Fair Value Measurement Discretion and Opportunistic Avoidance of Impairment Loss Recognition

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Prior studies find evidence that opportunistic reporting occurs in settings where fair value measurement is used. However, such research is unable to determine whether the source of the opportunistic reporting is the estimate of fair value itself. Using detailed insurer investment holdings information, we separate the use of fair value measurement discretion from the discretionary application of non-measurement-related recognition. Our evidence is inconsistent with the view that fair value measurement discretion plays a large role in opportunistic impairment loss avoidance. Instead, managers appear to avoid impairment losses on investment securities by opportunistically applying subjective criteria related to perceived loss persistence and their intent to continue holding loss securities.

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1.0 Introduction

The role of fair value measurement for financial instruments has been widely debated. While some argue that fair value measurement results in more timely recognition of relevant economic events, others are skeptical because of the perceived discretion inherent in fair value estimates. For example, Ramanna and Watts (2012) argue fair values are more subjective than historical cost-based measures used for accounts receivable, inventories and other accounts, and assert that the use of difficult-to-audit valuations for assets is "likely to compromise financial reporting's role as a management control system." Indeed, despite growing acceptability of valuation modeling techniques and independent pricing services, perceived lack of verifiability or reliability is the primary argument against the widespread use of fair value measurement for financial and other assets (Barker 2015; Kothari et al. 2010).

However, Liu (2017) provides evidence that corporate governance and internal controls over financial reporting produce reliable fair value estimates and provide fewer opportunities for opportunistically biased reporting. Relative to other estimates in the financial statements (e.g., contingencies, allowances for bad debts and returns), standard setters provide more detailed guidance governing the fair value estimation process for financial assets, including a mandatory hierarchy of acceptable inputs for valuation. The use of fair value estimates requires extensive contextual disclosures highlighting relevant assumptions and the sensitivity of measurements to changes in assumptions that are highly scrutinized by investors (Chung et al. 2018). These factors, combined with enhanced auditor scrutiny and the use of independent pricing services, may constrain opportunistic use of fair value measurement discretion, even when measurement uncertainty is high (i.e., the reasonable range of reported fair values is large).

Despite the prominent role of subjectivity in debates about broadening the use of fair value measurements, surprisingly little empirical research addresses the extent to which fair values are more subjective than other measurement bases, or the extent to which fair value subjectivity is used strategically to influence reported results.[1] Evaluating whether potential measurement subjectivity translates into opportunistic reporting is challenging. It requires establishing the existence of alternative acceptable measures for the same economic event or transaction, and then providing evidence that management uses measurement choice opportunistically. This is rarely possible in archival studies. Due to these challenges, extant evidence of opportunistic measurement is scarce and largely circumstantial. For example, a number of studies document results consistent with earnings management in settings where fair value measurement also is present (e.g., Dechow et al. 2010; Ramanna and Watts 2012). However, because selective gain or loss recognition in these settings results from measuring assets at cost, "cherry-picking" when and what to recognize at fair value through sale or impairment may play a larger role in earnings outcomes than fair value measurement discretion (Barth and Taylor 2010).

Our study contributes to the ongoing debate over fair value measurement for financial instruments, frequently characterized as a trade-off between relevance and reliability (Sloan 1999). Standard setters have taken the position that fair value is the most relevant measurement attribute for financial instruments and have proposed that all financial instruments be measured at fair value (FASB 2010). Consistent with relevance to equity holders, prior research documents a positive association between fair values of financial instruments and stock price levels and

[1] A recent study by Hanley et al. (2018) finds insurers are more likely to inflate Level 3 fair values when self-estimating than relying upon independent pricing services. However, Hanley et al. (2018) do not link the inflation of fair value levels to reporting outcomes, such as impairment loss avoidance.

changes (Landsman 2007). However, such associations reveal little about the reliability of fair values, which is a primary concern of fair value critics. In contrast, we collect multiple reporting outcomes for identical financial instruments, allowing us to quantify the extent of possible measurement discretion. Our evidence on the extent of potential fair value measurement discretion and its opportunistic use should be informative to those viewing reliability as a key constraint on the usefulness of fair value measurements.

We use security-specific holdings for which insurance companies report cost and periodic fair value measurements. Because managers face varying incentives to report higher or lower fair values for investments, and because sample firms receive annual audits, we treat the maximum and minimum of reported values across all holders of the identical security as an investment-specific "reasonable range" within which managers can exercise discretion over fair value measurement.[2] Moreover, because insurance companies are subject to costly regulatory intervention for making poor investment choices, our setting is one in which clear incentives exist to use discretion to avoid recognition of impairment losses.

To facilitate comparison with prior research, we first estimate a model in which the choice to recognize an impairment loss is expressed as a function of determinants, including incentives for loss avoidance (Ramanna and Watts 2012). Our setting allows us to reliably limit the sample to investments that are candidates for loss recognition. A finding that firms are less likely to recognize incurred losses when incentives for loss avoidance are high is consistent with firms using one or more forms of available discretion to avoid loss recognition.

[2] Net income is not affected by fair value measurement in our sample unless firms decide impairment losses must be recognized. Thus, managers may have incentives to overstate or understate reported fair values relative to their best estimate of value. For unimpaired securities, "conservative" valuations may reduce political costs, conceal proprietary return information, and place pressure on weaker competitors for which understated values make capital constraints binding.

To provide insight into what form of discretion is used opportunistically for loss avoidance, we identify two sets of investments for which opportunistic loss avoidance is feasible. The first is one in which fair value measurement discretion can be used to avoid loss recognition. The second is one in which other types of discretion can be used to avoid loss recognition, but fair value measurement discretion cannot. Identification of these samples is possible because accounting rules provide for loss recognition only when estimated fair value is less than cost. Thus, fair value measurement discretion is useful for loss avoidance only when unmanaged fair value is less than cost and the difference between fair value and cost is within a reasonable range of measurement discretion. We illustrate this relation in Figure 1. Given a reasonable range of fair value estimates for an investment, a firm can avoid loss recognition by choosing to report a reasonable fair value that is greater than the amortized cost only when cost falls within the reasonable range of fair values. If cost is less than the lowest reasonable estimate of fair value, there is no impairment. If cost is higher than the highest reasonable estimate of fair value, reporting constraints preclude using measurement discretion to avoid loss recognition. When loss avoidance using fair value measurement discretion is feasible, a finding that incentives for loss avoidance are associated with the propensity to report a fair value greater than cost is consistent with firms using fair value measurement discretion opportunistically to avoid loss recognition.

When fair value measurement discretion cannot be used to avoid loss recognition, accounting standards provide other forms of discretion that can be used to avoid loss recognition. These include managerial discretion in assessing the likelihood that the price of the financial instrument will increase above cost over the firm's intended holding period. In a sample in which reported fair value is less than cost, we assess the extent to which loss avoidance is achieved and is associated with incentives for earnings management. Because reporting a fair value less than

cost is inconsistent with using fair value measurement discretion to avoid loss avoidance, we attribute findings of opportunistic loss avoidance in this sample to non-fair value measurement discretion. However, in supplemental analyses, we also evaluate whether fair value measurement discretion is used to minimize the amount of loss recognized given the decision to recognize a loss. For this test, we assess whether impairment decisions are associated with valuation optimism, where optimism reflects firms' propensity to report fair values in the upper half of the investment's distribution of fair values.

Our results provide interesting insights. Consistent with Ramanna and Watts (2012), we find incentives for loss avoidance are negatively associated with impairment loss recognition, suggesting opportunistic loss avoidance. However, in contrast to their setting, we find potential fair value measurement discretion is positively associated with impairment loss recognition. That is, the wider the reasonable range of fair value estimates, the more likely are firms to recognize an impairment loss when an investment is a candidate for loss recognition. Further, we find no evidence that fair value measurement discretion is less positively associated with impairment loss recognition when incentives for management are high. These results are inconsistent with the conclusions of prior research that difficult-to-value investments are a source of opportunistic loss avoidance but are consistent with research suggesting increased scrutiny over uncertain measures constrains opportunism.

In tests designed to isolate fair value measurement discretion from non-fair value measurement discretion, we find the opportunity to use fair value measurement discretion to avoid impairment losses occurs infrequently—fair value measurement discretion could have influenced impairment loss recognition for only 0.6% of investments that are candidates for impairment loss recognition. Moreover, we find no evidence that incentives for earnings

management are associated with firms' propensity to report fair values in excess of cost in this sample. In contrast, in the sample in which fair value measurement discretion cannot be used to avoid loss recognition, we find incentives for loss avoidance are strongly associated with loss avoidance. Taken together, these results suggest fair value measurement discretion does not play a major role in impairment loss avoidance. Instead, discretion allowing firms to exclude unrealized losses from net income is a major source of opportunistic reporting.

With respect to optimistic reporting, we find no evidence that firms report optimistically for those securities for which they recognize impairment losses. Instead, loss-recognizing firms are more likely to report pessimistic values—those in the bottom half of reported values for that investment. This finding is consistent with valuations being subject to higher levels of opportunism-reducing scrutiny when losses are recognized in income. Further, we find no association between optimistic reporting and incentives for loss avoidance.

We conduct a battery of robustness checks. To validate our proxy for measurement discretion, we repeat our tests on the subsample of investments for which fair value hierarchy information is available. Results are consistent with our main findings: firms are more likely to recognize impairment losses when management classifies investments as Level 3. Similarly, firms are more likely to avoid loss recognition using non-fair value measurement discretion when management classifies investments as Level 3. We find no association between Level 3 investments and firms' propensity to report fair value greater than cost when cost is in the reasonable range of reported fair values. To validate our results are not sensitive to our proxy for earnings management incentives, we use alternative measures and find consistent results. Finally, to validate our results are not sensitive to CUSIP-level disaggregation, we repeat our analyses at the firm level and find consistent results.

Overall, we provide evidence in agreement with Barth and Taylor's (2010) conclusion that, given sufficient motivation and opportunity, firms will use allowable discretion to manage earnings when incentives for doing so are sufficiently high. However, in contrast to conclusions of prior literature, we find no association between fair value measurement discretion and loss avoidance, loss minimization, or opportunistic optimism. These findings are inconsistent with the conjecture that fair value measurements for financial instruments are inherently unreliable. Our findings are subject to several caveats. First, because our tests are limited to impairments of financial instruments, our results may not generalize to impairments of tangible and intangible assets subject to alternative accounting guidance and measurement challenges. Similarly, our focus on insurance companies and their incentives for earnings management may not generalize to firms in other industries subject to different reporting pressures. However, we note that insurance companies are significant holders of financial instruments, and that financial instruments are a significant asset class for which fair value measurement is controversial.

