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# The association between fair value measurements and banks' discretionary accounting choices[1]

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ABSTRACT

This study examines the association between fair value measurements and banks' discretionary loan loss provisions using regulatory financial data from 2009 to 2016 for a sample of U.S. public bank holding companies. I find that banks recognizing larger proportions of fair value assets and liabilities based on level 2 and level 3 inputs are associated with lower discretionary loan loss provisions. However, there is no significant association between level 1 fair value assets and liabilities and discretionary loan loss provisions. When pre-managed earnings are lower, banks with larger proportions of level 2 and level 3 fair value assets and liabilities report smaller discretionary loan loss provisions to inflate earnings. Banks reporting larger proportions of level 2 and level 3 fair value assets and liabilities are more likely to use discretionary loan loss provisions to beat earnings benchmarks and manage tier one capital ratios. Overall, the results support the proposition that fair value assets and liabilities based on level 2 and level 3 inputs are less transparent and are subject to more discretion regarding loan loss provisions.

## 1. Introduction

This paper studies the association between fair value measurements and banks' discretionary use of loan loss provisions. The ideal concept of fair value accounting is that all assets and liabilities of a firm are measured at fair value instead of historical cost and any change in the fair value of an asset or a liability is reported in the current period net income (Barth, Gomez-Biscarri, Kasznik, & Lopez-Espinosa, 2012). Proponents of fair value accounting argue that it better reflects the value of a firm's assets and liabilities, therefore, it provides more relevant information to investors. Opponents think that fair value is not as objective or reliable as historical cost because fair value accounting requires more subjective judgments in the process of preparing accounting information, which may cause inaccuracy and uncertainty.

A recently issued standard, Statement of Financial Accounting Standards (SFAS) 157 *Fair Value Measurements* (FASB, 2006), provides practical guidance on how to consistently measure fair values within the scope of existing standards on fair value accounting. Moreover, SFAS 157 requires firms to measure fair value assets and liabilities into three levels. The subsequently issued standard, SFAS 159 *Fair Value Option* (FASB, 2007), brings fair value accounting into a new stage by allowing firms to measure many other assets and liabilities at fair value. As fair value accounting evolves, the current financial reporting practice is a mix of fair value accounting and historical cost accounting. Some assets are reported at fair value with changes in fair value recognized in net income, e.g., trading assets and certain derivatives. Some assets are measured at fair value with changes in fair value reported in equity, e.g., available-for-sale assets. Some assets are measured at amortized cost, e.g., held-to-maturity assets (Barth et al., 2012). The objective of this research is to exam how fair value information disclosed under SFAS 157 is associated with banks' discretionary accounting choices, particularly, discretionary loan loss provisions. Especially, I compare level 1 fair value measurements to level 2 and 3 fair value measurements regarding their associations with discretionary loan loss provisions. I examine the banking industry because banks hold large amounts of financial assets and liabilities, which are most affected by current fair value accounting standards.

Recent research on fair value measurements show that fair value

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assets and liabilities based on unobservable (level 3) or indirectly observable inputs (level 2) are less value relevant (Song, Thomas, & Yi, 2010), are associated with more information risk (Riedl & Serafeim, 2011) and information asymmetry (Liao, Kang, Morris, & Tang, 2013), and are less priced (Goh, Li, Ng, & Yong, 2015), compared with assets and liabilities measured by more transparent fair value inputs (level 1).[2] Thus, auditors increase audit efforts to verify such fair values, resulting in higher audit fees (Ettredge, Xu, & Yi, 2014). In order to mitigate market discounting of the lower-level (level 2 or level 3) fair value measurements, Badia, Duro, Penalva, and Ryan (2017) provide evidence that firms with higher proportions of level 2 and level 3 fair value assets and liabilities report more conditionally conservative comprehensive income. Generally speaking, prior studies on fair value measurements imply that assets and liabilities based on lower-level fair value inputs (level 2 or level 3), inputs which do not have quoted prices directly observable from liquid and active markets, are less transparent, associated with greater valuation uncertainty and subject to more discretion.

This study is motivated by the critiques and concerns on fair value accounting and explores the relation between fair value measurements described in SFAS 157 and banks' discretionary use of loan loss provisions. Researchers and practitioners believe that fair values, especially fair values based on inputs which are not directly observed or unobservable, are subject to manipulation (Benson & Teclezion, 2007; Benston, 2008). Assets and liabilities based on level 2 or level 3 fair value inputs might be associated with banks' discretionary accounting choices, such as discretionary loan loss provisions and discretionary realized security gains and losses. For example, both level 2 and level 3 assets consist of large amounts of available-for-sale securities. Banks could smooth income, manage earnings and manage capital ratios by timing the sale of these securities (Barth et al., 2012; Bratten, Causholli, & Myers, 2017; Valencia, 2011). A large category of level 2 and level 3 available-for-sale securities are mortgage-backed securities. Level 2 and Level 3 assets and liabilities include certain derivative contracts which are not traded on active markets. Level 3 assets also consist of a large amount of loans. Both mortgage-backed securities and loans are associated with loan loss provisions which are subject to discretion. Huizinga and Laeven (2012) find that banks holding a large amount of mortgage-backed securities report significantly lower loan loss provisions to preserve regulatory capital during the financial crisis. Banks with more derivatives are more affected by SFAS 133 which reduces managerial discretion over derivatives. Thus, these banks are more likely to use discretionary loan loss provisions to smooth income (Kilic, Lobo, Ranasinghe, & Sivaramakrishnan, 2013). On the contrary, Bratten et al. (2017) show that banks with more fair value exposure are less likely to use discretionary loan loss provisions to smooth earnings.

This study examines whether banks' discretionary loan loss provisions are associated with the proportion of a bank's assets and liabilities measured by three levels of fair value. Especially, I compare level 1 fair value measurements to level 2 and 3 fair value measurements. I focus on discretionary loan loss provisions because “the LLP is the largest and most salient accrual for banks” (Bratten et al., 2017, p. 3) and is subject to great discretion. Given the critiques and concerns on the lower-level fair value inputs, I expect that banks with larger proportions of level 2 and level 3 fair value assets and liabilities are associated with discretionary use of loan loss provisions to smooth income, manage earnings and manage capital ratios.

Prior studies argue that managers exert discretion to reduce earnings volatility to reduce risk, increase compensation and improve access to external financing (Bratten et al., 2017). Bratten et al. (2017) provide evidence that banks' discretionary use of loan loss provisions to smooth earnings is associated with fair value exposure. I extend their study by investigating whether banks' discretionary use of loan loss provisions are associated with fair value assets and liabilities which are less transparent and are subject to greater discretion (Level 2 and 3 fair value measurements).

The literature on meeting or beating earnings benchmarks show that firms use discretionary accounting choices to avoid earnings decreases, losses or missing market expectations. So firms whose earnings just meet or beat benchmarks using discretionary accounting choices and miss earnings benchmarks otherwise can be considered as manipulating earnings (Beatty, Ke, & Petroni, 2002; Burgstahler & Dichev, 1997; Degeorge, Patel, & Zeckhauser, 1999; Harris, Shi, & Xie, 2018). Graham, Harvey, and Rajpopal (2005) show that about 85.1% of the surveyed CFOs in their sample consider earnings in the same quarter of the prior year to be important. Hence, I measure earnings management as small earnings increases after discretionary loan loss provisions. Prior studies also show that firms manage earnings to beat analyst forecasts (Dhaliwal, Gleason, & Mills, 2010; Davis, Soo, & Trompeter, 2009; Harris et al., 2018). Thus, I use slightly beating the consensus analyst forecasts as an alternative proxy for earnings management. Valencia (2011) examines managers' discretionary use of Level 3 instruments to meet earnings and capital ratio targets. My study is different from his study in that I examine both level 2 and level 3 fair value assets and liabilities. Valencia (2011) focuses on discretionary security gains and losses (realized and unrealized) while my study focuses on discretionary loan loss provisions.

I select a sample of U.S. public bank holding companies during the period of 2009–2016 from the Federal Reserve Bank Holding Company Database which have available fair value assets and liabilities information and other necessary financial data. I focus on public banks because the literature shows that public banks have greater incentives to manage earnings and engage in more discretionary accounting choices than private banks (Beatty et al., 2002; Beatty & Harris, 1999). Other studies show that public banks demand higher level verifiable accounting information and exhibit greater conditional conservatism (Nichols, Wahlen, & Wieland, 2009).

Following Burgstahler and Dichev (1997), I first examine the distributions of earnings changes for the banks with larger proportions of assets and liabilities based on level 2 and level 3 fair value inputs and for the banks with smaller proportions of level 2 and level 3 fair value assets and liabilities. I find a discontinuity around zero in the earnings change distributions of both groups, however, the kink is significantly larger for the banks with larger proportions of level 2 and level 3 fair value assets and liabilities. The multivariate tests show that banks with larger proportions of level 2 and level 3 fair value assets and liabilities are associated with lower discretionary loan loss provisions. However, banks' discretionary accounting choices are not associated with the proportion of level 1 fair value assets and liabilities. Further, the estimated coefficient suggests that 1% increase in the percentage of level 2 and 3 fair value assets and liabilities is associated with about $0.81 million decrease in discretionary loan loss provisions on average. When pre-managed earnings are lower, banks with more level 2 and level 3 fair value assets and liabilities have lower discretionary loan loss provisions to inflate earnings. The results of additional analyses show that banks with larger proportions of level 2 and level 3 fair value assets and liabilities are more likely to use discretionary loan loss provisions to manage earnings up to beat earnings targets and inflate tier one capital ratios. Finally, I provide weak evidence that the trade-off between discretionary loan loss provisions and discretionary security gains and losses is associated with the proportion of level 2 and 3 fair value assets and liabilities.

