximum reaching 43.8% indicate substantial variability. On average, each BHC attracts 9.05 quarterly forecasts with a maximum of 73 forecasts recorded. The sampled BHCs demonstrate a modest average return on assets (ROA) of only 0.63%. Furthermore, their liabilities constitute a substantial portion of total assets, averaging at 88.34%. The market-to-book (M/B) ratio, a common indicator of perceived growth potential, averages at a mere 1.31. This suggests that, in general, the companies within the sample are not typically viewed as high-growth entities. COMPLEX, a categorical variable, predominantly falls under category 2, accounting for 5307 out of 8734 total

observations. Importantly, all BHCs in the sample maintain a board of directors where independent directors form the majority, thus outnumbering executive directors. Summary statistics of BHCs with multiple quarterly forecasts and data yearly distribution table are provided in Appendix A.

Table 3 presents a correlation matrix which elucidates the relations among variables. The Loans/Assets ratio, denoted as (OPACITY1), appears to share a notable negative correlation with Trading Assets/Assets (OPACITY2) at -0.46, and a moderate negative correlation with LnAssets (-0.35) and Number of Forecasts (-0.37). This suggests that the growth patterns of loans and trading assets as proportionate component of total assets are not in unison, and those BHCs with a larger proportion of loans as assets can have a lesser number of forecasts. OPACITY2 demonstrates a moderate positive correlation with LnAssets (0.48) and Number of Forecasts (0.52). As might be expected, LnAssets presents a strong positive correlation with Number of Forecasts (0.86), suggesting larger BHCs typically attract more quarterly forecasts. Moreover, ROA has a moderate negative correlation with LEVERAGE (-0.42) and a positive correlation with M/B at 0.29, indicating that firms with higher returns on assets are often better received by the market. LEVERAGE has a positive correlation with OPACITY1 at 0.20, implying that firms with higher leverage tend to have a larger proportion of loans to total assets. COMPLEX and Independent Board variable shows weak correlations with all other variables.

Table 1: Sample selection

Description	Observations change	Total sample size
FR Y9C Report sample		17886
Less observations without asset value	-3274	14692
CRSP sample		16236
IBES sample		109374
Merge with CRSP	-412	108962
BHCs with multiple quarterly forecasts	-1415	107547
Keeping only quarterly ERROR value for each BHC	-97418	
Keeping only quarterly DISAGREEMENT value for each BHC	-97409	
IBES sample - forecast error		11544
IBES sample - forecast disagreement		10138
Merge with FR Y9C Report - forecast error	-1535	10009
Merge with FR Y9C Report - forecast disagreement	-1165	8973
BoardEx sample - forecast error		34511
Keeping only annual INDEPENDENT BOARD value for each BHC	-31449	3062
Merge with FR Y9C Report and IBES sample	-1275	8734
BoardEx sample - forecast disagreement		34804
Keeping only annual INDEPENDENT BOARD value for each BHC	-31824	2980
Merge with FR Y9C Report and IBES sample	-1112	7861
Total number of observations - forecast error		**8734**
Number of BHCs - forecast error		**351**
Total number of observations - forecast disagreement		**7861**
Number of BHCs - forecast disagreement		**339**

Table 2: Summary statistics of bank holding companies, 2012-2022

The sample include 351 publicly traded BHCs with earnings forecasts, covering a period between 2012 and 2022. 'Loans' represents the total loans and lease financing receivables. 'Trading Assets' refers to total trading assets. 'ERROR' is the absolute difference of actual earnings per share and median forecasted earning per share, standardized by quarterly share price. 'LnAssets' is the natural logarithm of quarterly total assets. 'Number of Forecasts' is the total number of quarterly forecasts. 'ROA' is the return on assets. 'Leverage' is total liabilities to total assets. ' M/B' is the market to book ratio. 'COMPLEX' is a complexity indicator for BHCs. 'Independent Board Directors' is a metric reflecting the percentage of independent directors serving on a company's board. The summary statistics for BHCs with multiple earnings forecasts can be found in Appendix A.

	N	Mean	Standard Deviation	Minimum	Maximum
Assets ($million)	8734	54,742	249,026	378	3,238,223
Loans/Assets (%)	8734	65.45	15.40	0.00	95.46
Trading Assets/Assets (%)	8734	0.73	3.58	0.00	43.80
ERROR (%)	8734	0.37	1.00	0.00	36.00
Control variables					
LnAssets ($million)	8734	8.96	1.53	5.93	14.99
Number of Forecasts	8734	9.05	10.24	1.00	73.00
ROA (%)	8734	0.63	0.72	-10.03	16.00
LEVERAGE (%)	8734	88.34	4.26	16.18	97.88
M/B	8734	1.31	0.52	0.13	9.17
COMPLEX	8734	2.82	2.55	0.00	9.00
Independent Board (%)	8734	87.08	6.48	55.56	100.00
Number of BHCs	351				