The rest of this paper proceeds as follows. Section 2 provides background for loss recognition in the context of investments and describes prior research in this area. Section 3 presents development of our hypotheses. Section 4 describes our data collection procedures and sample selection. Section 5 presents the results of our primary tests and supplemental analyses, and Section 6 concludes.

2. Background and prior research

2.1 Accounting for impairments

Under U.S. GAAP, firms must classify as available for sale (AFS) or held to maturity (HTM) securities they do not intend to use for trading activities.[3] For non-trading securities, holding gains and losses generally are recognized in net income only upon derecognition, typically associated with sales, conversions or redemptions. One exception to the nonrecognition of unrealized gains and losses in net income for these securities is the requirement to recognize impairment losses when there is a persistent decline in fair value below the security's carrying value. To the extent impairment losses are attributable to credit quality, they are recognized in net income; otherwise, impairment losses are recognized in other comprehensive income (ASC 320-10-35).[4] For financial assets, recognized impairment losses are called other-than-temporary-impairments (OTTIs).

A security is considered impaired when its fair value is less than its carrying value; however, impairments are required to be recognized in income only when the loss is considered other-than-temporary. Thus, at least two forms of discretion can be used to avoid loss recognition. First, discretion over fair value measurement can be used to avoid loss recognition if it provides management the option to report a fair value higher than cost. We refer to this as fair value measurement discretion. Second, the standard provides management the discretion to classify a particular impairment as OTTI. We refer to the application of subjective OTTI criteria as non-fair value measurement discretion. Subjective considerations related to non-fair value measurement discretion include determination of the holder's intent and ability to continue to

[3] Statutory accounting for the insurance industry does not adopt the AFS, HTM, or trading classifications for debt securities. Instead, the type of insurer (e.g., life, P&C) and the NAIC designation of the security, which is intended to reflect credit quality, drives the requirement to report at amortized cost or the lower of amortized cost or fair value (see Statements of Statutory Accounting Principles 26 and 43R). All insurers and security types, however, are subject to the same GAAP-derived rules for impairment.

[4] The bifurcation rule was introduced by FSPs 115-2 and 124-2. Prior to 2009, firms were required to recognize any impairment losses in net income in an amount equal to the difference between carrying value and fair value. Because the bifurcation rule may have reduced incentives to avoid loss recognition, we include year fixed effects in our tests.

hold the investment, and estimation of the likelihood prices will recover sufficiently to allow the holder to recover its amortized cost. ASC 320-10-35 describes factors that should be considered in determining whether the carrying value of the security is likely to be recovered.[5] These include observable issuer characteristics such as default status, credit ratings, or other adverse conditions related to the security or the issuer.

Managers have incentives to avoid OTTI recognition. Market participants negatively price recognized OTTI losses, even when the associated incurred but unrealized losses were previously reported in other comprehensive income (Badertscher et al. 2014). These results suggest negative consequences to OTTI recognition beyond economic information related to declines in investment value. Financial statement users may respond disproportionately negatively to OTTI recognition for several reasons. First, Badertscher et al. (2014) find impairment losses are serially correlated so that OTTI recognition on one investment may be perceived as an indicator of more widespread problems with the portfolio. Second, recognition of impairment losses can erode earnings and retained earnings, which are important components of insurance company regulatory capital (Ellul et al. 2014; Hanley et al. 2018). Finally, impairment loss recognition is relatively rare and may be perceived as a signal of management's inability to respond to market conditions or poor decisions related to investment acquisition.

2.2 Literature review

Although the reliability of fair value measurements is widely discussed in the literature, we are aware of few studies directly measuring fair value measurement discretion or the extent to

[5] In 2016, the FASB introduced two new accounting standards that significantly affect how impairments should be recognized in the financial statements. For example, under the new guidance, entities recognize an allowance for losses on debt securities as a contra-asset to cost basis when a decline in fair value below cost is considered credit-related. Subsequently, entities are able to recognize improvements in credit quality in earnings immediately by reversal of the allowance. Importantly, none of the new guidance is effective over our sample period. However, we note that our findings are relevant to the new accounting regime as estimation of the allowance involves similar discretionary factors.

which discretion in fair value measurement is used opportunistically. We attribute this to a lack of data necessary to support well-controlled analyses. While established methods exist for estimating abnormal accruals to isolate potential discretion over particular accounts (e.g., insurance claims reserves, the allowance for loan and lease losses), these methods cannot be applied to fair value estimates because significant heterogeneity within accounts recognized at fair value may invalidate a calculation of normal and abnormal fair value at the account-level across companies. Thus, evidence associating fair value measurement discretion with opportunism is largely circumstantial.

For example, Dechow et al. (2010) find a negative relation between recognized securitization gains and pre-securitization income and conclude managers use discretion over valuation inputs to smooth earnings. In their discussion of Dechow et al. (2010), Barth and Taylor (2010) identify at least three sources of potential discretion related to the recognition of securitization gains: 1) discretion over whether to securitize assets; 2) discretion over which assets to securitize; and 3) discretion over fair value estimates that determine the amount of the gain. Barth and Taylor (2010) posit the first two types of discretion are more important determinants of earnings management. Similar to other forms of real earnings management, discretion over the transaction and its timing allow firms to "cherry pick" for securitization only those assets for which securitization will result in gain recognition. Barth and Taylor conclude the use of historical cost, not fair value, is the primary facilitator of earnings management in the securitization setting, stating "(i)ronically, if fair value accounting were applied to the securitized assets, rather than historical cost-based accounting, the opportunity for earnings management associated with asset securitizations would be substantially reduced (2010, page 27)."

In another setting, Ramanna and Watts (2012) find that goodwill impairment decisions are associated with managers' private incentives and attribute their findings to the use of fair value measurement discretion to avoid loss recognition. However, similar to Dechow et al. (2010), Ramanna and Watts (2012) cannot exclude other mechanisms by which impairment losses may be avoided. Importantly, because the underlying events and transactions may differ across impairment loss or securitization gain outcomes, neither study can demonstrate that the selection of alternative measurements causes earnings management-related income statement effects.

We are aware of one study directly quantifying the extent of fair value measurement discretion. Liu (2017) investigates how the increasing availability of trade data through the Trade Reporting and Compliance Engine (TRACE) and independent third-party vendors impacts managerial discretion over fair values. Using field study techniques, Liu (2017) documents financial institutions in his sample tend to use independent pricing services and have separate valuation committees to value investments. Liu (2017) concludes that internal controls over valuation significantly constrain firms' ability to manipulate reported fair values to achieve desired reporting outcomes.

While Liu (2017) evaluates fair value measurement more generally, we examine the extent to which fair value measurement discretion and non-fair value measurement discretion are useful and used by particular firms in a particular setting to avoid loss recognition. For analysis of both types of discretion, our identification of opportunism relies on the existence of differences across firms in the strength of incentives to avoid loss recognition. Prior research supports this maintained assumption. In the context of accrued claims losses, Petroni (1992) finds managers of financially weak insurers use discretion to bias loss reserve estimates

downward relative to financially strong insurers. Petroni's (1992) results are consistent with the hypothesis that managers apply accounting discretion over non-fair value estimates to reduce regulatory and other costs associated with loss recognition. Petroni's research design is innovative because it uses subsequent "truing up" of the claims reserve to identify deviations from ultimately recognized amounts that may reflect discretion over accounting estimates in prior periods.

Similar to Petroni (1992), we identify deviations that may reflect the application of managerial discretion; however, our reference point for deviation is comprised of contemporaneous impairment decisions of other holders of the identical security, rather than subsequent outcomes for which the arrival of new information should be considered. Our research extends Petroni's (1992) study of optimistic reporting in the insurance industry to a context in which two types of accounting discretion (fair value measurement discretion and non-fair value measurement discretion) can be separately evaluated with respect to potential opportunism.

3. Development of hypotheses and research design

3.1 Potential fair value measurement discretion as a determinant of loss recognition

Barth and Taylor (2010) suggest incentivized managers generally can find ways to manipulate accounting amounts under any basis of accounting. Because measurement discretion affords opportunity, Ramanna and Watts (2012) and Dechow et al. (2010) argue observed accounting manipulation should be an increasing function of greater discretion they maintain is inherent in fair value measurement. In contrast to these studies, we measure rather than assume the extent of fair value measurement discretion and note that it may be negatively associated

with observed opportunistic reporting for at least two reasons. First, assets with high measurement uncertainty may command additional manager and auditor attention when evaluated for impairment (Goncharov et al. 2014). To the extent greater scrutiny over fair value measurement inhibits the exercise of non-fair value measurement discretion to avoid loss recognition, we may observe a positive association between fair value measurement discretion and impairment recognition. Second, if measurement uncertainty following price declines is negatively associated with the perceived likelihood of future price reversals, then measurement uncertainty should be positively related to impairment loss recognition in the absence of incentives to avoid loss recognition. Thus, whether there should be a positive or negative association between measurement uncertainty (*potential* fair value measurement discretion) and the likelihood of recognizing impairment losses for securities is unclear. For this reason, we state our first hypothesis in null form:

H1: The likelihood of recognizing an impairment loss is unrelated to potential fair value measurement discretion.

In testing this hypothesis, we follow Ramanna and Watts (2012) and include observations for which carrying value is greater than fair value. Our comparisons across investments with higher and lower amounts of fair value discretion reflect securities eligible for impairment. However, to allow for the possibility that fair values within the reasonable range may have been manipulated, we include observations for which reported fair value exceeds cost when cost is less than the highest end of the reasonable range of value. We also follow Ramanna and Watts (2012) and include a measure of earnings management incentives to ascertain whether incentives, on average, play a role in firms' decision to recognize impairment losses.[6] In contrast

[6] Our measure is specific to the insurance industry. We use certain ratios used by Petroni (1992) as proxies for incentives for loss avoidance and combine them in a composite measure. See Appendix 2 for details.

to prior research, our measure of potential measurement discretion is direct and asset-specific, and we include an indicator determine whether the relation between discretion and impairment decisions differs when incentives for earnings management are high.