My study contributes to two streams of research. I contribute to the literature examining banks' discretionary accounting choices, especially

[2] SFAS157 describes a fair value hierarchy based on the inputs of fair value measurements. Level 1 fair value inputs are quoted prices directly observable from active markets for identical assets and liabilities. Level 2 fair value inputs can be directly or indirectly observable, and exclude the level 1 inputs. Level 3 fair value inputs are unobservable allowing firms to use internal models and assumptions (SFAS 157, paragraph 22–31).

loan loss provisions. Beatty et al. (2002) provide evidence that public banks report more small earnings increases and less small earnings decreases than private banks by reporting lower discretionary loan loss provisions and higher discretionary security gains and losses. Beatty and Harris (1999) provide evidence that public banks are more likely to manipulate security gains to smooth earnings than private banks. I contribute to this line of research on using fair value information disclosed in the financial statements regulated by SFAS 157 to show that banks' discretionary use of loan loss provisions are associated with the proportion of assets and liabilities measured with lower-level (level 2 and level 3) fair value inputs.

I also contribute to the literature on fair value measurements. Prior studies find that fair value assets and liabilities based on lower-level inputs are less value relevant (Song et al., 2010) and are associated with a higher cost of capital (Riedl & Serafeim, 2011), larger bid-ask spreads (Liao et al., 2013), higher audit fees (Ettredge et al., 2014), a larger market discount (Goh et al., 2015) and more conditional conservatism in reporting comprehensive income (Badia et al., 2017). I contribute to this line of research by examining the association between fair value measurements, especially level 2 and level 3 fair value assets and liabilities, and banks' discretionary accounting choices. My study is different from prior studies in three main aspects. First, unlike prior studies which focus on certain types of assets or liabilities (e.g. Huizinga & Laeven, 2012; Kilic et al., 2013), my study focuses on level 2 and level 3 fair value assets and liabilities and directly tests the differences between level 1 and level 2&3 fair value measurements regarding their associations with discretionary accounting choices. Second, I examine a range of managerial discretion including income smoothing, earnings management, capital management and the trade-off between discretionary loan loss provisions and discretionary security gains and losses. Third, while most of studies on fair value accounting and earnings management investigate security gains and losses (Barth et al., 2012; Valencia, 2011), my study focuses on discretionary loan loss provisions, similar to Bratten et al. (2017).

One implication of this paper is that investors, analysts or auditors should pay attention to banks with larger proportions of level 2 and level 3 fair value assets and liabilities as those banks are more likely to engage in earnings management and capital management. More important, my results show that although fair value accounting provides opportunities for transaction-based earnings management (Bratten et al., 2017), banks might still use discretionary loan loss provisions to smooth income, manage earnings and manage capital ratios when their fair value assets and liabilities are less transparent and subject to discretion.

The rest of this paper is organized as follows. Section 2 discusses the background and motivations of this study. Section 3 reviews prior research on banks' discretionary accounting choices and research on fair value accounting. Section 4 discusses the research methodology and sample selection. Section 5 presents and discusses the empirical results. Section 6 concludes.

## 2. Background and motivations

The Financial Accounting Standards Board issued Statement of Financial Accounting Standards No. 157 *Fair Value Measurements* in September 2006, which was effective on November 15, 2007. SFAS 157 "defines fair value, establishes a framework for measuring fair value, and expands disclosures about fair value measurements" (SFAS 157, p.6 paragraph 1).[3] SFAS 157 "does not require any new fair value measurements" but consolidates the different definitions and applications of fair value in previously issued standards on fair value accounting (SFAS 157, p.2). This statement describes a fair value hierarchy based on the inputs of fair value measurements. Level 1 fair value inputs are quoted prices directly observable from active markets for identical assets and liabilities. Level 2 fair value inputs can be directly or indirectly observable, and exclude the level 1 inputs. Level 3 fair value inputs are unobservable allowing firms to use internal models and assumptions (SFAS 157, p. 10–12 paragraph 22–31). Firms are required to disclose in their financial reports the assets and liabilities measured at fair value in each level. Some researchers and practitioners criticize the difficulties in applying and verifying fair value measurements. For example, Benston (2008) points out that "fair values other than those taken from quoted prices (level 1) could be readily manipulated by opportunistic and overoptimistic managers, would be costly to make, and very difficult for auditors to verify and challenge" (Benston, 2008, p. 104). The following is a quotation from a newsletter of *i*Comp, LLC, a company providing services on firm, asset, and liabilities valuation:

"*The additional levels of discretion allotted management under this regulation, in the presence of limited valuation guidance, will, ultimately, increase their ability to manage earnings over time. This ability will increase directly with the proportion of Level 2 and Level 3 assets (liabilities) held by the firm.*"

Although it is generally considered that level 3 fair value inputs are the least transparent, the most subjective and subject to the greatest discretion among the three levels, level 2 fair value measurements are also subject to managerial discretion and could be manipulated. First, companies hold a much larger amount of level 2 assets and liabilities than level 3 assets and liabilities. Taking the sample in this study as an example, level 2 fair value assets and liabilities account for about 92% of the total fair value assets and liabilities while level 3 fair value assets and liabilities account for only about 2%. This suggests that there could be more room to manage earnings through level 2 fair value measurements. Second, there are mandatory detailed disclosures for level 3 fair value assets and liabilities but there is no such disclosure requirement for level 2 assets and liabilities. SFAS 157 requires companies to reconcile the beginning and ending balances of level 3 fair value assets and liabilities and to disclose changes due to 1) total gains and losses for the period; 2) purchases, sales, issuances, and settlements; 3) transfers in and out of level 3 (SFAS157, p.12). The more detailed disclosure requirement for level 3 fair value measurements makes it more difficult to manipulate level 3 fair value measurements since they will receive more attention from investors, auditors and regulators. Ryan (2008, p.1628) points out that "The required disclosures are considerably more detailed for level 3 fair value measurements" and "These disclosures make the effects of level 3 measurements on the financial statements considerably more transparent than they would have been under prior GAAP." He also mentions that "Indeed, given the poor quality market signals currently being generated, I believe level 3 fair value measurements supported by disclosures of critical inputs and the sensitivity of the measurements to the inputs often would be considerably more informative to users of financial reports than poor quality level 2 fair value measurements." (Ryan, 2008, p. 1628) In addition, discussion with practitioners indicates that level 3 fair value measurements have small dollar values and managers are conservative in reporting level 3 assets and liabilities. Generally speaking, although level 3 inputs are the least transparent and the most subjective by definition, both level 2 and level 3 fair value inputs are subject to discretion so assets and liabilities based on both level 2 and level 3 fair value inputs could be associated with banks' discretionary accounting choices.

## 3. Literature and hypotheses

This study follows two streams of research: (1) Discretionary accounting choices of banks; and (2) research on fair value accounting. In this section, I briefly review the two streams of research.

[3] SFAS 157 defines fair value as "the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date." (SFAS 157, p.6 paragraph 5).

### 3.1. Discretionary accounting choices of banks

There is a rich literature on earnings manipulation practices and financial accounting choices of bank holding companies. Early studies show that banks have incentives to meet regulatory capital requirements and earnings targets, and to reduce taxes (e.g., Moyer, 1990; Scholes, Wilson, & Wolfson, 1990). These objectives can be achieved by managing loan loss provisions and loan charge-offs, managing security gains and losses or adjusting investment strategies (e.g., Ahmed, Takeda, & Thomas, 1999; Beatty et al., 2002; Beatty, Chamberlain, & Magliolo, 1995; Beatty & Harris, 1999; Collins, Shackelford, & Wahlen, 1995). Banks have an incentive to manipulate earnings because accounting earnings convey firm information to investors and play an important role in firm performance evaluation and accounting-based contracting (Warfield, Wild, & Wild, 1995). For example, Dechow, Myers, and Shakespeare (2010) show that managers have a compensation incentive to manipulate securitization gains under SFAS 140.

Among the research on financial reporting in the banking industry, some studies specifically examine the discretionary use of loan loss provisions, which are an important accrual of bank holding companies. These studies find that loan loss provisions can be decomposed into one component which can be predicted and another component which is subject to managerial discretion. The market prices these two components differently (Beaver & Engel, 1996). Wahlen (1994) finds a positive association between discretionary loan loss provisions and future cash flow increases after controlling for the unexpected change in nonperforming loans and unexpected loan charge-offs. Beaver and Engel (1996) also find a positive association between discretionary loan loss provisions and stock returns, supporting the signaling effect of discretionary loan loss provisions. Kanagaretnam, Krishnan, and Lobo (2009) find that auditor expertise drives the positive market reactions, suggesting that investors perceive discretionary loan loss provisions disclosed by banks to convey more valuable information when the bank is audited by specialists in the banking industry.