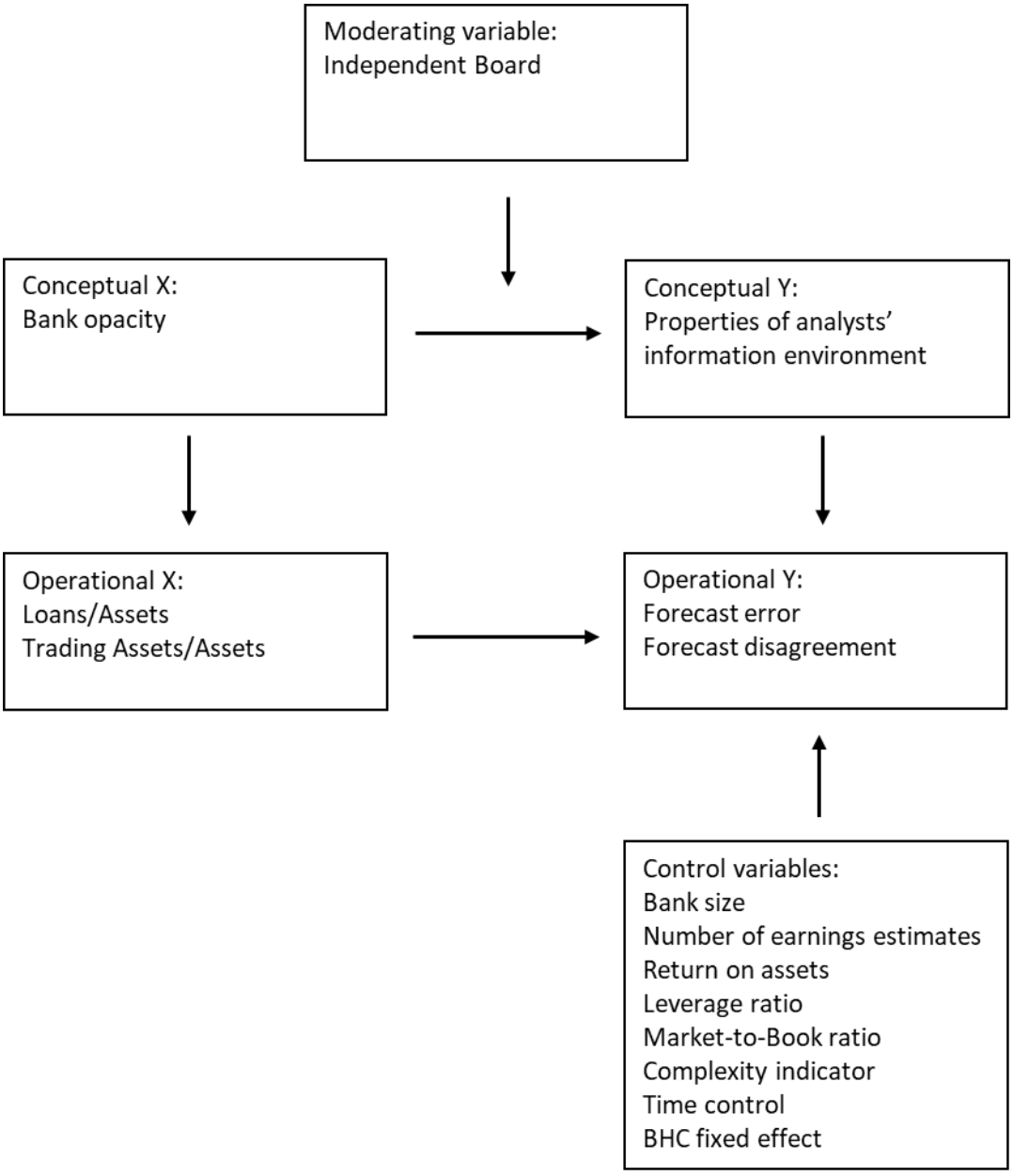
Table 3: Correlation table

	OPACITY1	OPACITY2	LnAssets	Number of Forecasts	ROA	LEVERAGE	M/B	COMPLEX	Independent Board
OPACITY1	1.00	-0.46	-0.35	-0.37	-0.09	0.20	-0.10	-0.12	-0.03
OPACITY2	-0.46	1.00	0.48	0.52	0.04	-0.03	-0.10	0.00	0.05
LnAssets	-0.35	0.48	1.00	0.86	0.08	0.03	-0.01	0.20	0.18
Number of Forecasts	-0.37	0.52	0.86	1.00	0.07	-0.01	-0.04	0.14	0.17
ROA	-0.09	0.04	0.08	0.07	1.00	-0.42	0.29	0.05	-0.03
LEVERAGE	0.20	-0.03	0.03	-0.01	-0.42	1.00	-0.03	-0.05	0.08
M/B	-0.10	-0.10	-0.01	-0.04	0.29	-0.03	1.00	0.08	-0.06
COMPLEX	-0.12	0.00	0.20	0.14	0.05	-0.05	0.08	1.00	0.06
Independent Board	-0.03	0.05	0.18	0.17	-0.03	0.08	-0.06	0.06	1.00

4.2 Methodology

The purpose of this paper is to examine the association between analysts' information environment and bank opacity, and how this relation is moderated by corporate governance. To operationalize analysts' information environment, two measures are used: analyst earnings forecast accuracy and dispersion. Bank opacity is operationalized by looking at the percentage of assets classified as loans and trading assets. The percentage of independent directors on the BHC's board is used as a measure of corporate governance.