3.2 Opportunistic use of fair value measurement discretion

Critics of fair value measurement assert fair values are difficult to estimate and verify, thereby creating opportunities for managers to use measurement uncertainty opportunistically to manage earnings. However, others argue that fair value measurement, particularly for financial assets, reflects current market conditions, provides more timely information to market participants (e.g., Vyas 2011), may be less easily manipulated due to internal controls over financial reporting (Liu 2017), and may result in greater auditor attention (Goncharov et al. 2014). In our context, discretion in fair value measurement can be used to greatest effect if fair values are overstated, allowing firms to avoid impairment by reporting fair value greater than cost. If managers manipulate fair values to report fair value amounts greater than cost, then the likelihood of reporting fair value greater than cost should be positively associated with earnings management incentives. We state this hypothesis in alternative form:

H2: Loss avoidance achieved by using fair value measurement discretion is increasing in incentives to manage earnings.

Because Hypothesis 2 focuses on fair value measurement discretion, we include in our tests only those observations for which reporting higher fair values could have avoided impairment loss recognition. This is in contrast to the sample we use to test Hypothesis 1, in which we evaluate the combined effect of fair value and non-fair value measurement discretion on loss recognition. When an impairment loss-recognition firm reports a fair value less than its cost even though it could have reported a fair value greater than its cost, we conclude the firm has not used fair value measurement discretion for loss avoidance. Conversely, when a firm

reports a fair value greater than its cost when other firms have reported fair values less than its cost, we conclude the firm has exercised fair value measurement discretion to avoid impairment loss recognition. Thus, in tests of Hypothesis 2, we are interested in cases in which an impairment is recognized by at least one holder ($holder_j$), consistent with a persistent decline in fair value of the security, but for which another holder of the identical security ($holder_i$) does not recognize an impairment because it reports a fair value greater than cost. By restricting the sample to observations for which cost falls within the reasonable range of reported fair values, we ensure firms not reporting fair value greater than cost have reasonable discretion to do so.

3.3 Opportunistic use of non-fair value measurement discretion

Although amortized-cost-subject-to-impairment (ACSI) is argued to be more unconditionally conservative than fair value measurement (Watts 2003), this conclusion is contingent on the extent of non-fair value measurement discretion inherent in accounting for impairments. Specifically, ACSI will be anti-conservative to the extent fair values decline below amortized cost, but incurred losses remain unrecognized due to the use of non-fair value measurement discretion (Laux and Leuz 2009). If non-fair value measurement judgments are neutrally applied, we should find no association between the decision not to recognize impairment losses and incentives for earnings management. However, consistent with the view that non-fair value measurement discretion may be used opportunistically when incentives are high (Barth and Taylor 2010), we state Hypothesis 3 in alternative form as follows:

> **H3: Loss avoidance achieved by non-fair value measurement discretion is increasing in incentives to manage earnings.**

To evaluate the extent to which non-fair value measurement discretion is used opportunistically to avoid loss recognition, we test Hypothesis 3 using a sample of observations for which carrying value is less than fair value, meaning our comparisons across investments

with higher and lower amounts of fair value discretion reflect only securities eligible for impairment loss recognition. Moreover, we restrict our investment-level observations to those for which at least one holder has elected to recognize an impairment loss.

3.4 Loss recognition as a determinant of optimistic fair value reporting

Hypothesis 2 suggests fair value measurement discretion may be used to avoid loss recognition by providing measurement slack relevant to the first step of impairment testing that requires firms to ascertain whether fair value is less than cost. However, fair value measurement discretion may also be used to reduce the magnitude of recognized losses for those investments for which the firm decides to recognize impairment losses. If firms exercise fair value measurement discretion to minimize loss recognition, we should observe relatively higher fair value estimates for securities for which firms recognize impairment losses. We state this hypothesis in alternative form:

> **H4: Firms report relatively higher fair values when impairment losses are recognized in income.**

4. Data and research design

4.1 Reported fair value distribution and reasonable range

We construct a distribution of reported prices from the National Association of Insurance Commissioners (NAIC) data across all holders at the CUSIP level. Insurance company holdings of corporate bonds are extensive, comprising between 30 and 40 percent of all investment grade bonds (Schultz 2001). Bessembinder et al. (2006) estimate that insurance companies are responsible for 12.5% of bond dollar trading volume in a given year. Thus, insurance company holdings and transaction data reflect a broad and significant cross-section of security holdings. To facilitate comparisons of potential fair value measurement discretion across holdings with

different per unit values, we compute the coefficient of variation (COV) for each investment. Because measurement uncertainty is time varying, we compute COV by CUSIP for each reporting period. We interpret investments having higher (lower) COV as having more (less) *potential* measurement discretion. Using COV as our measure of fair value measurement discretion and following the research design of Ramanna and Watts (2012), we ascertain whether potential measurement discretion is associated with firms' decision to recognize impairment losses.

To evaluate whether potential fair value measurement discretion is useful and used for loss avoidance, we construct a reasonable range of values for each investment at each reporting date. The reasonable range spans the highest and lowest unit price reported by all holders of the investment, reflecting cross-sectional differences in incentives to over or understate reported fair values. Using the reasonable range, we retain observations for which fair value measurement discretion is sufficiently large to influence loss recognition outcomes. We eliminate observations for which cost is less than the minimum reasonable value because the choice of any reasonable fair value estimate would not result in an unrealized loss. Similarly, we consider observations for which cost is higher than the maximum value of the reasonable range as not presenting opportunities for fair value measurement discretion because reporting the highest reasonable value would not be sufficient to avoid reporting an unrealized loss. Only for remaining observations, with cost falling within the reasonable range, could reasonable fair value measurement discretion be used to avoid loss recognition (see Figure 1).[7]

[7] Based on prior research documenting internal controls over fair value estimates, our definition of the reasonable range is based on the implicit assumption that all observed reported values are reasonable. If all reported fair values are unreasonably high (i.e. the bottom end of the true reasonable range is equal to the minimum observed value (Min) minus the absolute value of the Range), then our sample exclusions may miss some cases in which another holder impaired the security, and a holder with a carrying value greater than the true bottom end of the reasonable range failed to recognize an impairment. As a robustness check, we re-estimate our equations including observations with costs falling in the interval [(Min – ABS(Range)), Min]. Inferences remain unchanged.

4.2 Incentives for avoiding loss recognition

Consistent with prior research in the insurance industry, we posit the primary incentive for earnings management is to reduce the likelihood of regulatory intervention, and we operationalize this likelihood using a set of regulatory ratios (Petroni 1992). Specifically, the NAIC provides ranges for each ratio considered unusual for a financially healthy insurer (see Appendix 2). We classify insurers with more than four unusual ratios, which are those observations in the top decile, as financially weak and more threatened by regulatory intervention; all other insurers are considered financially strong and less threatened by regulatory intervention.[8]

We recognize that the NAIC ratios capture overlapping (but not identical) aspects of regulatory attention. To ensure the robustness of the results to alternative measures, we also use the NAIC risk-based capital ratio (RBC) as an incentive measure. Higher ratios are associated with better capitalization and, therefore, less regulatory intervention.

4.3 Research design

4.3.1 The association between fair value measurement discretion and loss recognition (H1)

We begin by examining the association between higher fair value measurement discretion and impairment loss recognition. The dependent variable in the model is *Impairment*, an indicator variable equal to one if the firm recorded an impairment loss for the security in year *t*, and zero otherwise. The main variable of interest (*FV Discretion*) is the coefficient of variation of fair value, calculated as the ratio of the standard deviation of fair value per unit, divided by the

[8] Insurance companies are structured as a single insurer or as a large group of affiliated insurers. Because insurance groups may implement corporate reporting strategies at the insurer group level, our primary unit of analysis is the insurer group level. Accordingly, regulatory intervention variables and other holder-specific controls are measured at the group level.

mean of fair value per unit. The aim of *FV Discretion* is to measure directly for each investment the divergence of opinion about fair value at each measurement date.

To ensure any association between *FV Discretion* and *Impairment* is not driven by other confounding factors, including attributes of the underlying investments, we include controls for investment characteristics and a number of other factors identified by prior literature as affecting the recognition of impairment losses. In deciding whether to recognize an impairment loss, managers must consider either their intention to sell the security or their ability to hold it until the price may recover. When a future sale is anticipated, the firm must recognize the impairment loss, irrespective of any other qualitative assessments about the likelihood of price recovery. To proxy for unobservable intent and ability to hold, we include an indicator variable set equal to one if the firm disposes of the security in the subsequent period (*Lead Disposal*), and expect a positive relation with *Impairment*. If managers do not intend to sell the investment, they must evaluate the likelihood the price will recover. Other things equal, the less extreme the impairment loss, the more likely the fair value will recover over any anticipated holding period. Thus, we include the ratio of fair value to cost at *t*-1 (*Lag FV to Cost)* and expect a negative association with *Impairment*.

In determining whether the fair value is likely to recover, management must consider the magnitude and direction of expected price movements. To control for the general price movement of a security during the impairment year, we include the median change in fair value per unit in year *t* less the median fair value per unit in year *t*-1, scaled by the median fair value per unit in year *t*-1, across all holders (*Delta FV*). We expect a negative relation between *Delta FV* and *Impairment*. We control for a change in the underlying risk of the investment by including an indicator set equal to one when a security is downgraded within the NAIC risk

designations (*Downgrade*). We expect *Impairment* is more likely when securities are downgraded. Because the remaining life of a debt instrument may influence the recognition of impairment, we include indicator variables for short-term (*Short-Term Maturity*) and long-term maturity (*Long-Term Maturity*). Because firms may be less (more) willing to recognize impairment losses on large (small) holdings, we include a control variable for the size of the investment holding (*Holding Size*). We measure *Holding Size* as the fair value of the security scaled by the firm's portfolio of securities, measured at fair value. We expect *Holding Size* to be negatively associated with *Impairment.*

We also include several control variables to address differences in security and issuer types. In general, security holdings are comprised of bonds and equities that may be investment grade or speculative. We control for speculative securities and define this as securities with an NAIC-assigned designation of 4, 5, or 6 (*Speculative*). We include an indicator variable for liquid securities, or those actively traded (*Traded*), as well as an indicator variable for asset-backed securities (*ABS*). Because the coefficient of variation may be indicative of the quality of the investment, we also control for the number of holders (*Number of Holders*). Finally, we include indicator variables for both common and preferred stock. We have no predictions for the sign of the associations of these variables with *Impairment*. We include control variables to reflect differences in issuer types. *US Govt Issuer* is an indicator variable for securities issued by the federal government and *State Issuer* is an indicator variable for securities issued by state governments. We expect a negative relation between these variables and impairment loss recognition. In addition to these measures, we include an indicator variable for life insurers (*Life*) to account for potential differences in the measurement bases across insurance lines. Consistent

with the prediction in Ellul et al. (2014) that life companies have greater incentives to avoid loss recognition on depreciated securities, we expect a negative relation between *Life* and *Impair*.