Banks have various incentives to manage loan loss provisions. Prior research provides evidence that banks use loan loss provisions to manage capital (Ahmed et al., 1999; Kim & Kross, 1998) and to smooth earnings (Kanagaretnam, Lobo, & Mathieu, 2003). Lobo and Yang (2001) jointly test the signaling effect, capital management effect and earnings management effect of loan loss provisions. Their findings suggest that the income smoothing effect is supported by all the models but the signaling effect is sensitive to different model specifications.

In addition to loan loss provisions, managers also have discretion over the security gains and losses. Prior studies document banks' discretionary use of security gains and losses to manage earnings (e.g., Beatty & Harris, 1999; Dechow et al., 2010; Dechow & Shakespeare, 2009). Banks might trade off discretionary loan loss provisions and discretionary security gains and losses (Bratten et al., 2017). Furthermore, banks could obtain accounting benefits, such as reducing leverage ratios, via timing the sales of securities (Dechow & Shakespeare, 2009).

### 3.2. Fair value accounting

There has been a long-lived debate over fair value accounting. Early studies primarily focus on the value relevance of fair value disclosures. Barth (1994) provides evidence that the fair value of investment securities provides incremental power in explaining stock returns compared with historical book value. Barth, Landsman, and Wahlen (1995) examine fair value based earnings and regulatory capital measures under SFAS 115. They find that fair value based earnings are more volatile and banks under fair value accounting violate regulatory capital requirements more frequently. Both Nelson (1996) and Barth, Beaver, and Landsman (1996) study the value relevance of fair value estimates under SFAS 107 but find conflicting results. Nelson (1996) shows that fair value measures are value irrelevant after controlling for future profitability while Barth et al. (1996) include nonperforming loans and interest-sensitive assets and liabilities as control variables and find the opposite results. Liang and Riedl (2014) examine the impact of fair value accounting on analyst forecasts. They find that U.K. firms have more accurate net asset value forecasts based on firm supplied fair values while U.S. firms have more accurate EPS forecasts based on historical cost reporting. Blankespoor, Linsmeier, Petroni, and Shakespeare (2013) show that leverage ratios using fair value information better explain banks' credit risk which is measured by bond spreads and bank failure.

The issuance of SFAS 157 *Fair Value Measurements* as well as the financial crisis in 2008–2009 provoked a large amount of research on fair value accounting based on the disclosure requirements and recommendations under SFAS 157. Song et al. (2010) find that level 1 and level 2 fair values are more value relevant than level 3 fair values. In addition, good governance increases the value relevance of fair values, especially level 3 fair values. Riedl and Serafeim (2011) document a higher cost of capital for financial institutions with more level 3 fair value assets. They also find that the differences in cost of capital across the three levels of fair value assets are smaller for financial institutions which have better information environments. Liao et al. (2013) document a positive association between information asymmetry, measured by the bid-ask spread, and both fair value net assets and loan loss provisions during the financial crisis. Goh et al. (2015) find that level 1 and level 2 fair value measurements are priced higher than level 3 fair value measurements during the financial crisis and the difference reduces since then. By investigating analyst forecast accuracy, Ayres, Huang, and Myring (2017) find that analyst forecast accuracy is positively associated with level 1 and level 2 fair value measurements, but not with level 3 fair value measurements.

Researchers have expressed concerns that fair value measurements described in SFAS 157 give managers more discretion over asset and liability valuation and fair values are more difficult and costly to audit (Benston, 2008). Martin, Rich, and Wilks (2006) conclude from a stream of judgment and decision-making research that there are unintentional and intentional biases when managers prepare fair values. Specific knowledge and skills are required but difficult to gain to audit fair values. In response to these concerns, studies examine how fair value measurements in SFAS 157 affect auditing. Ettredge et al. (2014) find that fair value assets, especially level 3 assets, increase audit fees. Overall, these studies suggest that assets and liabilities based on level 3 fair value inputs are less transparent and less objective, are associated with greater valuation uncertainty and are difficult to verify.

Recent studies on fair value measurements suggest that both level 2 and level 3 fair value measurements are opaque, less reliable and subject to discretion. Bens, Cheng, and Neamtiu (2016) show that the information uncertainty associated with level 2 and level 3 fair value assets are significantly reduced after the issuance of SEC fair value comment letters. Badia et al. (2017) provide evidence that firms with higher proportions of level 2 and level 3 fair value assets and liabilities report more conditionally conservative comprehensive income. Wang and Zhang (2017) show a positive association between fair value measurements, especially level 2 and level 3 measurements, and demand for convertible debt and short-term debt. Following these studies, I differentiate level 2 and 3 fair value measurements from level 1 fair value measurements.

Level 2 and level 3 fair value measurements consist of assets and liabilities which facilitate discretionary use of loan loss provisions. For example, level 2 and level 3 fair value measurements consist of assets such as loans, mortgage-backed securities, and certain derivative contracts, etc. Prior studies imply that banks with more level 2 and 3 fair value assets and liabilities are either more likely or less likely to use

**Table 1**
Sample construction.

Panel A: Sample selection procedure

| | Bank-years | Banks |
|---|---|---|
| Initial sample of U.S. public bank holding companies which filed report FR Y-9C to the Federal Reserve Bank in the period of 2009–2016 | 3316 | 621 |
| Less: Bank-years with missing data to calculate discretionary loan loss provisions and discretionary security gains and losses | (751) | (118) |
| Sample to calculate discretionary loan loss provisions and discretionary security gains and losses | 2565 | 503 |
| Less: Bank-years with missing data on fair value measurements | (65) | (17) |
| Full sample | 2500 | 486 |
| Less: Bank-years with missing data on lag-year discretionary loan loss provisions or lag-year discretionary security gains and losses | (499) | (57) |
| Sample for regressions controlling for lag-year discretionary loan loss provisions or lag-year discretionary security gains and losses | 2001 | 429 |

Panel B: Distribution of the sample by years

| Year | Frequency | Percent |
|---|---|---|
| 2009 | 333 | 13.32 |
| 2010 | 314 | 12.56 |
| 2011 | 310 | 12.40 |
| 2012 | 299 | 11.96 |
| 2013 | 309 | 12.36 |
| 2014 | 311 | 12.44 |
| 2015 | 318 | 12.72 |
| 2016 | 306 | 12.24 |
| Total | 2500 | 100 |

discretionary loan loss provisions. On one side, level 2 and level 3 fair value inputs are less transparent and are subject to more discretion. Banks with larger proportions of level 2 and level 3 fair value assets and liabilities are more likely to be associated with discretionary loan loss provisions. In addition, they are more likely to be associated with income smoothing, earnings and capital management using discretionary loan loss provisions. Huizinga and Laeven (2012) find that banks holding large amounts of mortgage-backed securities report significantly lower loan loss provisions to preserve regulatory capital during the financial crisis. Kilic et al. (2013) show that firms affected more by SFAS 133 are positively associated with income smoothing using discretionary loan loss provisions because SFAS 133 reduces managerial discretion to smooth income through derivatives.

On the other side, banks subject to more level 2 and level 3 fair value exposure might be more likely to use transaction-based discretionary accounting choices. Bratten et al. (2017) show that bank holding companies with more fair value reporting rely more on discretionary security gains and losses than discretionary loan loss provisions to smooth earnings during the period of 2000–2008 because fair value accounting provides more opportunities for transaction-based earnings management. I express the testable hypotheses in this study in null forms as follows:

**H1a.** : Larger proportions of level 2 and level 3 fair value assets and liabilities are not associated with discretionary loan loss provisions.

**H1b.** : The association between level 1 fair value measurements and discretionary loan loss provisions is not different from the association between level 2 and 3 fair value measurements and discretionary loan loss provisions.

**H2.** : Larger proportions of level 2 and level 3 fair value assets and liabilities are not associated with banks' earnings smoothing using discretionary loan loss provisions.

**H3a.** : Larger proportions of level 2 and 3 fair value assets and liabilities are not associated with the likelihood to beat earnings targets using discretionary loan loss provisions.

**H3b.** : Larger proportions of level 2 and 3 fair value assets and liabilities are not associated with the likelihood to meet capital requirements using discretionary loan loss provisions.

## 4. Data, sample and models

### 4.1. Sample selection

Table 1 Panel A shows the sample selection procedure. The initial sample contains all U.S. public bank holding companies from the Bank Holding Company Database maintained by the Federal Reserve Bank of Chicago during the period of 2009–2016.[4] The Bank Holding Company Data includes financial information of bank holding companies filed in the form FR Y-9C. I chose the year 2009 as the initial sample year because Schedule HC-Q Financial Assets and Liabilities Measured at Fair Value is required to be completed by all bank holding companies since 2009.[5] I find that many banks do not report fair value assets and liabilities in the years 2007 and 2008 although SFAS 157 was effective for financial statements which are issued for the fiscal years beginning on and after November 5, 2007 (SFAS 157). The initial sample includes 3316 bank-year observations for 621 unique public banks. I require the sample companies to have necessary financial data to calculate discretionary loan loss provisions, discretionary security gains and losses as well as change in return on assets. The sample at this stage has 2565 bank-years for 503 banks. I use this sample to calculate the bin width when examining the distributions of changes in return on assets.[6] Then

[4] I use a CRSP-FRB LINK table provided by the FRB Chicago to identify publicly traded banks which have PERMCOs in CRSP. I randomly select 20 banks and manually check if they file 10-Ks with the SEC to make sure my classification of public banks is correct.