Figure 1: Libby box



4.2.1 Empirical model

The following regressions will be tested:

$$ERROR_{i,t} = \alpha_0 + \beta_1 OPACITY1_{i,t} + \beta_2 OPACITY2_{i,t} + \beta_3 LnAsset_{i,t} + \beta_4 NumberOfForecasts_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LEVERAGE_{i,t} + \beta_7 M/B_{i,t} + \beta_8 COMPLEX_{i,t} + \beta_9 Time_t + \beta_{10} BHC_i + \varepsilon_{i,t}$$

(1)

$$DISAGREE_{i,t} = \alpha_0 + \beta_1 OPACITY1_{i,t} + \beta_2 OPACITY2_{i,t} + \beta_3 LnAsset_{i,t} + \beta_4 NumberOfForecasts_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LEVERAGE_{i,t} + \beta_7 M/B_{i,t} + \beta_8 COMPLEX_{i,t} + \beta_9 Time_t + \beta_{10} BHC_i + \varepsilon_{i,t}$$

(2)

$$ERROR_{i,t} = \alpha_0 + \beta_1 OPACITY1_{i,t} + \beta_2 OPACITY2_{i,t} + \beta_3 IndependentBoard_{i,t} + \beta_4 OPACITY1_{i,t} * IndependentBoard_{i,t} + \beta_5 OPACITY2_{i,t} * IndependentBoard_{i,t} + \beta_6 LnAsset_{i,t} + \beta_7 NumberOfForecasts_{i,t} + \beta_8 ROA_{i,t} + \beta_9 LEVERAGE_{i,t} + \beta_{10} M/B_{i,t} + \beta_{11} COMPLEX_{i,t} + \beta_{12} Time_t + \beta_{13} BHC_i + \varepsilon_{i,t}$$

(3)

$$DISAGREE_{i,t} = \alpha_0 + \beta_1 OPACITY1_{i,t} + \beta_2 OPACITY2_{i,t} + \beta_3 IndependentBoard_{i,t} + \beta_4 OPACITY1_{i,t} * IndependentBoard_{i,t} + \beta_5 OPACITY2_{i,t} * IndependentBoard_{i,t} + \beta_6 LnAsset_{i,t} + \beta_7 NumberOfForecasts_{i,t} + \beta_8 ROA_{i,t} + \beta_9 LEVERAGE_{i,t} + \beta_{10} M/B_{i,t} + \beta_{11} COMPLEX_{i,t} + \beta_{12} Time_t + \beta_{13} BHC_i + \varepsilon_{i,t}$$

(4)

The study employs two dependent variables, $ERROR_{i,t}$ and $DISAGREE_{i,t}$. To ensure the robustness of the regression model and to minimize the possibility of spurious associations, control variables are incorporated into the regression analysis. The variable $OPACITY_{i,t}$ contains specific asset variables, primarily focusing on Loans/Assets ($OPACITY1$), Trading Assets/Assets ($OPACITY2$). These two facets of a BHC's assets are subjected to thorough examination to assess their potential in explaining the variance in analysts' forecasts. This investigation forms the cornerstone of the study, enabling us to test the significance of the coefficients on Loans/Assets and Trading Assets/Assets from zero. In the first two regression models, the focus is on deriving meaningful conclusions that directly respond to the first hypothesis. Following this, a regression analysis incorporating a moderating effect is conducted, to glean insights to the second hypothesis. This structured analytical process ensures the validity and reliability of the study's findings, while also contributing to the broader understanding of the roles of opaque assets play in shaping the properties of forecasts.

4.2.2 Variable construction

4.2.2.1. Bank opacity

$OPACITY_{i,t}$ is a key construct in this study and is quantified using loans ($OPACITY1$) and trading assets ($OPACITY2$) as a percentage of total assets. The rationale for using asset classes is to investigate whether uncertainty faced by analysts changes when banks shift their assets toward riskier assets. Loans are considered to be inherently opaque, become a proxy for bank opacity, consistent with existing literature. Similarly, trading assets are also a source of opaqueness in BHCs' balance sheets, as it is difficult to determine which trading activity occurs during reporting dates (Jones et al. 2012). This attribute of trading assets resonates with the assertion made by Myers and Rajan's (1998) that liquid assets provide borrowers more freedom to act at creditors' expense. Consequently, a higher proportion of trading assets is expected to exacerbate bank opacity.

Acknowledging that a bank's loan portfolio is not a monolith but rather a collection of distinct loan types, each with its unique attributes and characteristics, additionally tests are conducted to identify their individual influence on the properties of analysts' forecasts. This entails a more detailed examination of the various loan types encompassed within a bank's portfolio. This nuanced approach aims to shed light on how specific types of loans, by virtue of their unique risk profiles and opacity, contribute significantly to the error and disagreement of analysts' forecasts.

4.2.2.2. Analyst forecast error and dispersion

This research uses methodologies from Lang and Lundholm (1996) on the topic of analysts' earnings forecast to measure the property of information environment uncertainty. The earnings' forecast error is measured as follows:

$$ERROR_{i,t} = \frac{|EPS_{i,t} - \widetilde{FORECAST_{i,t}}|}{PRICE_{i,t}}$$

Forecast error is measured as the difference between the actual earnings per share (EPS) and the median of the forecasted EPS, scaled by the share price of the BHC.

The disagreement of analysts' earnings forecast is measured as the standard deviation of analysts' earnings forecast and scaled by the share price of the BHC (Barron et al. 1998; Behn et al. 2008; Imhoff and Lobo 1992). BHCs observations with less than two earnings forecasts are excluded.

$$DISAGREE_{i,t} = \frac{STD(FORECASTi,t)}{PRICE_{i,t}}$$

4.2.2.3. Control variables.

The integration of size, time and BHC fixed effects variables into the model is crucial in addressing potential confounders that may influence the association between bank opacity and forecast properties. The variable $LnAsset_{i,t}$, the natural logarithm of total assets, is

utilized to account for bank size. Larger BHCs are often endowed with a richer general information environment (Ho and Michaely 1988), but they may exhibit distinctive traits compared to smaller banks, such as greater diversification, which can make forecasting more challenging (Demsetz and Strahan 1997).