Prior literature provides evidence that incentives play an important role in recognizing losses. As discussed in Section 4.2, the primary proxy for high regulatory intervention (*High Regulatory Intervention*) is an indicator variable set equal to one if the holder of the security has more than three unusual IRIS ratios, as defined by the NAIC and shown in Appendix 2. To ensure the robustness of the results, we use an alternate measure of regulatory attention, the NAIC risk-based capital ratio (RBC).[9] The NAIC risk-based capital ratio is defined as the ratio of total adjusted capital to NAIC risk-based capital. We identify firms facing the greatest regulatory intervention as those with a risk-based capital ratio below 2.0 (Ellul et al. 2011).[10] When using RBC, *High Regulatory Intervention* is an indicator variable set equal to one if the holder of the security has an RBC below 2.0.

We also include a variable for governance (*Governance*) as prior literature finds that strong corporate governance is associated with less aggressive reporting choices (e.g., Ahmed and Duellman 2007). We use four binary variables to construct our governance index, including: 1) the existence of an Audit Committee; 2) the requirement for a code of ethics; 3) required approval by the Board of Directors for investment transactions; and 4) the lack of current loans to directors and officers. *Governance* is an indicator variable equal to one if an insurer has a score of two or higher for the governance index, and zero otherwise. All continuous variables are winsorized at the 1st and 99th percentiles. In addition to the aforementioned controls, we use year

[9] We lose 311,900 observations when we utilize the NAIC risk-based capital ratio as our measure of high regulatory intervention due to insurers not disclosing this item.
[10] According to the NAIC, risk-based capital ratios below 2.0 are subject to supervisory intervention.

fixed effects and standard errors clustered at the firm level. Appendix 1 provides a more detailed description of the test and control variables.

While the primary analysis occurs at the security level, we also perform our analysis with firm-level data. Firm-level analyses are performed with 11,405 insurer-year observations and variables are measured as averages by insurer-year.

4.3.2 The association between the use of fair value measurement discretion and incentives for earnings management (H2)

The next test examines the use of fair value measurement discretion on loss avoidance, and whether the use of this discretion is associated with incentives for earnings management. To examine this association, we consider only observations for which the cost of the security is within the reasonable range of fair values such that manipulating fair value could have had an impact on loss recognition. We also require at least one holder of the security to have recognized an impairment loss in year *t*. Restricting the sample in this way ensures that we have disagreement as to loss recognition within the same security for firms with amortized costs within the reasonable range of fair value measurement discretion. The dependent variable in the model is *FV Failure*, an indicator variable equal to one if: 1) the holder did not recognize an impairment loss in year *t*; and 2) the reported fair value of the security is greater than cost. We set *FV Failure* equal to zero if the holder did recognize an impairment loss and the reported fair value is less than cost. Thus, the "treatment" group (*FV Failure* = 1) is comprised of observations for which the holders could have avoided or did avoid impairment by reporting a fair value in excess of cost. The "control" group (*FV Failure* = 0) is comprised of observations for which holders reported a fair value less than cost and did not avoid impairment loss recognition when they could have done so by reporting a higher, reasonable, fair value estimate.

The main variable of interest in this test is *High Regulatory Intervention*, defined above. A positive association between *High Regulatory Intervention* and *FV Failure* is consistent with the opportunistic use of fair value measurement discretion to avoid loss recognition.

We include control variables, as previously defined, except we omit the ratio of fair value to cost at *t*-1 (*Lag FV to Cost*) due to correlation with the dependent measure. For other control variables, the expected signs are generally reversed because we express the dependent variable in terms of failure to recognize impairment losses when impairment losses are indicated. In particular, we expect a positive sign for *Lead Disposal, Delta FV,* and *Life*. We do not predict signs for *Speculative, Common,* or *Preferred*, indicators of security attributes.

We also perform our analysis with firm-level data. For the firm-level regressions, the variable of interest and control variables are measured as averages by insurer-year. *FV Failure* is measured as the percentage of an insurer's portfolio designated as *FV Failure* on an annual basis.

4.3.3 The association between the use of non-fair value measurement discretion and incentives for earnings management (H3)

One of the strengths of our research design is the ability to evaluate separately the use of fair value measurement and non-fair value measurement discretion in avoiding loss recognition. To investigate whether non-fair value measurement discretion is used opportunistically, we evaluate managements' subjective decisions to avoid impairment losses when reported fair value is less than cost—a context in which fair value measurement discretion is not relevant to loss avoidance. To examine whether non-fair value measurement discretion used to avoid loss recognition is associated with incentives for earnings management, we consider only observations for which the reported fair value of the security is less than cost where one holder of the identical security recognized an impairment loss. The dependent variable is *Non-FV*

Failure, which is set equal to one (zero) if the holder did not (did) recognize an impairment loss in year *t.* Thus, the primary difference between this test and the test of Hypothesis 1 is that the sample is restricted to underwater investments that have been impaired by at least one holder of the identical security. We include all of the control variables defined in Section 4.4.1.

We also perform our analysis with firm-level data. For the firm-level regressions, the variable of interest and control variables are measured as averages by insurer-year. *Non-FV Failure* is measured as the percentage of an insurer's portfolio designated as *Non-FV Failure* on an annual basis.

4.3.4 The association between optimistic fair value reporting and loss recognition (H4)

Our final set of analyses examines the extent to which insurers exercise available fair value measurement discretion to reduce the magnitude of impairment losses given recognition. In this set of tests, the dependent variable is optimistic reporting of fair values (*Optimism*). We operationalize this by measuring the ratio of the deviation from the implied fair value, calculated as the difference between the security's reported fair value and the security's median fair value, to the implied fair value of the security. To control for security and time-specific factors that may influence optimistic reporting in comparisons of optimistic reporting across securities and time, we include CUSIP and year fixed effects. Our objective is to measure, for each CUSIP-firm-year, the relative optimism of the fair value estimate and to assess whether OTTI recognition is associated with more optimistic reporting in the period the OTTI is recognized.

For this analysis, we first include only those observations for which at least one holder of the security impaired the security in the current year. The primary variable of interest is *Impairment*, an indicator variable set equal to one if an impairment was recognized. If firms attempt to minimize recognized impairment amounts by optimistically reporting fair values when

impairments are recognized, we expect a positive coefficient on *Impairment.* To examine the validity of the results, we then use the full sample of observations.

While the above research design provides the greatest control by examining within CUSIP variation, we are also interested in the effect of optimism across securities. To examine this, we first examine this question at the security level, using the full sample of observations. We then move to a firm-level analysis.

5. Results and discussion

5.1 Descriptive statistics

We summarize the sample selection procedures in Table 1. We begin with investment securities held by insurers, using information from the insurers' statutory filings with the NAIC. The Schedule D filings focus on the investment portfolio transactions for each insurer, including investment holdings, acquisitions, and disposals for the current reporting year. We retain in the sample only observations for each CUSIP where the purchase price and fair value are positive and non-missing. We exclude observations in the tails of the reported fair value distribution by truncating the data at 10% and 190% of median fair value, as extreme values are likely to be data errors. We remove observations in the health insurance industry as IRIS ratios do not apply to health insurers. We also limit the sample to CUSIPs that do not involve affiliated investments, including joint ventures, or foreign currency exchange gains and losses and to CUSIPs with at least three holders for each reporting year. The final sample period runs from 2005 to 2016. We begin the sample in 2005 due to the availability of investment holdings. We require CUSIP-firm-year observations to have non-missing data for all control variables. The final sample includes 3,018,457 total CUSIP-firm-year observations.

[Insert Table 1 here]

Table 2, Panel A, details the number of security observations across sample years and by insurer type. The sample is evenly distributed across years, ranging from 3.0% in 2005 to 12.8% in 2016. The growth trend is consistent with the growth of insurer assets over the 12-year period. When we split the sample based on the type of insurer, either P&C or Life, we continue to see a similar distribution across the sample years.

Table 2, Panel B, provides the sample distribution of recognized impairment losses. Of the 3,018,457 security observations, we identify 44,997 observations (1.5%) for which holders recognize an impairment loss. The P&C and Life sub-samples reveal that P&C firms are more likely to record impairment losses than Life, with impairment observations totaling 2.0% and 1.0%, respectively. Consistent with the findings of Badertscher et al. (2014) at the account level, we document an increase in recognized impairments in 2008 and 2009 attributable to the financial crisis. Approximately 33.7% of all impairments in the sample were recognized in 2008 and 2009; however, in contrast to prior research, the disaggregated data reveals impairment losses in every year, a result that is obscured in aggregated financial statement level data. Overall, the concentration of impairments in the financial crisis years during which fair values are more difficult to estimate indicates the need for year fixed effects in our analysis.

[Insert Table 2 here]

Table 3, Panel A, provides descriptive statistics for the sample. The average value of *FV Discretion* is 0.534 and is larger than its median value of 0.181, consistent with significant skew in variability. Therefore, in addition to the primary variable of interest, *FV Discretion*, we also use *FV Discretion (top decile),* which is an indicator variable equal to one if the fair value coefficient of variation is in the top decile. The sample of holdings exhibits moderate turnover

during the sample period with *Lead Disposal*, averaging 16.3%. Interestingly, although reported fair value is less than cost for 30.7% of holdings (securities underwater), impairment losses are recognized for only 1.5% of holdings. This result is consistent with significant non-fair value measurement discretion allowing holders to avoid recognition of incurred losses for the vast majority of holdings. Sample holdings are comprised primarily of bonds (82.6%), followed by common stock (14.0%), and preferred stock (0.9%). The remaining holdings (2.5%) are classified as other securities and include private placements, hybrids, and options.

Table 3, Panel B, presents descriptive statistics across subsamples consisting of impairment loss recognition (non-recognition). The amount of potential fair value discretion varies between the two sub-samples with the impairment sample averaging 0.860 and the non-impairment sample averaging 0.529. This is consistent with the disproportionate recognition of impairment losses during financial crisis years when fair value measurement uncertainty was higher, as well as attributes of the holdings for which impairment losses are recognized. Holdings for which impairment losses are recognized are more likely to be equity securities (55.7% compared to 14.3%), less likely to be bonds (43.7% compared to 83.2%), and more likely to be speculative 13.4% compared to 2.3%). Consistent with the requirements of accounting standards, investments for which impairment losses are recognized are more likely to be liquidated in the subsequent period (33.4% compared to 16.1%) and to experience general price level declines over the period the loss is recognized with *Delta FV* averaging -6.3% compared to 2.3% for the non-impairment sample. The impairment loss observations are more likely to be underwater in the year prior to loss recognition (54.5% compared to 30.3%).