[5] Schedule HC-Q Financial Assets and Liabilities Measured at Fair Value is to be completed by bank holding companies that have adopted FASB Statement No. 157, "Fair Value Measurements," and (1) have elected to account for financial instruments or servicing assets and liabilities at fair value under a fair value option or (2) are required to complete Schedule HC-D—Trading Assets and Liabilities. This schedule is required to be completed by all bank holding companies since 2009.

I exclude all bank-year observations with missing data on fair value measurements. The full sample consists of 2500 bank-year observations for 486 unique public banks. For regressions controlling for lag-year discretionary loan loss provisions and lag-year discretionary security gains and losses, bank-year observations missing such information are deleted, resulting in 2001 observations for 429 unique banks. Table 1 Panel B presents the distribution of banks across years. The sample banks are evenly distributed across years. On average, there are approximately 300 banks each year in the full sample.

### 4.2. Discretionary loan loss provisions and discretionary security gains and losses

I use the following models to estimate the discretionary loan loss provisions and discretionary security gains and losses, following Beatty et al. (2002).

$$LLP_{it} = \alpha_0 + \alpha_1 Log(ASSET)_{it} + \alpha_2 \Delta NPL_{it} + \alpha_3 LLR_{it} + \alpha_4 LOANR_{it} + \alpha_5 LOANC_{it} + \alpha_6 LOAND_{it} + \alpha_7 LOANA_{it} + \alpha_8 LOANI_{it} + \alpha_9 LOANO_{it} + Year\ dummies_{it} + \varepsilon_{it} \quad (1)$$

$$RSGL_{it} = \beta_0 + \beta_1 Log(ASSET)_{it} + \beta_2 TSGL_{it} + Year\ dummies_{it} + \varepsilon_{it} \quad (2)$$

Definitions of all variables are presented in the appendix A. I expect that the loan loss provisions are increasing in bank size (Beatty et al., 2002), change in nonperforming loans (Ahmed et al., 1999; Beatty et al., 2002; Beaver & Engel, 1996; Kanagaretnam et al., 2009; Lobo & Yang, 2001; Wahlen, 1994) and loan size (Beatty et al., 2002; Beaver & Engel, 1996; Wahlen, 1994). I also expect that the realized security gains and losses are increasing in the total security gains and losses (Beatty et al., 2002; Beatty & Harris, 1999). The residual estimated from Eq. (1) is the discretionary component of loan loss provisions. The residual estimated from Eq. (2) is the discretionary component of realized security gains and losses. The residuals are used in the main analyses.

### 4.3. Association between fair value measurements and banks' discretionary use of loan loss provisions

To test the association between fair value measurements and banks' discretionary loan loss provisions, I estimate the following equations similar to Bratten et al. (2017):

$$DLLP_{it} = \gamma_0 + \gamma_1 FV1_{it} + \gamma_2 FV23 + \gamma_3 PME\_HIGH_{it} + \gamma_4 PME\_HIGH_{it} \times HFV1_{it} + \gamma_5 PME\_HIGH_{it} \times HFV23_{it} + \gamma_6 LDLLP_{it} + \gamma_7 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it} \quad (3)$$

$$DLLP_{it} = \gamma_0 + \gamma_1 FV1_{it} + \gamma_2 FV23 + \gamma_3 PME\_LOW_{it} + \gamma_4 PME\_LOW_{it} \times HFV1_{it} + \gamma_5 PME\_LOW_{it} \times HFV23_{it} + \gamma_6 LDLLP_{it} + \gamma_7 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it} \quad (4)$$

Definitions of all variables are presented in the appendix A. *DLLP* is discretionary loan loss provisions from Eq. (1). I follow Badia et al. (2017) to define fair value measurement variables. *FV1* is level 1 fair value assets plus level 1 fair value liabilities, deflated by total assets. *FV23* is level 2 and 3 fair value assets plus level 2 and 3 fair value liabilities, deflated by total assets. If $\gamma_2$ is significantly different from zero, then H1a is rejected. That is, banks with larger proportions of level 2 and 3 fair value assets and liabilities are associated with discretionary loan loss provisions. If $\gamma_1$ is significantly different from $\gamma_2$, then H1b is rejected. The coefficient $\gamma_3$ tests earnings smoothing using *DLLP*. A positive value of $\gamma_3$ in the Eq. (3) and a negative value of $\gamma_3$ in the Eq. (4) imply that *DLLP* is larger (smaller) when the pre-managed earnings are higher (lower), which is consistent with earnings smoothing. Bratten et al. (2017) show that banks' earnings smoothing using discretionary loan loss provisions is less pronounced for banks with more fair value exposure. However, their study does not differentiate between level 1 fair value exposure and level 2 and 3 fair value exposure. To test the difference in earnings smoothing effect between banks with more level 1 fair value exposure and banks with more level 2 and 3 fair value exposure, I interact *PME_HIGH* (*PME_LOW*) with dummy variables, *HFV1* and *HFV23*, respectively. If $\gamma_4$ is significantly different from $\gamma_5$, then the earnings smoothing effect is different for banks with more level 1 fair value exposure from banks with more level 2 and 3 fair value exposure. To test the causality, I use a Granger-type lead-lag approach by including the lagged value of *DLLP, LDLLP,* as an additional independent variable, following prior studies (e.g., Ajinkya, Bhojraj, & Sengupta, 2005).

Then I test the association between fair value measurements and the likelihood to using discretionary loan loss provisions to beat prior year earnings benchmarks and analyst forecasts (H3a). Specifically, I estimate the Eq. (5):

$$EM\_UP_{it} = \theta_0 + \theta_1 FV1_{it} + \theta_2 FV23 + \theta_3 Log(ASSET)_{it} + Year\ dummies_{it} + \varepsilon_{it} \quad (5)$$

*EM_UP* is an indicator variable equal to one if change in return on assets ($\Delta ROA$) before *DLLP* is less than zero and change in return on assets after *DLLP* is slightly more than zero ($0 \leq \Delta ROA \leq 0.0012$),[7] and zero otherwise. *FV1, FV23* and *Log (ASSET)* are as previously defined. I expect $\theta_2$ to be significantly different from zero, implying that level 2 and 3 fair value assets and liabilities are associated with the likelihood of using discretionary loan loss provisions to manage earnings up to beat the prior year earnings targets. I replace *EM_UP* with *EM_DN* to examine whether there is an association between fair value measurements and downward earnings management using discretionary loan loss provisions. *EM_DN* is an indicator variable equal to one if change in return on assets before *DLLP* is $> 0.0012$ and change in return on assets after *DLLP* is slightly more than zero ($0 \leq \Delta ROA \leq 0.0012$), and zero otherwise. Lastly, I replace *EM_UP* with *BEAT*, an indicator variable equal to one if the difference between the actual EPS from I/B/E/S and the analysts' EPS forecast is between 0 and 1 cent (slightly beat), and zero if the difference is between $-1$ cent and 0 (slightly miss). I expect that banks with more level 2 and 3 fair value assets and liabilities are associated with the likelihood of beating analysts' earnings forecasts.

To test H3b, I examine the association between fair value measurements and capital management by estimating the following equation:

$$T1CAP\_UP_{it} = \mu_0 + \mu_1 FV1_{it} + \mu_2 FV23 + \mu_3 Log(ASSET)_{it} + Year\ dummies_{it} + \varepsilon_{it} \quad (6)$$

*T1CAP_UP* is an indicator variable equal to one if the actual tier one capital ratio is higher than the capital ratio before discretionary loan loss provisions, and zero otherwise. I expect $\mu_2$ to be significantly different from zero, indicating that level 2 and 3 fair value assets and liabilities are associated with the likelihood of capital management.

### 4.4. Fair value measurements and the trade-off between DLLP and DRSGL

Bratten et al. (2017) provide evidence that the trade-off between

[6] The calculation of bin width is discussed in Section 5.1.

[7] Following Burgstahler and Dichev (1997), $\Delta ROA$ is calculated as net income at year t minus net income at year t-1, divided by total assets at year t-2. The small earnings increase is defined as twice the bin width. The calculation of bin width is discussed in Section 5.1.