$Time_t$ variable serves to control for fluctuating factors potentially affecting the relation, such as changes in macroeconomic conditions or the occurrence of a crisis period. Fosu et al. (2017) document that the effect of opacity is more pronounced during crisis periods. The integration of temporal controls enables the examination of the consistency of the bank opacity and forecasts' properties association over time, and potential variations across different period. Furthermore, the integration of company-specific fixed effects (BHC_i), mitigates the risk of omitted variable bias. The model focuses on estimating effects from within-company variations.

The level of analysts' coverage can potentially confound the properties of analysts' forecasts (McNichols and O'Brien 1997). To account for this, the number of quarterly forecasts estimates ($NumberOfForecasts_{i,t}$) is included as a control variable, mitigating the potential influence of coverage on forecast error and disagreement.

Building on the arguments by Byard and Cebenoyan (2007) that a firms' operational efficiency can influence analyst forecasts since firms with higher efficiency often have more stable earnings, aiding in more accurate forecasting. I use return on assets ($ROA_{i,t}$) as a variable to control for its potential effects on the properties of forecasts. Additionally, given that financial leverage can introduce volatility to earnings (Haw et al. 1994; Thomas 2002), I include a control variable $LEVERAGE_{i,t}$ calculated as total liabilities to total assets. This helps to mitigate the variance caused by this factor.

The Market-to-book (M/B) ratio, a widely accepted proxy for a firm's growth opportunities, is also considered in the model. A high M/B ratio may suggest that a BHC is perceived to have substantial growth opportunities, which can complicate forecasting due to the inherent uncertainty associated with future growth (Cheng 2005). $M/B_{i,t}$ controls for this potential source of variation in forecast error and disagreement.

Finally, the model incorporates a measure of BHC complexity ($COMPLEX_{i,t}$) as a control variable. The Federal Reserve categorizes whether a BHC as either complex or noncomplex and further classifies them based on their types of complexities. Noncomplex institutions of any size use 2, unless supervisory judgement overrules due to complexity factors, they use 9. Complex institutions, on the other hand, are given values 1 and 3 to 8, it is important to note that these numbers do not necessarily denote a higher degree of complexity, but rather, they correspond to different types of complexities. By using these dummy variables corresponding to each category, with category 2 serving as the reference category, the models effectively control for the impact of varying degrees of business complexity on forecast properties.

5. Empirical Results and Analysis

5.1 Analysis and Results from Regressions

Table 4 presents the outcomes of the first two regression models, both characterized by fixed effects, differing in their dependent variables. This 'within' BHC analysis enables an examination of internal deviations as opposed to 'between' BHC disparities.

The first model's dependent variable is the standardized absolute difference between actual earnings per share and the median of the earnings forecasts. Contrary to my expectation, this model suggests an insignificant correlation between higher proportions of loans ($OPACITY1$) and trading assets ($OPACITY2$) and increased forecast error. This weak association shows a lack of substantial evidence linking opacity of assets to the difficulty of earnings prediction. The second regression model employs the standard deviation of earnings forecasts for a BHC within a specific quarter as its dependent variable. The variables again yielding no compelling conclusions. In alignment with the insights of Trueman (1994) and Leece and White (2017), this observation might reflect analyst tendencies to herd in a more opaque information environment. In light of these results, the null hypothesis remains unchallenged, indicating insufficient evidence to claim that increased opacity, within the context of US BHCs, lead to greater errors and disagreement in analysts' earnings forecasts.

Table 4: Multivariate tests for the effect of bank opacity on forecasts' error and disagreement

Regression coefficients and standard error are reported. The dependent variable for the first regression is the standardized absolute difference between actual earning per share and the median of the earnings forecasts. The dependent variable for the second regression is the standard deviation of earnings forecasts for a BHC in a given quarter. Equations are estimated for 8734 observations and 7861 observations over 2012-2022. All regressions include time variable controls and individual fixed effects.

	(1) ERROR				(2) DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
OPACITY1	0.000	0.000	0.143		0.000	0.000	0.350	
OPACITY2	0.000	0.000	0.709		0.000	0.000	0.934	
LnAssets	0.001	0.001	0.023	*	0.000	0.000	0.776	
Number of Forecasts	0.000	0.000	0.884		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.008	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
Observations	8734				7861			
Number of BHCs	351				339			
R-Squared	0.102				0.113			
Adj. R-Squared	0.057				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

The subsequent pair of regression model shift focus to explore the moderating effect of a corporate governance factor, board independence. The integration of the $IndependentBoard$ demonstrates a positive correlation with both $ERROR$ and $DISAGREE$. This finding echoes the work of Cornett et al. (2009), underscoring that increased board independence curtails earnings management, thereby limiting managerial discretion in meeting earnings expectations. As a moderating variable, board independence alters the signs of the variables of interest, suggesting that it potentially mitigates the impact of opaque assets on the forecast properties. However, statistical significance is achieved solely in the coefficient of $ERROR$ dependent variable. This leads to the acceptance of the second hypothesis positing that increased board independence weakens the positive association between bank opacity, and errors in analysts' earnings forecasts.