Table 3, Panel C, presents descriptive statistics across subsamples consisting of traded and non-traded securities. Following Amihud (2002), we identify traded securities as those

securities for which the security has return and volume data for more than 200 days during the current year. Panel C shows that 1,016,551 (33.7%) of observations relate to securities we classify as actively traded. Thus, the majority of sample observations (66.3%) comprise securities with unobservable market values. The amount of potential fair value discretion varies between the two sub-samples, with the traded sample averaging *FV Discretion* of 0.454 and the non-traded sample averaging 0.574.

Consistent with expectations, the *Number of Holders* significantly differs across the two subsamples with the traded (non-traded) sample averaging 59 (25) holders of the security. Traded securities are less likely to be speculative than non-traded securities (1.9% compared to 2.7%). A higher percentage of non-traded than traded securities are held by life insurance companies (52.9% relative to 44.6%), consistent with life insurance companies having longer average holding periods. Common stocks are a larger component of traded securities (37.4% of traded securities compared to 2.1% of non-traded securities) and impairment loss recognition is more likely for traded securities (2.5% compared to 1.0%).

Table 3, Panel D, presents the correlation matrix for select variables. Impairment loss recognition is positively associated with *FV Discretion* (*corr.* = 0.037). At the same time, *FV Discretion* is positively associated with *Speculative* (*corr*. = 0.038) and *Downgrade* (corr. =0.018). These univariate results are consistent with the premise that fair value measurement discretion is positively associated with non-fair value measurement factors that give rise to impairment loss recognition (i.e., credit quality trends, price trajectory). Overall, the descriptive statistics highlight the need for multivariate analysis to control for security attributes and year fixed effects.

[Insert Table 3 here]

5.2 The association between fair value measurement discretion and loss recognition (H1)

Table 4, Panel A, presents results for our examination of the association between higher fair value measurement discretion and the recognition of impairment losses at the security level. Inconsistent with literature positing that potential discretion in fair value measurement is used to avoid loss recognition, we find the main variable of interest, *FV Discretion*, is positively associated with firms' propensity to record impairment losses for securities. Column 1 reports the primary model with *FV Discretion* having a *t*-statistic of 6.06. Control variables generally are associated with the dependent variable as expected. *Lead Disposal* is positively associated with the firm's decision to recognize impairment losses, consistent with the requirement of accounting standards that impairment losses be recognized when the firm anticipates selling the securities. Similarly, the ratio of fair value to cost at year *t*-1 (*Lag FV to Cost*) is negatively associated with *Impairment*. This suggests that managers consider the extent to which the security is underwater in their assessments of the likelihood that price will recover over their holding period.

Delta FV is negatively associated with impairment decisions, which is consistent with more positive price changes increasing managers' assessment that price will recover. Conversely, *Downgrade* is positively associated with *Impairment*, as is *Speculative*. These results suggest that the security's quality influences the decision to recognize impairments.

We also examine the extent to which incentives influence impairment decisions. When firms face an increased likelihood of regulatory intervention, they are less likely to impair their securities (*t*-statistic of -3.62). After including an indicator, we find no evidence the positive relation between fair value measurement discretion is less positively associated with impairment recognition when incentives for loss avoidance are high.

Column 2 presents the results using an indicator for the top decile of the fair value coefficient of variation, *FV Discretion (decile)*. Results on the main variable of interest continue to suggest potential discretion in fair value measurement is positively associated with loss recognition (*t*-statistic of 5.50). Control variables continue to demonstrate consistent relations with the previous results presented in Column 1.

Columns 3 and 4 present the results using the alternate measure of regulatory attention based on the NAIC RBC ratio. Results are consistent with those presented in Columns 1 and 2 and suggest that discretion in fair value measurement is positively associated with loss recognition (*t*-statistics of 5.61 and 5.35).

Panel B presents the results of the firm-level analysis. Impairment is measured as the insurer's average impairment for the year. Control variables are also measured as averages by insurer-year. *FV Discretion* continues to have a positive and statistically significant coefficient (*t*-statistic of 4.03). *High Regulatory Intervention* continues to have a negative and statistically significant coefficient (*t*-statistic of -2.07). Overall, we find weak evidence incentives for earnings management are associated with impairment recognition decisions, but no evidence that *FV Discretion* is associated with loss avoidance. Instead, *FV Discretion* is positively associated with loss recognition. These results are consistent with the notion that higher levels of fair value measurement uncertainty lead to increased auditor scrutiny or increased management skepticism about price recovery.

[Insert Table 4 here]

5.3 The association between the use of fair value measurement discretion and incentives for earnings management (H2)

We next examine the association between the use of fair value measurement discretion and incentives for earnings management. Table 5 presents results when *FV Failure* is the dependent measure. *FV Failure* reflects non-impairment loss recognition when firm *j* reports a fair value above its cost, but another firm *k* reports a fair value below firm *j*'s cost and any other firm recognizes an impairment loss. The main variable of interest in this test is *High Regulatory Intervention*. Using our primary measure of regulatory attention based on the NAIC IRIS ratios, Column 1 reports a positive but insignificant coefficient on *High Regulatory Intervention* (*t*-statistic 1.07), failing to support that firms with stronger incentives to avoid losses due to regulatory concerns use fair value measurement discretion opportunistically by failing to recognize impairment losses when impairment losses are warranted.

However, we do find evidence that corporate governance plays a role in the impairment decision. The negative coefficient on *Governance* (*t*-statistic -2.04) suggests that firms with higher quality governance are less likely to fail to recognize impairment losses, consistent with strong corporate governance resulting in more conservative accounting choices.

We then examine the robustness of our result. Column 2 presents the results using the RBC-based measure for *High Regulatory Intervention.* The coefficient on *High Regulatory Intervention* is positive but insignificant (*t*-statistic of 0.62). Column 3 provides the results of the firm-level analysis. The coefficient on *High Regulatory Intervention* continues to be positive but insignificant (*t*-statistic of 1.24). Overall, we conclude that firms with stronger incentives to avoid losses do not appear to use fair value measurement discretion opportunistically.

[Insert Table 5 here]

5.4 The association between the use of non-fair value measurement discretion and incentives for earnings management (H3)

Table 6 presents the results for our examination of the association between non-fair value measurement discretion and incentives for earnings management. For this test, we include only observations for which fair value measurement discretion is irrelevant to the loss recognition decision (i.e., we limit observations to those with *FV* < *Cost*). In addition, we include only those securities for which some other holder has recognized an impairment loss. The main variable of interest is *High Regulatory Intervention*. We find a positive and statistically significant coefficient on *High Regulatory Intervention* (*t*-statistic of 3.78), suggesting that firms with stronger incentives to avoid losses due to regulatory concerns strategically use non-fair value discretion to avoid impairment loss recognition. The signs on control variables are generally consistent with expectations. The signs on *Lead Disposal*, *Speculative*, and *Downgrade* are negative, consistent with firms being less likely to avoid recognizing an impairment loss when there are observable negative indicators to point toward OTTI. Conversely, the signs on *Lag FV to Cost*, *Delta FV*, *Number of Holders*, and *Traded* are positive, consistent with firms considering price trajectory and liquidity as justification for not classifying the impairment as OTTI. For completeness, we include *FV Discretion* and find a negative coefficient (*t*-statistic of -3.15), suggesting higher fair value measurement discretion is negatively associated with loss avoidance. These results are consistent with the idea that higher levels of fair value measurement uncertainty either leads to increased auditor scrutiny that inhibits loss avoidance, or increased management skepticism about the likelihood of subsequent price recovery in the presence of high fair value measurement uncertainty.

We next examine the robustness of this result. Column 2 presents the results using the RBC-based measure for *High Regulatory Intervention.* The coefficient on *High Regulatory Intervention* is positive and statistically significant (*t*-statistic of 3.93). In addition, we examine

this test using firm-level analysis as shown in Column 3. We continue to find a positive and statistically significant coefficient on *High Regulatory Intervention* (*t*-statistic of 2.28). Overall, we conclude that firms with stronger incentives to avoid losses appear to use non-fair value measurement discretion opportunistically.

[Insert Table 6 here]

5.5 The association between optimistic fair value reporting and loss recognition (H4)

The final set of analyses examines the association between impairment loss recognition and the use of fair value discretion to minimize the amount of loss recognized, given that a loss is recognized. The dependent variable, *Optimism*, is measured as the difference in the reported fair value of the security less the implied fair value of the security (security measured at median value), scaled by the implied fair value of the security.

Table 7 presents the within CUSIP analysis where the variable of interest is *Impairment*. We restrict the sample to securities for which at least one holder recognized an impairment. Using our primary measure of regulatory attention based on the NAIC IRIS ratios, Column 1 reports a negative and significant coefficient on *Impairment* (*t*-statistic of -2.41). We next examine the robustness of this result. Column 2 presents the results using the RBC-based measure for *High Regulatory Intervention*. We continue to find a negative and significant coefficient on *Impairment* (*t*-statistic of -3.29). We then perform this analysis for the full sample of securities. Columns 3 and 4 show a negative and significant coefficient on *Impairment* with both the IRIS-based and RBC-based measures for *High Regulatory Intervention* (*t*-statistics of -2.92 and -3.36, respectively). Taken together, these results suggest that impaired securities are not optimistically valued relative to the identical, but non-impaired, security of a different holder.

[Insert Table 7 here]

We then examine the same research question using a cross-sectional design. Table 8 presents the results. Column 1 reports the security level analysis using the full sample of observations and the IRIS-based measure of *High Regulatory Intervention*. We find a negative and significant coefficient on *Impairment* (*t*-statistic of -3.11). Column 2 reports the security level analysis with the RBC-based measure of *High Regulatory Intervention*. We find a negative and significant coefficient on *Impairment* (*t*-statistic of -3.72). These results are not consistent with impaired securities being optimistically valued.

[Insert Table 8 here]

5.6 Additional analysis of fair value levels

To ensure the robustness of the results, we examine our tests in a sample more commonly used in the literature – observations for which fair value levels are disclosed. FAS 157 establishes a three-level hierarchy to reflect the amount of judgment involved in estimating fair values. Inputs to the fair value estimation drive the level determination. Level 1 inputs are obtained from quoted prices in active markets. Level 2 inputs are obtained from similar assets in active markets, similar assets in inactive markets, or other observable market measures. Level 3 inputs are unobservable and, therefore, management values the asset by making assumptions about how market participants would price the asset. Level 3 fair values involve greater subjectivity and are more susceptible to managerial discretion (e.g., Goh et al. 2015; Kolev 2013; Song et al. 2010). Because a higher value of *FV Discretion* signifies greater potential measurement discretion, we expect a positive association with fair value levels. In statutory filings, insurers are able to designate the fair value methodology used in valuing a security (i.e., Level 1, 2 or 3).