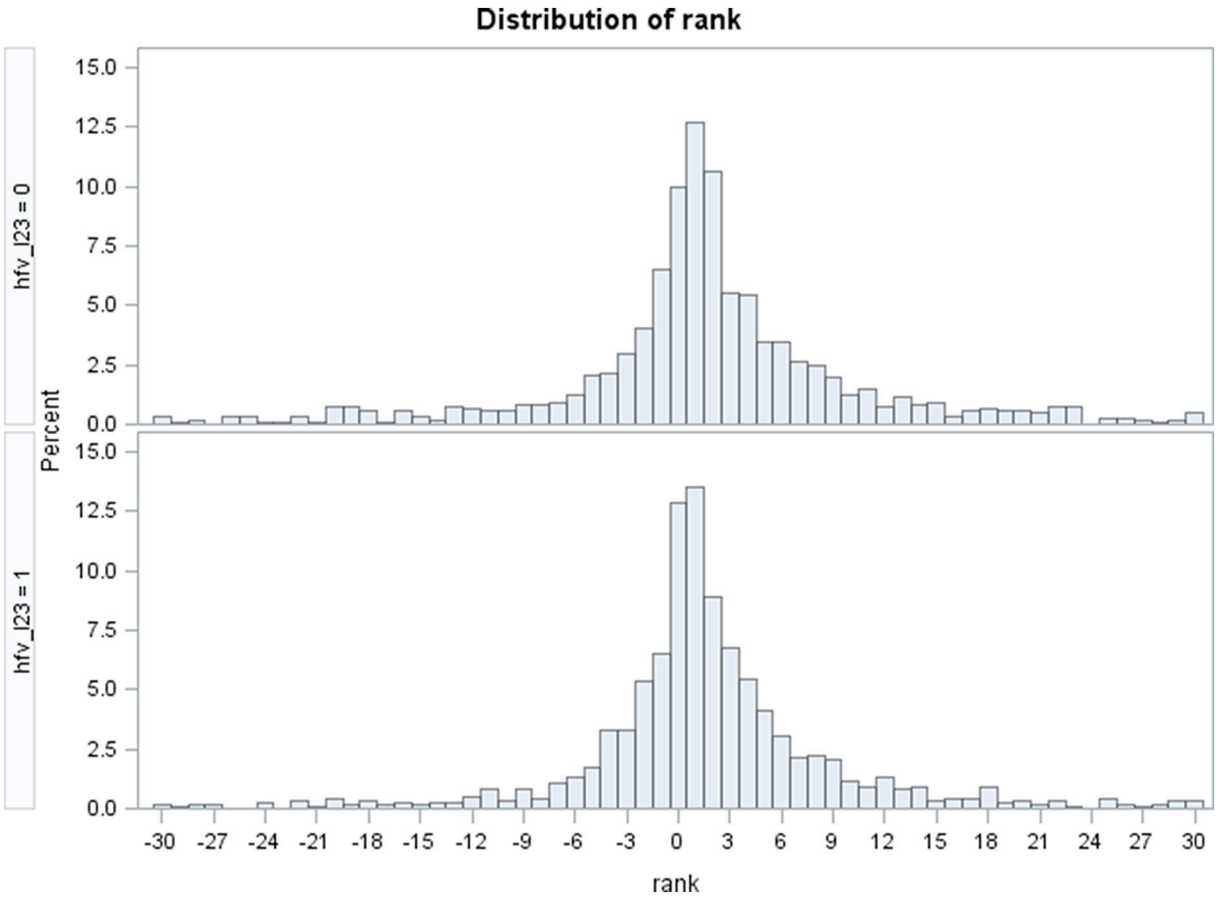


**Fig. 1.** Distributions of changes in return on assets.

Note: The figure compares the distribution of changes in return on assets between the banks with larger proportions of level 2 and level 3 fair value assets and liabilities (*HFV23* = 1) and the banks with smaller proportions of level 2 and level 3 fair value assets and liabilities (*HFV23* = 0).

LLP-based and transaction-based earnings management is associated with banks' fair value exposure. To extend their findings, I examine whether this trade-off is associated with level 1 fair value exposure or level 2 and 3 fair value exposure using the following models:

$$\begin{aligned} DRSGL_{it} = {} & \lambda_0 + \lambda_1 FV1_{it} + \lambda_2 FV23_{it} + \lambda_3 PME\_HIGH_{it} \\ & + \lambda_4 PME\_HIGH_{it} \times HFV1_{it} + \lambda_5 PME\_HIGH_{it} \times HFV23_{it} \\ & + \lambda_6 DLLP_{it} + \lambda_7 DLLP_{it} \times HFV1_{it} + \lambda_8 DLLP_{it} \times HFV23_{it} \\ & + \lambda_9 LDRSGL_{it} + \lambda_{10} Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it} \end{aligned} \quad (7)$$

$$\begin{aligned} DRSGL_{it} = {} & \lambda_0 + \lambda_1 FV1_{it} + \lambda_2 FV23_{it} + \lambda_3 PME\_LOW_{it} \\ & + \lambda_4 PME\_LOW_{it} \times HFV1_{it} + \lambda_5 PME\_LOW_{it} \times HFV23_{it} \\ & + \lambda_6 DLLP_{it} + \lambda_7 DLLP_{it} \times HFV1_{it} + \lambda_8 DLLP_{it} \times HFV23_{it} \\ & + \lambda_9 LDRSGL_{it} + \lambda_{10} Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it} \end{aligned} \quad (8)$$

*DRSGL* is discretionary security gains and losses estimated from the Eq. (2). A positive coefficient on *DLLP* suggests the trade-off between discretionary loan loss provisions and discretionary security gains and losses. If the trade-off is associated with level 1 (level 2 and 3) fair value exposure, then $\lambda_7$ ($\lambda_8$) is expected to be significantly different from zero. I also control for bank size in models (3)–(8). In the end, all regression models are controlled for year fixed effects and all standard errors are adjusted for bank-level clustering.

## 5. Results

### 5.1. Earnings change distributions

Following Burgstahler and Dichev (1997) and Beatty et al. (2002), I examine the distribution of changes in return on assets for my sample. The bin width is calculated following the approach in Degeorge et al. (1999). They suggest "a bin width positively related to the variability of the data and negatively related to the number of observations" (Degeorge et al., 1999, p. 18). I calculate the bin width as $2M\ (n^{-1/3})$, where $M$ is the sample interquartile range of $\Delta ROA$ and $n$ is the sample size. The bin width in this study is 0.0006. Bin(0) indicates an earnings change ranges from 0 to 0.0006 and bin(−1) indicates an earnings change ranges from −0.0006 to 0. In the regressions, I use twice the bin width to indicate a small increase in return on assets ($0 \leq \Delta ROA \leq 0.0012$). Fig. 1 plots the distributions of changes in return on assets for a subsample of banks with smaller proportions of level 2 and 3 fair value assets and liabilities (the top panel) and a subsample of banks with larger proportions of level 2 and 3 fair value assets and liabilities (the bottom panel). The distribution of earnings changes for the subsample with smaller proportions of level 2 and level 3 fair value assets and liabilities is smoother around bin(0) than the subsample with larger proportions of level 2 and 3 fair value assets and liabilities. There is a discontinuity of the distribution of $\Delta ROA$ around zero for the high level 2 and 3 fair value sample, shown as unexpectedly high frequency of bank-years in bin(0) and unexpectedly low frequency of bank-years

**Table 2**
Descriptive statistics.

| Variable | N | Mean | Median | Std Dev | Q1 | Q3 |
|---|---|---|---|---|---|---|
| *LLP* | 2565 | 0.008 | 0.003 | 0.013 | 0.001 | 0.010 |
| *RSGL* | 2565 | 0.000 | 0.000 | 0.001 | 0.000 | 0.001 |
| *ASSETS ($mil)* | 2565 | 43,409 | 2541 | 232,312 | 1190 | 7694 |
| *Log(ASSET)* | 2565 | 15.135 | 14.748 | 1.615 | 13.990 | 15.856 |
| *ΔNPL* | 2565 | −0.001 | −0.001 | 0.016 | −0.006 | 0.003 |
| *LLR* | 2565 | 0.017 | 0.015 | 0.009 | 0.011 | 0.021 |
| *LOANR* | 2565 | 0.731 | 0.778 | 0.187 | 0.654 | 0.860 |
| *LOANC* | 2565 | 0.154 | 0.131 | 0.106 | 0.081 | 0.202 |
| *LOAND* | 2565 | 0.001 | 0.000 | 0.002 | 0.000 | 0.000 |
| *LOANA* | 2565 | 0.008 | 0.001 | 0.017 | 0.000 | 0.005 |
| *LOANI* | 2565 | 0.052 | 0.020 | 0.081 | 0.007 | 0.055 |
| *LOANO* | 2565 | 0.037 | 0.012 | 0.077 | 0.002 | 0.037 |
| *TSGL* | 2565 | 0.001 | 0.002 | 0.006 | 0.000 | 0.004 |
| *DLLP* | 2500 | 0.000 | 0.000 | 0.009 | −0.005 | 0.003 |
| *DRSGL* | 2500 | 0.000 | 0.000 | 0.001 | 0.000 | 0.000 |
| *EM_UP* | 2500 | 0.103 | 0.000 | 0.304 | 0.000 | 0.000 |
| *EM_DN* | 2500 | 0.068 | 0.000 | 0.251 | 0.000 | 0.000 |
| *T1CAP_UP* | 2500 | 0.533 | 1.000 | 0.499 | 0.000 | 1.000 |
| *FV1* | 2500 | 0.014 | 0.000 | 0.040 | 0.000 | 0.005 |
| *FV2* | 2500 | 0.196 | 0.171 | 0.156 | 0.111 | 0.245 |
| *FV3* | 2500 | 0.005 | 0.000 | 0.012 | 0.000 | 0.003 |
| *FV23* | 2500 | 0.204 | 0.175 | 0.171 | 0.114 | 0.250 |

Note: All continuous variables are winsorized at top and bottom 1%.

in bin(−1), but such discontinuity around zero is less apparent for the low level 2 and 3 fair value sample. I test the significance of kinks around bin(0) shown in the Fig. 1 for the two groups. I calculate the kink as the standardized difference in percentages of bank-years between bin(0) and bin(−1).[8] A larger number indicates a bigger kink. The difference in percentages of bank-years between bin(0) and bin (−1) is 3.19% for the subsample of banks with larger proportions of level 2 and level 3 fair value assets and liabilities. This is significantly higher than the difference in percentages (1.71%) for the subsample of banks with smaller proportions of level 2 and level 3 fair value assets and liabilities. In other words, the kink around bin(0) of the high level 2 and 3 fair value sample is significantly bigger than the kink for the low level 2 and 3 fair value sample at 10% level, suggesting that there is a larger proportion of bank-years reporting small earnings increases for the subsample of banks reporting larger proportions of level 2 and level 3 fair value assets and liabilities.