Table 5: Multivariate tests for the moderator effect

Regression coefficients and standard error are reported. The dependent variable for the first regression is the standardized absolute difference between actual earning per share and the median of the earnings forecasts. The dependent variable for the second regression is the standard deviation of earnings forecasts for a BHC in a given Time. Equations are estimated for 8734 observations and 7861 observations over 2012-2022. All regressions include time variable controls and individual fixed effects.

	(3) ERROR				(4) DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
OPACITY1	0.001	0.000	0.000	***	0.000	0.000	0.328	
OPACITY2	0.002	0.001	0.040	*	0.000	0.000	0.580	
LnAssets	0.001	0.001	0.057	.	0.000	0.000	0.649	
Number of Forecasts	0.000	0.000	0.877		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.007	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Independent Board	0.050	0.012	0.000	***	0.011	0.007	0.094	.
OPACITY1 * Independent Board	-0.001	0.000	0.000	***	0.000	0.000	0.235	
OPACITY2 * Independent Board	-0.002	0.001	0.074	.	0.000	0.000	0.716	
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
Observations	8734				7861			
Number of BHCs	351				339			
R-Squared	0.104				0.114			
Adj. R-Squared	0.059				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

Control variables such as $NumberOfForecasts$, do not yield significant results on $ERROR$, but returns expected result on $DISAGREE$. $LnAsset$, a measure of bank size, returns significantly positive result on $ERROR$. That suggest larger BHCs can increase their investment in risky activities due to their diversification advantage, make them harder to forecast (Demsetz and Strahan 1997). ROA, $LEVERAGE$ and M/B yield significant results in all models, indicating the necessity to control for these variables.

In conclusion, the regression analyses offer valuable insights into the impact of the loans and trading assets variables, as well as other control variables, on forecast error and disagreement. Moreover, they illuminate the moderating influence of an independent board on these relations. Despite the assumption that opaque assets could lead to increased forecast error and disagreement, the empirical findings do not convincingly substantiate this hypothesis. It appears that the effects of bank opacity on analyst's information environment could be mitigated by the presence of a more independent board.

Building on the work of Flannery (2004) and Morgan (2001), who suggest that varying degrees of opacity across different types of bank loans, further investigations are conducted in the subsequent section. These analyses delve into the specific impacts of individual loan types on the analyst's information environment, providing a more nuanced understanding of these asset. Taking into consideration Robb (1998)'s argument that banking managers utilize loan loss reserves to align with market expectations, thereby decreasing mean forecast error, an examination of these reserves is in order. This test not only aims to provide further evidence to either endorse or challenge Robb's claim, but also to confirm the assumption that increased board independence limits earnings management (Cornett et al. 2009). These additional analyses function as robustness test, strengthening the reliability of our findings and potentially uncovering more intricate insights into the dynamics between opaque assets, analyst forecasts and corporate governance within banking institutions.

5.2 Analysis and Results from Regression with Individual Loan Variables

Tables 6 through 10 display the results of the regression analyses, considering specific loan type variables. It is crucial to note that a BHC's loan portfolio predominantly comprises loans collateralized by real estate (Real Estate Loans). Predicting the performance of these loans can be complex, especially given the unique characteristics of individual properties.

Commercial and Industrial (C&I) Loans, customarily structured around borrowers' specific requirements, can encompass complex structures and terms, thereby augmenting the unpredictability of their performance. Moreover, Consumer Loans are predominantly characterized by the absence of collateral and a substantial reliance on consumer creditworthiness, both factors contributing considerably to opacity.

Loans and Acceptances to Other Banks (LOAN2OTHERBANK) present additional complexity, transacting with banking institutions of various sizes and degrees of financial stability. These

elements contribute to the unique attributes of each loan. Reserves and Unearned Interest (LOSSRESERVES) pose opacity issues, primarily due to uncertainties related to future financial liabilities and the prospective profitability of the institution.

The regression analyses demonstrate that most loan types exert a positive influence on forecast errors, with Real Estate Loans being the only statistically significant variable. As anticipated, Real Estate Loans, comprising the majority of BHCs' loan portfolios and inherently opaque, increase $ERROR$. However, this relationship is significant only at the 5% level, and the effect size, as reflected in the coefficient, is minimally observable, suggesting a relatively weak impact on forecast error. In the forecast disagreement model, Real Estate Loans fail to reach significance, rendering any conclusion about their impact on analysts' consensus inconclusive.

Table 6: Multivariate tests for the effect of Real Estate Loans on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
Real Estate Loans	0.000	0.000	0.013	*	0.000	0.000	0.268	
LnAssets	0.001	0.001	0.016	*	0.000	0.000	0.736	
Number of Forecasts	0.000	0.000	0.939		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.006	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.102				0.113			
Adj. R-Squared	0.058				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

C&I loans, typically customized to suit the needs of individual borrowers, also exhibit a positive correlation, albeit without statistical significance. This pattern is similarly observed with Consumer Loans, which encompass diverse lending categories such as credit card and student loans. Detailed results from the regression analyses for these types of loans, which do not manifest significant results, are presented in Appendix D.

The directions of these coefficients align with Morgan (2001)'s findings, indicating that these high-risk asset classes tend to be associated with increased uncertainty. While these observations do not establish a statistically significant impact on forecast error and disagreement, they offer noteworthy insights into the potential influences of different loan types on these outcomes.