Table 9 presents the results. Panel A details the sample by fair value methodology. We note that the largest percentage of securities are designated as Level 2 securities (76.2%). The correlation between our measure of *FV Discretion* and the ordinal fair value hierarchy level (i.e., Level 1, 2 or 3) is 0.060, which is statistically significant at the one percent level. Because Level 3 fair values are expected to involve greater discretion than Level 1 or Level 2 fair values, we expect a positive correlation between Level 3 and our measure of discretion. We find that our measure of *FV Discretion* and Level 3 fair values are positively correlated (*corr*. = 0.167).

Panel B presents the regression results when we substitute an indicator variable for Level 3 assets (*Level Three*) for our measure of *FV Discretion*. Column 1 reports the analysis for Hypothesis 1 for the sample of securities for which fair value discretion is useful. We continue to find a positive association between *Level Three* and *Impairment* (*t*-statistic of 1.97), consistent with the finding that potential discretion in fair value measurement is positively associated with loss recognition.

We then examine the analyses for Hypotheses 2 and 3. Column 2 presents the results for Hypothesis 2. We find a positive but insignificant association with *FV Failure* (*t*-statistic of 1.07), which is consistent with the findings reported in Table 5. Column 3 presents the results for Hypothesis 3. We find a positive and significant association between *High Regulatory Intervention* and *Non-FV Failure* (H3) (*t*-statistic of 3.85). These results are consistent with the primary results using our measure of *FV Discretion* and suggest that firms with stronger incentives to avoid losses appear to use non-fair value measurement discretion, but not fair value measurement discretion, opportunistically.

[Insert Table 9 here]

6. Conclusion

Given sufficient motive and opportunity, managers are likely to use available accounting discretion opportunistically (Watts and Zimmerman 1986; Barth and Taylor 2010). In the accounting literature, fair value estimates for financial assets and liabilities are portrayed as a significant source of managerial discretion over measurement. Indeed, critics of fair value measurement assert that the potential for managerial discretion in estimating fair values is an important impediment that should preclude its use. However, little research exists documenting the actual extent of fair value measurement uncertainty that could give rise to discretion, or whether fair value measurement uncertainty is used opportunistically.

There are reasons fair value estimates for financial instruments may not be a significant source of optimistic discretion. In contrast to other critical estimates, opportunistic use of fair value measurements for financial instruments is bounded by the availability of external pricing services and transaction data (Liu 2017). Internal controls over financial reporting, the discipline of the fair value measurement hierarchy, and process-focused audits may all act to curb opportunism even when measurement uncertainty is high. Therefore, whether financial instrument fair value measurements present opportunities for significant managerial discretion, or whether managers choose to use available fair value measurement discretion opportunistically, has been an open question.

We provide evidence on these questions by examining the extent of opportunism in an impairment loss setting in which firms have clear incentives to avoid loss recognition. Our setting is unique because we can compare fair value estimates across holders and separate fair value measurement discretion from non-fair value measurement discretion. In the context of financial instruments, we find available fair value measurement discretion is not large. Using

reported fair values across holders to construct a security-specific reasonable range for fair value, fair value measurement discretion could have influenced loss recognition for fewer than 3% of the sample. These represent cases where choosing to report the maximum reasonable fair value at a given measurement date could possibly have avoided recognition of an impairment loss.

When we restrict the sample to cases where fair value measurement discretion cannot be used to avoid loss recognition, we find incurred but unrealized losses are not recognized the vast majority of the time, even in cases in which reported fair value is less than cost and some other holder of the security has recognized impairment losses. Specifically, differences in opinion about whether impairments are "other-than-temporary" are resolved in favor of loss avoidance approximately 98% of the time. The resulting loss avoidance that derives from continued use of amortized cost measurement when losses are not judged OTTI is large and opportunistic—30.5% of holdings are in an unrealized, unrecognized loss position. The ability to opportunistically avoid loss recognition is inconsistent with the notion that amortized cost subject to impairment necessarily results in more conservative balance sheets than fair value measurement.

Our results highlight the importance of identifying the source of isolating fair value measurement discretion from non-fair value measurement discretion when drawing conclusions about the role of fair value measurement discretion in earnings management. In supplemental analyses, we examine optimistic fair value reporting that we define at the CUSIP-YEAR level as reporting fair values in the upper half of the distribution of reported fair values. We find no evidence firms report optimistically when they recognize impairment losses on the income statement. Putting all these results in the context of a broader conclusion, we find that non-fair value measurement discretion is frequently useful and frequently used to achieve loss avoidance, and when such discretion is used to avoid loss recognition, it is used opportunistically. In

contrast, fair value measurement discretion is infrequently useful and infrequently used to avoid impairment loss recognition. To the contrary, we find the wider the reasonable range of reported values, the more likely are firms to recognize impairment losses.

Our study contributes to the debate about opportunistic fair value measurement by providing important evidence about the extent to which fair value measurement discretion can be used, and is used, to achieve a particular loss avoidance outcome. In contrast to prior research, our setting allows us to separate fair value measurement discretion and non-fair value measurement discretion and evaluate the contribution of each to loss avoidance. We investigate whether both types of discretion vary with incentives for earnings management while controlling for underlying economic fundamentals.

Our study is subject to important limitations, many of which are inherent to our setting. Specifically, we cannot draw conclusions about the extent of fair value measurement discretion or non-fair value measurement discretion outside of financial instruments. We also cannot determine whether OTTI loss recognition is appropriate or inappropriate in any particular situation. Finally, we note that conclusions about the appropriateness of measurement bases must consider their relevance and the extent to which they faithfully represent underlying economic events and not the extent to which they can be used to manage earnings.

Appendix 1. Variable definitions

Variable	Definition
Dependent variables	
Impairment	Indicator variable equal to one if the security was impaired in year *t*, and zero otherwise.
FV Failure	Indicator variable equal to one if: 1) the holder did not recognize an impairment loss in year *t*; 2) another holder of the security recognized an impairment loss in year *t*; 3) the reported fair value of the security is greater than cost; and 4) the cost of the security is within the reasonable range of fair values, and zero otherwise.
Non-FV Failure	Indicator variable equal to one if: 1) the holder did not recognize an impairment loss in year *t*; 2) another holder of the security recognized an impairment loss in year *t*; and 3) the reported fair value of the security is less than cost, and zero otherwise.
Optimistic	Ratio of the deviation from implied fair value, calculated as the difference between the reported fair value of the security and the median fair value, to the implied fair value of the security.
Variables of interest	
FV Discretion (continuous)	FV coefficient of variation, which is measured as the ratio of the standard deviation of FV per unit, divided by the mean value of FV per unit. A higher value equates to more potential measurement discretion.
FV Discretion (top decile)	Indicator variable equal to one if the FV coefficient of variation is in the top decile, and zero otherwise.
High Regulatory Intervention (IRIS)	Indicator variable equal to one if an insurer has more than three unusual ratios as defined by the NAIC, and zero otherwise. Refer to Appendix 2 for definitions of the ratios as well as the usual range.
High Regulatory Intervention (RBC)	Indicator variable equal to one if an insurer has a risk-based capital (RBC) ratio less than 2.0, and zero otherwise.
Control variables	
Lag FV to Cost	Ratio of FV to cost in year *t*-1.
Delta FV	Change in fair value is measured as the median fair value per unit in year *t* less the median fair value per unit in year *t*-1, scaled by the median fair value per unit in year *t*-1.
Number of Holders	The number of holders of the CUSIP in year *t*.
Traded	Indicator variable equal to one if the security has return and volume data from CRSP for more than 200 days during year *t*, and zero otherwise.

Appendix 1. Variable definitions (continued)

Variable	Definition
Control variables	
Lead Disposal	Indicator variable equal to one if the firm disposes of the security in year $t + 1$, and zero otherwise.
Speculative	Indicator variable equal to one if the security is assigned a designation of level 4, 5, or 6, and zero otherwise.
Downgrade	Indicator variable equal to one if the security is downgraded, and zero otherwise.
Common Stock	Indicator variable equal to one if the security is common stock, and zero otherwise.
Preferred Stock	Indicator variable equal to one if the security is preferred stock, and zero otherwise.
Life	Indicator variable equal to one if the insurer's primary business is life insurance, and zero otherwise.
Governance	Indicator variable equal to one if an insurer has more than two of the four high governance indicators (top quartile), and zero otherwise. The high governance rating is based on the following four variables: 1) the existence of an Audit Committee; 2) the requirement for a code of ethics has not been waived; 3) the Board of Directors approves the investment transactions; and 4) the insurer does not have any current loans to directors and officers.
Holding Size	Fair value of the security scaled by the firm's portfolio measured at fair value.
US Govt Issuer	Indicator variable equal to one if an issuer is the US federal government, and zero otherwise.
State Issuer	Indicator variable equal to one if an issuer is one of the US states, and zero otherwise.
ABS	Indicator variable equal to one if the security is an asset-backed security, and zero otherwise.
Short-Term Maturity	Indicator variable equal to one if the security's remaining maturity is in the lowest quartile of the distribution, and zero otherwise.
Long-Term Maturity	Indicator variable equal to one if the security's remaining maturity is in the highest quartile of the distribution, and zero otherwise.
Underwater	Indicator variable equal to one if the security's FV is less than cost during year t-1, and zero otherwise.