### 5.2. Univariate tests

Table 2 presents the descriptive statistics of variables used in the analyses. All continuous variables are winsorized at the top and bottom 1%. The sample used to estimate discretionary accounting choices has 2565 bank-years. The average loan loss provisions are 0.8% of the average total loans and the average realized gains and losses are about 0.04% of the total bank assets. Since the sample only includes public banks, the sample banks are large. The total assets of sample banks are 43,409 million dollars on average. The mean value of change in nonperforming loans is −0.1% of average total loans and the mean of loan loss reserve is 1.7% of total loans. In terms of loan composition, real estate loans and commercial loans account for 73% and 15% of the total loans respectively.

The final sample has 2500 bank-years. The mean values of discretionary loan loss provisions and discretionary security gains and losses are zero by construction. Approximately 10.3% of the sample banks use discretionary loan loss provisions to manage earnings up to beat prior year earnings targets. Approximately 53.3% of the sample use discretionary loan loss provisions to inflate tier one capital ratios. Turning to fair value measurements, level 1 fair value assets and liabilities are about 1.4% of total assets on average. Level 2 fair value assets and liabilities account for the largest component of the total fair value assets and liabilities. Banks report very small amounts of level 3 fair value assets and liabilities. Level 2 and 3 fair value assets and liabilities are about 19.6% and 0.5% of total assets on average. These statistics are consistent with prior studies on fair value measurements (e.g. Song et al., 2010).

Table 3 presents the Pearson correlation coefficients among the variables used in regressions. *DLLP* and *DRSGL* are positively correlated. *FV1* is not correlated with either *DLLP* or *DRSGL*. *FV23* is negatively correlated with *DLLP* and positively correlated with *DRSGL*. This indicates that only level 2 and 3 fair value assets and liabilities are associated with banks' discretionary loan loss provisions. *FV23* is also positively correlated with the likelihood that banks manage tier one capital ratios upward using discretionary loan loss provisions. *FV23* is positively correlated with *EM_UP*, as expected, but the coefficient is insignificant. I turn to multivariate tests to further explore the association between fair value measurements and banks' discretionary accounting choices.

### 5.3. Multivariate tests

#### 5.3.1. Estimation of banks' discretionary accounting choices

The estimation results of discretionary loan loss provisions and discretionary security gains and losses are presented in Table 4. The second column presents the estimation results of discretionary loan loss provisions. The model has an adjusted R-square of 48.7%. Loan loss provisions can be predicted by factors such as bank size, change in nonperforming loans, loan loss reserve at the beginning of the year, and different types of loans. The coefficients on *ΔNPL* and *LLR* are 0.177 and 0.519 ($p < 0.001$), suggesting that banks which increase nonperforming loans during the year and have a larger loan loss reserve at the beginning of the year report higher loan loss provisions. Loan loss provisions are also significantly associated with bank size and different types of loans, except for loans to depository institutions. The third column presents the estimation results of discretionary security gains and losses. The model has an adjusted R-square of 15.3%. The coefficient of total security gains and losses is positive and significant at 1% level. Overall, the estimated results of *DLLP* are consistent with the discretionary loan loss provisions model in Beatty et al. (2002) except for *LOANR, LOANC, LOANI* and *LOANO*.[9] The estimation results of *DRSGL* are consistent with discretionary security gains and losses models in prior research (e.g., Beatty et al., 2002; Beatty & Harris, 1999).

#### 5.3.2. The association between fair value measurements and banks' discretionary loan loss provisions

Table 5 reports the regression results of discretionary loan loss provisions on fair value measurements. In all the three models, *FV23* is negatively and significantly associated with discretionary loan loss provisions controlling bank size (*Log(ASSET)*) and lag-year discretionary loan loss provisions (*LDLLP*), which rejects H1a. In the model 1, the coefficient on *FV23* is −0.005, implying that 1% increase in the

[8] I calculate this difference for each two adjacent bins. The significance of a kink around zero is calculated as the difference in percentages of bank-years between bin(0) and bin(−1) divided by the standard deviation of the differences.

[9] The estimated coefficients on *LOANR, LOANC, LOANI* and *LOANO* are inconsistent with Beatty et al. (2002). One possible reason could be the sample period of this study is after the financial crisis, which is a time period with tightened bank lending. In addition, the sample of this study includes only public banks while the sample in Beatty et al. (2002) includes both public and private banks.

**Table 3**
Correlations.

| | *DLLP* | *FV1* | *FV23* | *PME_HIGH* | *PME_LOW* | *EM_UP* | *EM_DN* | *T1CAP_UP* | *DRSGL* |
|---|---|---|---|---|---|---|---|---|---|
| *FV1* | −0.016 | | | | | | | | |
| | (0.430) | | | | | | | | |
| *FV23* | −0.116*** | 0.230*** | | | | | | | |
| | (< 0.001) | (< 0.001) | | | | | | | |
| *PME_HIGH* | 0.006 | 0.207*** | 0.154*** | | | | | | |
| | (0.758) | (< 0.001) | (< 0.001) | | | | | | |
| *PME_LOW* | 0.104*** | −0.054*** | −0.068*** | −0.248*** | | | | | |
| | (< 0.001) | (0.007) | (0.001) | (< 0.001) | | | | | |
| *EM_UP* | −0.175*** | −0.038* | 0.032 | −0.038* | −0.047** | | | | |
| | (< 0.001) | (0.055) | (0.115) | (0.059) | (0.019) | | | | |
| *EM_DN* | 0.105*** | −0.017 | −0.048** | 0.021 | −0.082*** | −0.091*** | | | |
| | (< 0.001) | (0.402) | (0.017) | (0.294) | (< 0.001) | (< 0.001) | | | |
| *T1CAP_UP* | −0.634*** | −0.021 | 0.073*** | −0.060*** | 0.014 | 0.318*** | −0.288*** | | |
| | (< 0.001) | (0.283) | (< 0.001) | (0.003) | (0.499) | (< 0.001) | (< 0.001) | | |
| *DRSGL* | 0.124*** | 0.030 | 0.097*** | −0.036* | 0.116*** | −0.055*** | 0.033* | −0.118*** | |
| | (< 0.001) | (0.132) | (< 0.001) | (0.073) | (< 0.001) | (0.006) | (0.095) | (< 0.001) | |
| *Log(ASSET)* | −0.006 | 0.256*** | 0.306*** | 0.683*** | −0.214*** | −0.025 | −0.014 | −0.039* | 0.002 |
| | (0.756) | (< 0.001) | (< 0.001) | (< 0.001) | (< 0.001) | (0.203) | (0.476) | (0.052) | (0.930) |

Note: All continuous variables are winsorized at top and bottom 1%. P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

**Table 4**
Estimation of discretionary accounting choices using Beatty et al. (2002) approach.

| Variables | *LLP* | *RSGL* |
|---|---|---|
| Intercept | 0.000 | 0.001*** |
| | (0.955) | (0.000) |
| *Log(ASSET)* | 0.000* | 0.000*** |
| | (0.055) | (0.000) |
| *ΔNPL* | 0.177*** | |
| | (0.000) | |
| *LLR* | 0.519*** | |
| | (0.000) | |
| *LOANR* | −0.007** | |
| | (0.022) | |
| *LOANC* | −0.010*** | |
| | (0.004) | |
| *LOAND* | −0.013 | |
| | (0.877) | |
| *LOANA* | −0.025** | |
| | (0.027) | |
| *LOANI* | −0.009** | |
| | (0.025) | |
| *LOANO* | −0.011*** | |
| | (0.008) | |
| *TSGL* | | 0.072*** |
| | | (0.000) |
| N | 2565 | 2565 |
| Adj. R-Square | 0.487 | 0.153 |
| Year fixed effects | Yes | Yes |

$$LLP_{it} = \alpha_0 + \alpha_1 Log(ASSET)_{it} + \alpha_2 \Delta NPL_{it} + \alpha_3 LLR_{it} + \alpha_4 LOANR_{it} + \alpha_5 LOANC_{it} + \alpha_6 LOAND_{it} + \alpha_7 LOANA_{it} + \alpha_8 LOANI_{it} + \alpha_9 LOANO_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

$$RSGL_{it} = \beta_0 + \beta_1 Log(ASSET)_{it} + \beta_2 TSGL_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

Note: P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

percentage of level 2 and 3 fair value assets and liabilities is associated with about $0.81 million decrease in discretionary loan loss provisions on average.[10] Because discretionary loan loss provisions negatively affect earnings, negative coefficients on *FV23* imply that banks with more level 2 and 3 fair value assets and liabilities tend to report less discretionary loan loss provisions (*DLLP*) to inflate earnings. There is no significant association between *FV1* and *DLLP*. F-tests show that the coefficients on *FV1* are significantly different from the coefficients on *FV23* in all the three models, which rejects H1b.