In the forecast disagreement model, LOAN2OTHERBANK displays statistically significant correlations, signifying that these factors may increase forecast disagreement among analysts. For Loans and Acceptances to Other Banks, this positive correlation can be attributed to the varying assessments by analysts concerning the financial health and creditworthiness of borrowing institutions. Due to the diversified characteristics and unique risks of different banks, analysts' evaluations may diverge, contributing to greater disagreement.

Table 7: Multivariate tests for the effect of Loans and Acceptances to Other Banks on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
LOAN2OTHERBANK	0.001	0.001	0.174		0.001	0.001	0.017	*
LnAssets	0.001	0.001	0.030	*	0.000	0.000	0.769	
Number of Forecasts	0.000	0.000	0.868		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.005	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.101				0.114			
Adj. R-Squared	0.058				0.067			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

The financial elements of LOSSRESERVES inherently embody substantial uncertainty and complexity, potentially hindering analysts' comprehensive understanding. The unpredictable nature of future financial liabilities and potential profitability can lead to an amplified level of disagreement among analysts. However, counter to expectations, LOSSRESERVES exhibit a significantly negative correlation with both $ERROR$ and $DISAGREE$. This intriguing result implies that higher levels of Reserves and Unearned Interest are associated with less challenging future predictions and a closer alignment of views among analysts. These findings add evidences to Robb (1998)'s argument that managers utilize this item to align with analysts' expectations. Furthermore, the observed effects are reduced by the presence of an independent board. This revelation supports the premise that an independent board can potentially fortify risk management practices and foster transparency, consequently mitigating the impact of earnings management on these specific items (Cornett et al., 2009). This leads to the inference that robust corporate governance mechanisms can serve as a powerful tool in diminishing the influence of opacity on information environment.

The empirical findings gleaned from this investigation offer meaningful insights into the considerable impact of specific loan types and board independence on the errors and disagreements in analysts' forecasts. These findings reveal that the presence of more opaque asset items, e.g. real estate loans, can cloud the information environment and

complicate the prediction process, thereby leading to greater forecast errors. However, the implementation of robust corporate governance practices as it shows in Table 9, characterized by a strong and independent board, can significantly temper these adverse effects. Moreover, the variation among specific loan types further underscores the heterogeneous nature of banks' loan portfolios. This study's findings suggest that while some loan types, such as real estate loans, may have influence on analysts' information environment, others, may not have significant impact. Moreover, LOSSRESERVES can even negative correlate with $ERROR$ and $DISAGREE$. These distinctions can be vital in refining our understanding of how the composition of banks' loan portfolios can influence analysts' forecasting abilities.

Table 8: Multivariate tests for the effect of Reserves and Unearned Interest on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
LOSSRESERVES	-0.004	0.000	0.000	***	-0.002	0.000	0.000	***
LnAssets	0.002	0.001	0.000	***	0.001	0.000	0.151	
Number of Forecasts	0.000	0.000	0.712		0.000	0.000	0.000	***
ROA	-0.002	0.000	0.000	***	0.000	0.000	0.025	*
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.002	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.114				0.123			
Adj. R-Squared	0.070				0.076			

Tests for the moderating effect on Reserves and Unearned Interest and forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
LOSSRESERVES	-0.010	0.004	0.005	**	0.008	0.002	0.000	***
Independent Board	0.006	0.005	0.198		-0.006	0.002	0.013	*
LOSSRESERVES * Independent Board	0.007	0.004	0.092	.	-0.011	0.002	0.000	***
Controls & Time & BHC Fixed Effects	yes				yes			
R-Squared	0.114				0.126			
Adj. R-Squared	0.070				0.079			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

6. Conclusions and Future Directions

This study's results do not provide substantial evidence to support that the opacity of a BHC significantly impacts the quality of analysts' information environment. However, it does support the hypothesis that the presence of an independent board mitigates the negative effect of bank opacity on analyst information environment. These findings bear notable implications for investors, as they often heavily rely on analyst research for informed investment decisions making.

Furthermore, this research underscores that shifts in a BHC's loan portfolio towards certain types of loans, such as real estate loans, can lead to decrease in the accuracy of forecasts. Conversely, it reveals that an increase in the proportion of Reserves and Unearned Interest in a BHC's portfolio can contribute to decreased forecast error and disagreement among analysts. These findings, therefore, reflect the varied influence of different loans types on the external information environment.

The insights generated from this investigation could also serve as a valuable resource for regulatory authorities. By revealing the loan types that could potentially impair the information environment accessible to external analysts, this study lays a foundation for crafting targeted regulations. These regulations could aim to enhance the financial transparency of BHCs, thereby facilitating a more reliable and transparent information environment.

However, as with all research endeavours, this study is not without its limitations. The sample selection, confined to public BHCs in the US, might limit the generalizability of the findings to private BHCs, banks in other regions, or during different time periods. The multi-source data utilized for this analysis could carry inherent inaccuracies or omissions, thereby influencing the reliability of the results. Furthermore, the presence of multicollinearity among variables could potentially confound interpretations of the results. Lastly, the operationalization of bank opacity, though based on asset composition as informed by prior literature, might not fully capture all aspects of a bank's opacity. These limitations present avenues for further research.