Appendix 2. Likelihood of regulatory attention

We measure the likelihood of regulatory attention using key ratios cutoffs established by the National Association of Insurance Commissioners (NAIC). The NAIC Insurance Regulatory Information System (IRIS) is a collection of analytical solvency tools and databases designed to provide state insurance departments with an integrated approach to screening and analyzing the financial condition of insurers operating within their respective states. IRIS, developed by state insurance regulators participating in NAIC committees, is intended to assist state insurance departments in targeting resources to those insurers in greatest need of regulatory attention. The IRIS Ratio Application generates key financial ratio results based on financial information obtained from insurers' statutory annual financial statements. The ratio results are used in determining the level of regulatory attention required. The NAIC Financial Analysis and Examination Unit of Financial Regulatory Services Department, under the direction of the NAIC Financial Analysis Research and Development Working Group, conducts annual reviews of the ratios. IRIS Ratio Reports are made available to state insurance regulators and interested parties. The reports list insurers by type of insurer and include ratio results, usual ranges, and identification of unusual values. The following table provides the ratio cutoffs used by the NAIC and their descriptions:

NAIC IRIS ratio descriptions	Risk attributes	High value	Low value
P&C IRIS ratios			
1. Gross premiums written to policyholders' surplus	PR/UW, ST	900	---
2. Net premiums written to policyholders' surplus	PR/UW, ST	300	---
3. Change in net premiums written	PR/UW, ST	33	-33
4. Surplus aid to policyholders' surplus	PR/UW, ST	15	---
5. Two-year overall operating ratio	OP	100	---
6. Investment yield	MK, LQ, ST	6.5	3
7. Gross change in policyholders' surplus	ST, OP	50	-10
8. Change in adjusted policyholders' surplus	ST, OP	25	-10
9. Adjusted liabilities to liquid assets	LQ	100	---
10. Gross agents' balances (in collection) to policyholders' surplus	CR	40	---
11. One-year reserve development to policyholders' surplus	RV	20	---
12. Two-year reserve development to policyholders' surplus	RV	20	---
13. Estimated current reserve deficiency to policyholders' surplus	RV	25	---
Life IRIS ratios			
1. Net change in capital and surplus	OP, ST	50	-10
2. Gross change in capital and surplus	OP, ST	50	-10
3. Net income to total income (incl. realized capital gains & losses)	OP	---	0
4. Adequacy of investment income	RV, MK, ST	900	125
5. Nonadmitted to admitted assets	CR, LQ	10	---
6. Total real estate & total mortgage loans to cash & invested assets	CR, MK	30	---
7. Total affiliated investments to capital and surplus	CR, LQ, MK	100	---
8. Surplus relief			
(over $5 million capital and surplus)	ST, PR/UW	30	-99
($5 million or less capital and surplus)	ST, PR/UW	10	-10
9. Change in Premiums	PR/UW	50	-10
10. Change in product mix	PR/UW	5	---
11. Change in asset mix	CR, MK, ST	5	---
12. Change in reserving	RV	20	-20

Risk symbol descriptions:
Credit (CR): Amounts actually collected or collectible are less than those contractually due, or payments are not remitted on a timely basis. Legal (LG): Nonconformance with laws, rules and regulations, prescribed practices, or ethical standards (in any jurisdiction in which the entity operates) that may result in a disruption in business and financial loss. Liquidity (LQ): Inability to meet contractual obligations as they become due because of an inability to liquidate assets and/or obtain adequate funding without incurring unacceptable losses. Market (MK): Movement in market rates or prices (e.g., interest rates, foreign exchange rates, equity prices) adversely affect the reported and/or market value of the investments. Operational (OP): The risk of financial loss resulting from inadequate or failed internal processes, personnel, and systems, as well as unforeseen external events. Pricing/Underwriting (PR/UW): Pricing and underwriting practices are inadequate to provide for risks assumed. Reputation (RP): Negative publicity, whether true or not, causes a decline in the customer base, costly litigation, and/or revenue reductions. Reserving (RV): Actual losses and/or other contractual payments reflected in reported reserves or other liabilities are greater than estimated. Strategic (ST): Inability to implement an appropriate business plan, to make decisions, to allocate resources, or to adapt to changes in the business environment adversely affects the competitive position and financial condition.

Figure 1: Potential discretion in fair value measurement and in loss avoidance

In addition to other holders of Investment X, assume that Firm A has a carrying value of $147 for 1 unit of Investment X. Firm B has a carrying value of $100, and Firm C has a carrying value of $170. Assume also that the distribution of reported values for Investment X range from $130 to $152 with a median of $141. We first quantify the percentage of time FV measurement discretion is useful. As shown in the diagram below, FV measurement is useful only when the firm's cost is greater than the lower bound of the reasonable range. Irrespective of Firm B's reported fair value, we classify Firm B's report as one in which fair value measurement cannot be used to avoid impairment recognition because the investment is not impaired. Irrespective of Firm C's reported fair value, we classify Firm C's report as one in which potential discretion in fair value measurement is not sufficient to achieve loss avoidance, meaning that, if a loss is to be avoided, some other form of discretion must be used.

We next classify each report according to whether discretion within the useful range is used. For example, if Firm A reports a fair value less than its carrying value, we classify Firm A as making a report that does not use available discretion to avoid loss recognition. If Firm A reports a fair value greater than or equal to $147, we classify Firm A as making a report that uses available discretion that results in loss avoidance.

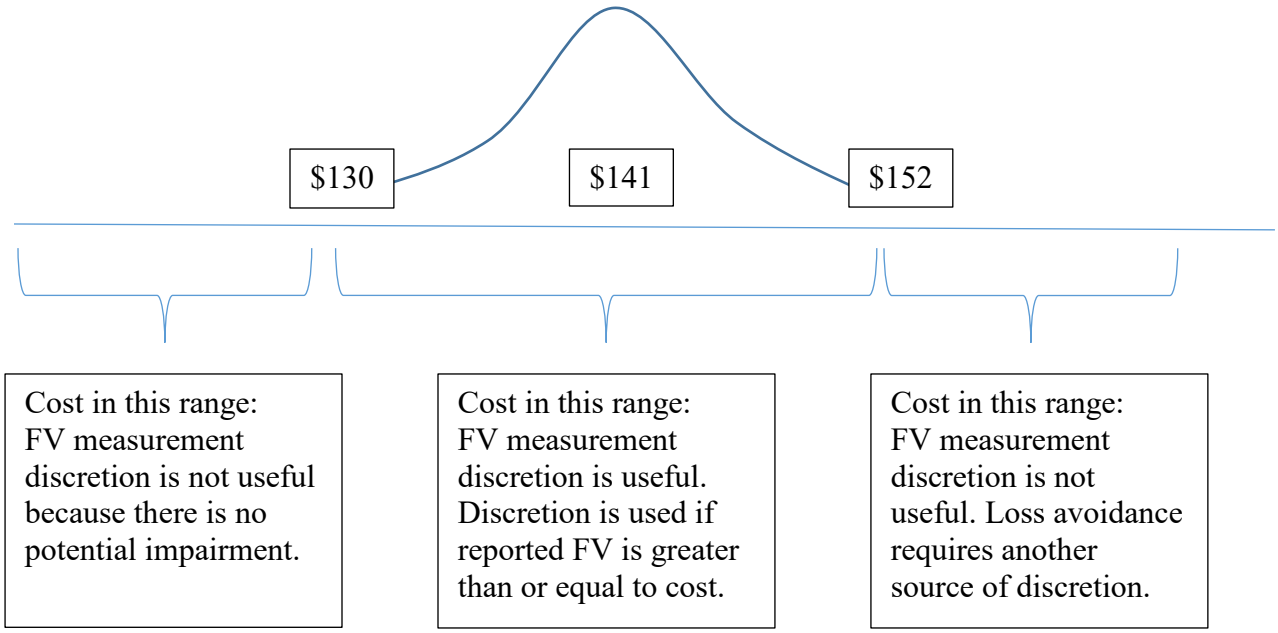

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Table 1
Sample selection

Description of selection criteria	*Observations lost*	*Observations remaining*
NAIC firm-security-year observations 2005 to 2016		5,417,436
Remove the following firm-security-years:		
Health insurers	(750,855)	4,666,581
Affiliated investments	(101,128)	4,565,453
Foreign securities	(9,890)	4,555,563
Missing control variables	(1,537,106)	3,018,457
Final Sample		**3,018,457**

This table provides sample selection criteria for security level observations obtained from the NAIC statutory filings. The sample is reduced for transactions involving health insurers, affiliated investments, foreign securities and transactions missing control variable data.

Table 2
Sample distribution over time

Panel A: Observations by year and insurer type

	Full sample		*P&C insurers*		*Life insurers*	
Year	*Observations*	*Percentage*	*Observations*	*Percentage*	*Observations*	*Percentage*
2005	91,011	3.02	44,742	2.97	46,269	3.06
2006	111,290	3.69	59,714	3.96	51,576	3.41
2007	120,037	3.98	64,407	4.27	55,630	3.68
2008	116,195	3.85	61,967	4.11	54,228	3.59
2009	254,902	8.44	126,101	8.37	128,801	8.52
2010	286,777	9.50	137,887	9.15	148,890	9.85
2011	281,509	9.33	139,003	9.22	142,506	9.43
2012	318,934	10.57	161,561	10.72	157,373	10.41
2013	334,784	11.09	170,838	11.34	163,946	10.85
2014	359,049	11.90	182,937	12.14	176,112	11.65
2015	356,642	11.82	176,613	11.72	180,029	11.91
2016	387,327	12.83	181,231	12.03	206,096	13.64
Total	3,018,457	100.00	1,507,001	100.00	1,511,456	100.00

Panel B: Impairments by year and insurer type

	Full sample		*P&C insurers*		*Life insurers*	
Year	*Observations*	*Percentage*	*Observations*	*Percentage*	*Observations*	*Percentage*
2005	1,937	4.3	1,610	5.35	327	2.19
2006	2,605	5.79	1,878	6.24	727	4.88
2007	2,855	6.34	1,905	6.33	950	6.38
2008	7,384	16.41	5,501	18.28	1,883	12.64
2009	7,800	17.33	4,920	16.35	2,880	19.33
2010	2,724	6.05	1,477	4.91	1,247	8.37
2011	3,385	7.52	2,189	7.27	1,196	8.03
2012	3,053	6.78	1,923	6.39	1,130	7.58
2013	2,234	4.96	1,629	5.41	605	4.06
2014	2,246	4.99	1,313	4.36	933	6.26
2015	5,081	11.29	3,316	11.02	1,765	11.85
2016	3,693	8.21	2,437	8.10	1,256	8.43
Total	44,997	100.00	30,098	100.00	14,899	100.00

This table presents the frequency of firm-security-year observations over time and by insurer type (P&C or Life). Panel A presents the frequency of observations for the full sample. Panel B presents the frequency of impairment observations for the full sample.