Models 2 and 3 also test the association between fair value measurements and earnings smoothing (H2). In model 2, the coefficient on *PME_HIGH* is positive and significant, which is consistent with banks with higher pre-managed earnings report more *DLLP* to manage earnings downward. The coefficients on *PME_HIGH* × *HFV1* and *PME_HIGH* × *HFV23* are negative and significant only when I use one-tailed tests (*p*-values are 0.057 and 0.095 respectively). I do not find significantly different coefficients between *PME_HIGH* × *HFV1* and *PME_HIGH* × *HFV23*. These results are consistent with Bratten et al. (2017) that banks with higher pre-managed earnings use *DLLP* to manage earnings downward.

In model 3, the coefficient on *PME_LOW* is negative, as predicted, but insignificant. The coefficient on *PME_LOW* × *HFV1* is positive, as expected, but insignificant. However, the coefficient on *PME_LOW* × *HFV23* is negative and significant at 10% level, which suggests that banks holding larger proportions of level 2 and level 3 fair value assets and liabilities report smaller *DLLP* to inflate earnings when the pre-managed earnings are lower. Further, the F-test shows that the coefficient on *PME_LOW* × *HFV1* is significantly different from that on *PME_LOW* × *HFV23*. These results provide evidence beyond Bratten et al. (2017) that only banks with lower pre-managed earnings and larger level 2 and level 3 fair value assets and liabilities are associated with upward earnings management using *DLLP*. Overall, Table 5 shows that banks with larger proportions of level 2 and level 3 fair value assets and liabilities are negatively associated with *DLLP*. Further, banks with lower pre-managed earnings are associated with more *DLLP* to inflate earnings only when banks hold larger proportions of level 2 and level 3 fair value assets and liabilities. These results reject H1 and H2.

Table 6 presents the association between fair value measurements and the likelihood of beating prior year earnings targets and analyst forecasts. *EM_UP* captures bank-years which have earnings decreases before *DLLP* and report small earnings increases after *DLLP*. In other words, *EM_UP* measures the probability that banks use *DLLP* to beat

[10] The average loan size over a year is $16,266 million in the sample. When the percentage of level 2 and 3 fair value assets and liabilities increases by 1%, discretionary loan loss provisions decrease by $16,266 million × 0.005% = $0.81 million.

**Table 5**
Association between fair value measurements and banks discretionary loan loss provisions.

| Variables | *DLLP* | *DLLP* | *DLLP* |
|---|---|---|---|
| | (1) | (2) | (3) |
| Intercept | 0.002 | 0.002 | 0.003* |
| | (0.294) | (0.208) | (0.092) |
| *FV1* | 0.005 | 0.004 | 0.004 |
| | (0.140) | (0.301) | (0.209) |
| *FV23* | −0.005*** | −0.004*** | −0.003** |
| | (0.002) | (0.010) | (0.021) |
| *PME_HIGH* | | 0.004*** | |
| | | (< 0.001) | |
| *PME_HIGH × HFV1* | | −0.001 | |
| | | (0.114) | |
| *PME_HIGH × HFV23* | | −0.001 | |
| | | (0.189) | |
| *PME_LOW* | | | −0.000 |
| | | | (0.785) |
| *PME_LOW × HFV1* | | | 0.000 |
| | | | (0.981) |
| *PME_LOW × HFV23* | | | −0.002* |
| | | | (0.059) |
| *LDLLP* | 0.261*** | 0.267*** | 0.269*** |
| | (< 0.001) | (< 0.001) | (< 0.001) |
| *Log(ASSET)* | 0.000 | 0.000 | 0.000 |
| | (0.571) | (0.237) | (0.243) |
| R-square | 0.102 | 0.125 | 0.111 |
| Year fixed effects | Yes | Yes | Yes |
| Firm clustering | Yes | Yes | Yes |
| N | 2001 | 2001 | 2001 |
| Coeffcient Comparsions | F-value | F-value | F-value |
| Test of *FV1 = FV23* | 6.79*** | 3.84* | 4.51** |
| Test of *PME_HIGH × HFV1 = PME_HIGH × HFV23* | | 0.07 | |
| Test of *PME_LOW × HFV1 = PME_LOW × HFV23* | | | 2.80* |

$$DLLP_{it} = \gamma_0 + \gamma_1 FV1_{it} + \gamma_2 FV23 + \gamma_3 LDLLP_{it} + \gamma_4 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

$$DLLP_{it} = \gamma_0 + \gamma_1 FV1_{it} + \gamma_2 FV23 + \gamma_3 PME\_HIGH_{it} + \gamma_4 PME\_HIGH_{it} \times HFV1_{it} + \gamma_5 PME\_HIGH_{it} \times HFV23_{it} + \gamma_6 LDLLP_{it} + \gamma_7 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

$$DLLP_{it} = \gamma_0 + \gamma_1 FV1_{it} + \gamma_2 FV23 + \gamma_3 PME\_LOW_{it} + \gamma_4 PME\_LOW_{it} \times HFV1_{it} + \gamma_5 PME\_LOW_{it} \times HFV23_{it} + \gamma_6 LDLLP_{it} + \gamma_7 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

Note: Standard errors are adjusted for firm-level clustering. P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

**Table 6**
The association between fair value measurements and earnings management.

| Variables | *EM_UP* | *EM_DN* | *BEAT* |
|---|---|---|---|
| Intercept | −0.419 | −1.260 | 2.405 |
| | (0.604) | (0.164) | (0.289) |
| *FV1* | −4.181 | −0.135 | −2.552 |
| | (0.107) | (0.948) | (0.601) |
| *FV23* | 0.917* | −1.906*** | 7.347*** |
| | (0.055) | (0.005) | (0.005) |
| *Log(ASSET)* | −0.085 | −0.046 | −0.059 |
| | (0.107) | (0.457) | (0.682) |
| Pseudo R-square | 0.022 | 0.088 | 0.126 |
| D.V. = 1 | 258 | 169 | 229 |
| D.V. = 0 | 2242 | 2331 | 20 |
| Year fixed effects | Yes | Yes | Yes |
| Firm clustering | Yes | Yes | Yes |
| N | 2500 | 2500 | 249 |
| Coeffcient Comparsions | F-value | F-value | F-value |
| Test of *FV1 = FV23* | 3.30* | 0.41 | 3.46* |

$$EM_{it} = \theta_0 + \theta_1 FV1_{it} + \theta_2 FV23 + \theta_3 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

$$BEAT_{it} = \theta_0 + \theta_1 FV1_{it} + \theta_2 FV23 + \theta_3 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

Note: Standard errors are adjusted for firm-level clustering. P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

**Table 7**
The association between fair value measurements and capital management.

| Variables | *T1CAP_UP* |
|---|---|
| Intercept | 0.715 |
| | (0.248) |
| *FV1* | −1.887 |
| | (0.140) |
| *FV23* | 0.976*** |
| | (0.004) |
| *Log(ASSET)* | −0.057 |
| | (0.161) |
| R-Square | 0.042 |
| D.V. = 1 | 1332 |
| D.V. = 0 | 1168 |
| Year fixed effects | Yes |
| Firm clustering | Yes |
| N | 2500 |
| Coefficient Comparison | F-value |
| Test of *FV1 = FV23* | 4.87** |

$$T1CAP\_UP_{it} = \mu_0 + \mu_1 FV1_{it} + \mu_2 FV23 + \mu_3 Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

Note: Standard errors are adjusted for firm-level clustering. P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

prior year earnings targets and otherwise would miss prior year earnings targets. The results show that *FV23* is positively and significantly associated with *EM_UP*, suggesting that banks with more level 2 and level 3 fair value assets and liabilities are more likely to manage earnings upward to beat prior year earnings targets. *EM_DN* measures the probability that banks manage earnings downward using *DLLP*. *FV23* is negatively and significantly associated with downward earnings management using *DLLP*, which confirms the results in Table 5 that banks with larger proportions of fair value assets and liabilities are associated with less downward earnings management using *DLLP*. In the last column, *BEAT* identifies bank-years which beat analysts' earnings forecasts. The coefficient on *FV23* is positive and significant at 1% level, suggesting that banks with larger proportions of level 2 and level 3 fair value assets and liabilities are associated with the likelihood of beating analyst earnings forecasts. In both column 1 and column 3, the F-tests show the coefficients on *FV1* and *FV23* are significantly different, implying the effect of level 2 and level 3 fair values on earnings management to beat earnings targets is different from the effect of level 1 fair values.