Future studies could consider banks outside the US, alongside exploring data from periods of distinct economic circumstances. In light of the varied magnitudes of effects observed across different loan types and variables, it would be insightful to dive deeper into why certain types of loans and variables exert a stronger influence on forecast error and disagreement. This could entail investigating the role of individual analyst characteristics or firm specific factors in shaping these relations. This line of research would add granularity to our understanding of how information asymmetry and corporate governance practices interact to shape the information environment of banks. In sum, this study has provided initial evidences of the intricate relationships between bank opacity, corporate governance, and the quality of analyst forecasts. These findings contribute to our understanding of the dynamics of the information environment in BHCs and open new doors for future research.

Appendix A Additional Summary Statistics of BHCs

Table A: Summary statistics of bank holding companies, 2012-2022

The sample include 339 publicly traded BHCs with earnings forecasts, covering a period between 2012 and 2022. 'Loans' represents the total loans and lease financing receivables. 'Trading Assets' refers to total trading assets. 'ERROR' is the absolute difference of actual earnings per share and median forecasted earning per share, standardized by quarterly share price. 'LnAssets' is the natural logarithm of quarterly total assets. 'Number of Forecasts' is the total number of quarterly forecasts. 'ROA' is the return on assets. 'Leverage' is total liabilities to total assets. ' M/B' is the market to book ratio. 'COMPLEX' is a complexity indicator for BHCs. 'Independent Board Directors' is a metric reflecting the percentage of independent directors serving on a company's board.

	N	Mean	Standard Deviation	Min.	Max.
Assets ($million)	7861	58,849	260,505	378	3,757,576
Loans/Assets (%)	7861	65.35	15.62	0.00	95.46
Trading Assets/Assets (%)	7861	0.75	3.66	0.00	43.80
DISAGREE (%)	7861	0.20%	1.00%	0.00%	22.56%
Control variables					
LnAssets ($million)	7861	9.13	1.51	5.93	15.14
Number of Forecasts	7861	10.18	10.82	2.00	88.00
ROA	7861	0.66	0.76	-10.03	21.03
LEVERAGE	7861	88.31	4.46	8.49	97.88
M/B	7861	1.34	0.57	0.24	9.17
COMPLEX	7861	2.91	2.60	0.00	9.00
Independent Board (%)	7861	87.23	6.40	55.56	100.00
Number of BHCs	339				

Table A2: Sample Date distribution

Number of observations per year		
Year	ERROR	DISAGREE
2012	869	745
2013	874	750
2014	914	746
2015	872	750
2016	855	760
2017	885	790
2018	823	744
2019	734	696
2020	741	718
2021	725	702
2022	442	460

Appendix B Complete Breakdown of Assets

Sample: Forecast Error	Mean	Standard Deviation	Minimum	Maximum
Asset Portfolio (%)				
Cash/Assets	5.45	5.14	0.28	57.62
Security/Assets	19.47	11.35	0.00	75.42
Loans/Assets	65.45	15.40	0.00	95.46
FF Sold/Assets	0.67	3.31	0.00	38.78
Trading Assets/Assets	0.73	3.58	0.00	43.80
Premises & Fixed Assets/Assets	1.34	0.95	0.05	13.16
Other Real Estate Owned/Assets	0.20	0.42	0.00	5.13
Subsidiary Investments/Assets	0.17	0.43	0.00	6.64
Intangible Assets/Assets	2.23	2.09	0.00	16.78
Other Assets/Assets	4.28	4.67	0.72	71.72
Loan Portfolio (%)				
Real Estate Loans/Assets	46.74	18.00	0.00	93.43
Commercial & Industrial Loans/Assets	11.62	8.30	0.00	52.05
Other Consumer Loans/Assets	1.16	2.09	0.00	17.00
Consumer Credit Card Loans/Assets	0.76	6.39	0.00	84.59
Consumer Other Revolving Credit Plans/Assets	0.34	1.84	0.00	30.59
Automobile Loans/Assets	1.68	3.95	0.00	38.67
Loans and Acceptances to US Depository Institutions and Other Banks/Assets	0.02	0.16	0.00	6.38
Loans and Acceptances to Foreign Depository Institutions and Other Banks/Assets	0.02	0.13	0.00	2.32
Agricultural Loans/Assets	0.43	1.23	0.00	23.92
Foreign Government Loans/Assets	0.00	0.03	0.00	0.49
Lease and Financing Receivables/Assets	0.72	4.05	0.00	85.58
Other Loans/Assets	2.79	4.36	0.00	85.58
Reserves and Unearned Interest/Assets	-0.85	0.61	-10.70	0.00