Table 7 presents the association between fair value measurements and capital management using *DLLP*. *T1CAP_UP* measures the probability that banks inflate tier one capital ratios using discretionary loan

**Table 8**
Trade-off between discretionary loan loss provision and discretionary realized gains and losses.

| Variables | *DRSGL* | *DRSGL* |
|---|---|---|
| | (1) | (2) |
| Intercept | 0.0003 | 0.0002 |
| | (0.125) | (0.439) |
| *FV1* | 0.0014 | 0.0012 |
| | (0.188) | (0.256) |
| *FV23* | 0.0004*** | 0.0004*** |
| | (0.004) | (0.015) |
| *PME_HIGH* | −0.0002*** | |
| | (< 0.001) | |
| *PME_HIGH × HFV1* | 0.0001 | |
| | (0.400) | |
| *PME_HIGH × HFV23* | 0.0000 | |
| | (0.788) | |
| *PME_LOW* | | 0.0001 |
| | | (0.192) |
| *PME_LOW × HFV1* | | 0.0002 |
| | | (0.118) |
| *PME_LOW × HFV23* | | 0.0002* |
| | | (0.089) |
| *DLLP* | 0.0093* | 0.0076 |
| | (0.094) | (0.154) |
| *DLLP × HFV1* | 0.0034 | 0.0037 |
| | (0.645) | (0.618) |
| *DLLP × HFV23* | 0.0090 | 0.0110* |
| | (0.160) | (0.092) |
| *LDRSGL* | 0.2457*** | 0.2380*** |
| | (< 0.001) | (< 0.001) |
| *Log(ASSET)* | 0.000 | 0.000 |
| | (0.062) | (0.129) |
| R-square | 0.126 | 0.133 |
| Year fixed effects | Yes | Yes |
| Firm clustering | Yes | Yes |
| N | 2001 | 2001 |

$$DRSGL_{it} = \lambda_0 + \lambda_1 FV1_{it} + \lambda_2 FV23_{it} + \lambda_3 PME\_HIGH_{it} + \lambda_4 PME\_HIGH_{it} \times HFV1_{it} + \lambda_5 PME\_HIGH_{it} \times HFV23_{it} + \lambda_6 DLLP_{it} + \lambda_7 DLLP_{it} \times HFV1_{it} + \lambda_8 DLLP_{it} \times HFV23_{it} + \lambda_9 LDRSGL_{it} + \lambda_{10} Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

$$DRSGL_{it} = \lambda_0 + \lambda_1 FV1_{it} + \lambda_2 FV23_{it} + \lambda_3 PME\_LOW_{it} + \lambda_4 PME\_LOW_{it} \times HFV1_{it} + \lambda_5 PME\_LOW_{it} \times HFV23_{it} + \lambda_6 DLLP_{it} + \lambda_7 DLLP_{it} \times HFV1_{it} + \lambda_8 DLLP_{it} \times HFV23_{it} + \lambda_9 LDRSGL_{it} + \lambda_{10} Log(ASSET)_{it} + Year\ Dummies_{it} + \varepsilon_{it}$$

Note: Standard errors are adjusted for firm-level clustering. P-values are reported in the parentheses. *, **, *** indicate significance at 10%, 5%, 1% level, (two-tailed), respectively.

loss provisions. I find that *FV23* is positively and significantly associated with *T1CAP_UP*, implying that banks with more level 2 and level 3 fair value assets and liabilities are more likely to manage tier one capital ratios up using discretionary loan loss provisions. However, *FV1* is insignificantly associated with *T1CAP_UP*. F-test shows that *FV1* and *FV23* are significantly different regarding their associations with the likelihood of capital management using *DLLP*. Taken together, the results in Table 6 and Table 7 reject H3.

Table 8 presents the results of the trade-off between discretionary loan loss provisions (*DLLP*) and discretionary realized gains and losses (*DRSGL*), as well as the association between the trade-off and fair value measurements. The coefficients on *FV23* are positive and significant while the coefficients on *FV1* are not, suggesting that only level 2 and level 3 fair value assets and liabilities are positively associated with discretionary realized gains and losses (*DRSGL*). Coefficients on *DLLP* test the trade-off between *DLLP* and *DRSGL*. Coefficients on *DLLP* × *HFV1* and *DLLP* × *HFV23* test the trade-off between *DLLP* and *DRSGL* for banks with more level 1 fair value exposure and for banks with more level 2 and level 3 fair value exposure, respectively. The coefficient on *DLLP* × *HFV23* is positive and marginal ($p = 0.092$) significant in model 2 and it is marginal significant in model 1 only when I use one-tailed test ($p = 0.08$). However, the coefficients on *DLLP* × *HFV1* are positive but insignificant in both models. Table 8 provides weak evidence that the association between the trade-off between *DLLP* and *DRSGL* and fair value exposure might be driven by level 2 and level 3 fair value assets and liabilities.

In additional analyses, I repeat the regressions in Table 5 using a restricted sample consisting of banks which have information throughout the whole sample period. There are 189 banks which have information during all years from 2010 to 2016. The un-tabulated results show that controlling for bank size and lag-year *DLLP*, *FV23* is negatively associated with *DLLP* and the coefficient is significant at 1% level in all the three models. *FV1* is insignificantly associated with *DLLP*. *PME_HIGH* is significantly positive ($p < 0.01$) and *PME_LOW* is significantly negative ($p < 0.01$), which is consistent with earnings smoothing using *DLLP*. F-tests show that the association between *DLLP* and *FV1* is significantly different from the association between *DLLP* and *FV23* ($p$-value $< 0.05$). The association between *DLLP* and upward earnings management is significantly different (p-value = 0.097) between banks with more level 1 fair value exposure and banks with more level 2 and level 3 fair value exposure. Taken together, results using the restricted sample are consistent with the results using the full sample.

## 6. Conclusions

This study examines the association between fair value measurements and banks' discretionary loan loss provisions using regulatory financial data from 2009 to 2016 for a sample of U.S. public bank holding companies. I find that banks recognizing larger proportions of assets and liabilities measured by level 2 and level 3 fair values are associated with lower discretionary loan loss provisions. However, there is no significant association between level 1 fair value assets and liabilities and discretionary loan loss provisions. When pre-managed earnings are lower, banks with more level 2 and 3 fair value assets and liabilities are associated with lower discretionary loan loss provisions. Further analyses show that banks reporting larger proportions of level 2 and level 3 fair value assets and liabilities are more likely to use discretionary accounting loan loss provisions to meet prior year earnings targets, beat analyst forecasts and preserve tier one capital ratios. Overall, the results are consistent with fair value assets and liabilities based on level 2 and level 3 inputs are less transparent and are subject to more discretion.

## Data availability

Data are available from public sources identified in the study.

## Appendix A. Definition of Variables

*Dependent variables*

*DLLP*: discretionary loan loss provisions estimated from eq. (1).

*DRSGL*: discretionary realized security gains and losses estimated from eq. (2).

*EM_UP*: an indicator variable equal to 1 if change in return on assets before *DLLP* is less than zero and change in return on assets after *DLLP* is slightly more than zero ([0, 0.0012]), and 0 otherwise.

*EM_DN*: an indicator variable equal to 1 if change in return on assets before *DLLP* is > 0.0012 and change in return on assets after *DLLP* is slightly more than zero ([0, 0.0012]), and 0 otherwise.

*T1CAP_UP*: an indicator variable equal to 1 if the actual tier one capital ratio is higher than the tier one capital ratio before *DLLP*, and 0 otherwise.

*BEAT*: an indicator variable equal to one if the difference between the actual EPS from I/B/E/S and the consensus analysts' EPS forecast is between 0 and 1 cent (slightly beat), and zero if the difference is between −1 cent and 0 (slightly miss).

*Fair value variables and other independent variables*

*FV1*: the sum of level 1 fair value assets and level 1 fair value liabilities divided by the total assets at the beginning of the year.

*FV2*: the sum of level 2 fair value assets and level 2 fair value liabilities divided by the total assets at the beginning of the year.

*FV3*: the sum of level 3 fair value assets and level 3 fair value liabilities divided by the total assets at the beginning of the year.

*FV23*: *FV2* plus *FV3*.

*HFV1*: an indicator variable equal to 1 if *FV1* is more than the sample median, and 0 otherwise.

*HFV23*: an indicator variable equal to 1 if *FV23* is more than the sample median, and 0 otherwise.

*PME_HIGH*: an indicator variable equal to 1 if return on assets before *DLLP* and *DRSGL* are in the top quintile of sample observations in each year, and 0 otherwise.

*PME_LOW*: an indicator variable equal to 1 if return on assets before *DLLP* and *DRSGL* are in the bottom quintile of sample observations in each year, and 0 otherwise.

*LDLLP*: lagged value of discretionary loan loss provisions.

*LDRSGL*: lagged value of discretionary security gains and losses.

*Variables used to estimate DLLP and DRSGL*

*Log (ASSET)*: natural log of total assets.

*ΔNPL*: change in nonperforming loans, divided by the average of beginning and ending total loans.

*LLP*: loan loss provisions divided by the average of beginning and ending total loans.

*LLR*: loan loss reserve at the beginning of the year divided by total loans.

*LOANR*: real estate loans divided by total loans.

*LOANC*: commercial loans divided by total loans.

*LOAND*: loans to depository institutions divided by total loans.

*LOANA*: loans to agricultural productions divided by total loans.

*LOANI*: loans to households and individuals divided by total loans.

*LOANO*: Other loans, including loans to foreign governments, divided by total loans.

*RSGL*: realized security gains and losses divided by total assets at the beginning of the year.

*TSGL*: total reported unrealized securities gains, computed as the sum of recognized securities gains plus the ending fair market value of securities less their cost, divided by total assets at the beginning of the year.

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