Sample: Forecast Disagreement	Mean	Standard Deviation	Minimum	Maximum
Asset Portfolio (%)				
Cash/Assets	5.72	5.61	0.31	47.48
Security/Assets	19.13	11.04	0.00	75.42
Loans/Assets	65.35	15.62	0.00	95.46
FF Sold/Assets	0.68	3.38	0.00	38.78
Trading Assets/Assets	0.75	3.66	0.00	43.80
Premises & Fixed Assets/Assets	1.33	1.02	0.05	13.85
Other Real Estate Owned/Assets	0.18	0.37	0.00	4.95
Subsidiary Investments/Assets	0.18	0.41	0.00	6.64
Intangible Assets/Assets	2.34	2.11	0.00	16.35
Other Assets/Assets	4.35	4.83	0.72	71.72
Loan Portfolio (%)				
Real Estate Loans/Assets	45.79	18.57	0.00	94.28
Commercial & Industrial Loans/Assets	11.88	8.45	0.00	52.05
Other Consumer Loans/Assets	1.22	2.23	0.00	17.00
Consumer Credit Card Loans/Assets	1.12	7.43	0.00	84.59
Consumer Other Revolving Credit Plans/Assets	0.35	1.90	0.00	30.59
Automobile Loans/Assets	1.69	3.94	0.00	38.67
Loans and Acceptances to US Depository Institutions and Other Banks/Assets	0.02	0.17	0.00	6.38
Loans and Acceptances to Foreign Depository Institutions and Other Banks/Assets	0.02	0.11	0.00	2.32
Agricultural Loans/Assets	0.43	1.16	0.00	23.92
Foreign Government Loans/Assets	0.00	0.02	0.00	0.38
Lease and Financing Receivables/Assets	0.68	3.70	0.00	85.58
Other Loans/Assets	3.01	4.64	0.00	57.90
Reserves and Unearned Interest/Assets	-0.85	0.63	-10.70	0.00

Appendix C Variable definitions

Table C: List of Variables	
Variables	Definition
Agricultural Loans	= Total loans to finance agricultural production and other loans to farmers/Total assets
Automobile Loans	= Total loans secured by automobile/Total assets
Commercial & Industrial (C&I) Loans	= Total commercial and industrial loans/Total assets
COMPLEX	A complexity indicator for BHCs. Small BHCs with total assets less than or equal to $5 billion, established 2002, use values 3-8 for complexity. Noncomplex institutions of any size use 2, but if supervisory judgement overrules due to complexity factors, they use 9.
Consumer Loans	= Total loans to individual for household, family, and other personal expenditures (excluding automobile)/Total assets
DISAGREE	The standard deviation of forecasted earning per share, divide by the quarterly end price per share
ERROR	The absolute difference of actual earning per share and median forecasted earning per share, divide by the quarterly end price per share
FORECAST	Analyst earning per share forecast
Independent Board	= Number of independent board directors/Number of board directors
Lease and Financing Receivables	= Total lease financing receivables (net of unearned income)/Total assets
LEVERAGE	= Total liabilities/Total assets
LnAssets	= Natural logarithm of quarterly total assets
LOAN2OTHERBANK	= Total loans to depository institutions and acceptances of other banks/Total assets
LOSSRESERVES	= (Total allowance for loan and lease losses+ unearned income on loans)/Total assets
Loans/Assets	= Total loans and lease financing receivables/Total assets
M/B	= Market capitalization/ Total equity
Non-accruing Loans	= Total nonaccrual loans/Total assets
Number of Forecasts	= The number of quarterly earnings forecasts for a BHC
OPACITY	A vector contains Loans/Assets and Trading assets/Assets variables that measures bank opacity
OPACITY1	= Total loans and lease financing receivables/Total assets
OPACITY2	= Total trading assets/Total assets
Other Loans	= Total loans to non-depository financial institutions and other loans/Total assets
Other Real Estate Owned	= Total other real estate owned/Total assets
PRICE	Stock price per share
Real Estate Loans	= Total loans secured by real estate/Total assets
Return on Assets (ROA)	= Net income/Total assets
Trading Assets/Assets	= Total trading assets/Total assets

Appendix D Additional Regression Results

Table D1: Multivariate tests for the effect of C & I Loans on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
C&I Loans	0.000	0.000	0.306		0.000	0.000	0.314	
LnAssets	0.001	0.001	0.029	*	0.000	0.000	0.815	
Number of Forecasts	0.000	0.000	0.921		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.005	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.002	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.101				0.113			
Adj. R-Squared	0.057				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

Table D2: Multivariate tests for the effect of Consumer Loans on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
Consumer Loans	0.000	0.000	0.258		0.000	0.000	0.879	
LnAssets	0.001	0.001	0.026	*	0.000	0.000	0.808	
Number of Forecasts	0.000	0.000	0.877		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.006	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.101				0.113			
Adj. R-Squared	0.057				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

Table D3: Multivariate tests for the effect of Automobile Loans on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
Automobile Loans	0.000	0.000	0.368		0.000	0.000	0.751	
LnAssets	0.001	0.001	0.032	*	0.000	0.000	0.804	
Number of Forecasts	0.000	0.000	0.902		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.006	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.101				0.113			
Adj. R-Squared	0.057				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

Table D4: Multivariate tests for the effect of Agricultural Loans on forecasts' error and disagreement

	ERROR				DISAGREE			
	Coefficients	Std. Error	Marg.prob.		Coefficients	Std. Error	Marg.prob.	
Agricultural Loans	0.000	0.000	0.306		0.000	0.000	0.671	
LnAssets	0.001	0.001	0.038	*	0.000	0.000	0.782	
Number of Forecasts	0.000	0.000	0.923		0.000	0.000	0.000	***
ROA	-0.003	0.000	0.000	***	0.000	0.000	0.006	**
LEVERAGE	0.000	0.000	0.000	***	0.000	0.000	0.000	***
M/B	-0.003	0.000	0.000	***	-0.001	0.000	0.000	***
Complexity Fixed Effects	yes				yes			
Time & BHC Fixed Effects	yes				yes			
R-Squared	0.101				0.113			
Adj. R-Squared	0.057				0.066			

Signif. level: '***' 0.001, '**' 0.01, '*' 0.05, '.' 0.1

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