Table 3
Descriptive statistics

Panel A: Descriptive statistics for the full sample

Variable	*N*	*Mean*	*Lower quartile*	*Median*	*Upper quartile*	*Std dev*
Impairment	3,018,457	0.015	0.000	0.000	0.000	0.121
FV Discretion (continuous)	3,018,457	0.534	0.044	0.181	0.493	1.083
Lag FV to Cost	3,018,457	1.091	0.990	1.029	1.102	0.290
Delta FV	3,018,457	0.022	(0.028)	0.001	0.046	0.132
Number of Holders	3,018,457	36.510	8.000	24.000	50.000	39.259
Traded	3,018,457	0.337	0.000	0.000	1.000	0.473
Lead Disposal	3,018,457	0.163	0.000	0.000	0.000	0.370
Speculative	3,018,457	0.024	0.000	0.000	0.000	0.154
Downgrade	3,018,457	0.017	0.000	0.000	0.000	0.130
Common Stock	3,018,457	0.140	0.000	0.000	0.000	0.347
Preferred Stock	3,018,457	0.009	0.000	0.000	0.000	0.094
Life	3,018,457	0.501	0.000	1.000	1.000	0.500
Governance	3,018,457	0.207	0.000	0.000	0.000	0.405
Holding Size	3,018,457	0.193	0.014	0.048	0.165	0.422
U.S. Govt Issuer	3,018,457	0.056	0.000	0.000	0.000	0.231
State Issuer	3,018,457	0.034	0.000	0.000	0.000	0.180
ABS	3,018,457	0.172	0.000	0.000	0.000	0.378
Short-Term Maturity	3,018,457	0.362	0.000	0.000	1.000	0.481
Long-Term Maturity	3,018,457	0.208	0.000	0.000	0.000	0.406
High Regulatory Intervention	3,018,457	0.032	0.000	0.000	0.000	0.177
Underwater	3,018,457	0.307	0.000	0.000	1.000	0.461
Firm-Level Average	11,405	1.979	0.000	0.000	0.000	7.576
Firm-Level FV Failure	11,405	0.009	0.000	0.000	0.009	0.025
Firm-Level Non FV Failure	11,405	0.076	0.011	0.044	0.098	0.111

Panel B: Descriptive statistics bifurcated by impairment

	Observations where Impairment=1 (N =44,997)			*Observations where Impairment=0 (N =2,973,460)*		
Variable	*Mean*	*Median*	*Std dev*	*Mean*	*Median*	*Std dev*
FV Discretion (continuous)	0.860	0.029	1.830	0.529	0.183	1.067
Lag FV to Cost	1.014	0.988	0.358	1.093	1.030	0.289
Delta FV	(0.063)	(0.056)	0.274	0.023	0.002	0.129
Number of Holders	41.637	21.000	47.083	36.432	24.000	39.124
Traded	0.576	1.000	0.494	0.333	0.000	0.471
Lead Disposal	0.334	0.000	0.472	0.161	0.000	0.367
Speculative	0.134	0.000	0.341	0.023	0.000	0.149
Downgrade	0.033	0.000	0.178	0.017	0.000	0.129
Common Stock	0.535	1.000	0.499	0.134	0.000	0.341
Preferred Stock	0.023	0.000	0.150	0.009	0.000	0.093
Life	0.331	0.000	0.471	0.503	1.000	0.500
Governance	0.107	0.000	0.309	0.209	0.000	0.406
Holding Size	0.067	0.013	0.211	0.195	0.049	0.424
U.S. Govt Issuer	0.013	0.000	0.111	0.057	0.000	0.232
State Issuer	0.003	0.000	0.055	0.034	0.000	0.182
ABS	0.160	0.000	0.366	0.172	0.000	0.378
Short-Term Maturity	0.627	1.000	0.483	0.358	0.000	0.479
Long-Term Maturity	0.168	0.000	0.374	0.209	0.000	0.407
High Regulatory Intervention	0.020	0.000	0.140	0.033	0.000	0.178
Underwater	0.545	1.000	0.498	0.303	0.000	0.460

Panel C: Descriptive statistics bifurcated by traded

	Observations where Traded=1 (N =1,016,551)			*Observations where Traded=0 (N =2,001,906)*		
Variable	*Mean*	*Median*	*Std Dev*	*Mean*	*Median*	*Std Dev*
Impairment	0.025	0.000	0.158	0.010	0.000	0.097
FV Discretion (continuous)	0.454	0.160	0.997	0.574	0.194	1.122
Lag FV to Cost	1.180	1.049	0.428	1.046	1.023	0.168
Delta FV	0.042	0.011	0.181	0.011	(0.001)	0.097
Number of Holders	58.790	44.000	48.630	25.196	15.000	27.258
Lead Disposal	0.168	0.000	0.374	0.161	0.000	0.367
Speculative	0.019	0.000	0.138	0.027	0.000	0.161
Downgrade	0.012	0.000	0.111	0.020	0.000	0.139
Common Stock	0.374	0.000	0.484	0.021	0.000	0.144
Preferred Stock	0.012	0.000	0.110	0.007	0.000	0.085
Life	0.446	0.000	0.497	0.529	1.000	0.499
Governance	0.189	0.000	0.391	0.217	0.000	0.412
Holding Size	0.181	0.044	0.399	0.200	0.050	0.433
U.S. Govt Issuer	0.000	0.000	0.013	0.085	0.000	0.279
State Issuer	0.000	0.000	0.003	0.051	0.000	0.220
ABS	0.002	0.000	0.041	0.259	0.000	0.438
Short-Term Maturity	0.552	1.000	0.497	0.266	0.000	0.442
Long-Term Maturity	0.094	0.000	0.293	0.266	0.000	0.442
High Regulatory Intervention	0.030	0.000	0.172	0.033	0.000	0.180
Underwater	0.274	0.000	0.446	0.323	0.000	0.468

Panel D: Correlation matrix

Variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*	*(8)*	*(9)*	*(10)*	*(11)*	*(12)*
(1) Impairment	1.000											
(2) FV Discretion (continuous)	**0.037**	1.000										
(3) Lag FV to Cost	**-0.033**	**-0.013**	1.000									
(4) Delta FV	**-0.078**	**0.003**	**-0.033**	1.000								
(5) Number of Holders	**0.016**	**-0.025**	**0.226**	**0.089**	1.000							
(6) Traded	**0.062**	**-0.053**	**0.218**	**0.111**	**0.404**	1.000						
(7) Lead Disposal	**0.057**	**0.010**	**0.059**	**0.049**	**0.018**	**0.010**	1.000					
(8) Speculative	**0.088**	**0.038**	**-0.054**	**0.008**	**-0.085**	**-0.022**	**-0.007**	1.000				
(9) Downgrade	**0.015**	**0.018**	**-0.026**	**0.005**	**-0.038**	**-0.027**	**-0.014**	**0.013**	1.000			
(10) Governance	**-0.031**	**0.052**	**0.003**	**-0.002**	**-0.032**	**-0.033**	**-0.003**	0.001	**0.026**	1.000		
(11) Holding Size	**-0.037**	**-0.011**	**-0.014**	**0.003**	**0.103**	**-0.021**	**-0.046**	**-0.049**	**-0.023**	**-0.058**	1.000	
(12) High Regulatory	**-0.009**	**0.017**	**-0.041**	**0.020**	**0.003**	**-0.008**	**-0.010**	**-0.008**	-0.001	**0.014**	**0.043**	1.000

This table presents descriptive statistics for the sample. Panel A presents descriptive statistics for the full sample. Panel B provides descriptive statistics separated by impairment and non-impairment observations. Panel C presents descriptive statistics separated by traded and non-traded observations. Panel D provides Pearson correlations for select variables. The bolded correlations are significant at the one percent level. Variables are defined in Appendix 1.

Table 4
Fair value measurement discretion and loss recognition (H1)

Panel A: Security level analysis

FV Discretion measure:	*Continuous*	*Top decile*	*Continuous*	*Top decile*
High Reg. Int. measure:	*IRIS*	*IRIS*	*RBC*	*RBC*
Variable	*(1)*	*(2)*	*(3)*	*(4)*
FV Discretion	0.0606***	0.2769***	0.0620***	0.2809***
	(6.06)	(5.50)	(5.61)	(5.35)
Lag FV to Cost	-5.5529***	-5.5948***	-5.7388***	-5.7820***
	(-15.58)	(-15.63)	(-14.46)	(-14.54)
Delta FV	-2.8278***	-2.8416***	-2.8172***	-2.8312***
	(-19.59)	(-19.57)	(-16.85)	(-16.86)
Number of Holders	-0.0008	-0.0008	0.0001	0.0000
	(-0.67)	(-0.71)	(0.04)	(0.00)
Traded	0.0919**	0.0922***	0.0870**	0.0871**
	(2.57)	(2.58)	(2.16)	(2.17)
Lead Disposal	0.5314***	0.5297***	0.5628***	0.5611***
	(7.57)	(7.54)	(7.48)	(7.45)
Speculative	1.8462***	1.8545***	1.8737***	1.8824***
	(18.06)	(18.11)	(15.72)	(15.77)
Downgrade	1.1739***	1.1751***	1.1546***	1.1569***
	(14.43)	(14.52)	(13.27)	(13.32)
Common Stock	2.1239***	2.1193***	2.3630***	2.3582***
	(8.70)	(8.63)	(8.36)	(8.30)
Preferred Stock	1.1612***	1.1602***	1.2755***	1.2741***
	(6.05)	(6.04)	(5.52)	(5.51)
Life	-0.3553**	-0.3551**	-0.3284	-0.3273
	(-1.97)	(-1.97)	(-1.55)	(-1.55)
Governance	0.2427	0.2418	0.2785	0.2769
	(1.34)	(1.34)	(1.32)	(1.31)
Holding Size	-1.2292***	-1.2284***	-1.3025***	-1.3023***
	(-5.33)	(-5.32)	(-4.61)	(-4.60)
US Govt Issuer	-0.1989	-0.1976	-0.3520*	-0.3507*
	(-0.79)	(-0.79)	(-1.67)	(-1.66)
State Issuer	-0.9885***	-0.9884***	-0.9142***	-0.9135***
	(-6.46)	(-6.47)	(-5.28)	(-5.29)
ABS	0.5138***	0.5266***	0.4898***	0.5041***
	(5.45)	(5.61)	(4.69)	(4.86)
Short-Term Maturity	-0.2253***	-0.2238***	-0.2825***	-0.2808***
	(-2.86)	(-2.84)	(-2.79)	(-2.77)
Long-Term Maturity	0.3727***	0.3678***	0.3038***	0.2992***
	(5.36)	(5.30)	(3.61)	(3.58)
High Regulatory Intervention	-0.7183***	-0.7298***	-1.5059***	-1.5176***
	(-3.62)	(-3.82)	(-3.26)	(-3.27)
*FV Discretion * High Regulatory Intervention*	0.0285	0.1995	0.0968	0.1110
	(0.74)	(1.03)	(1.30)	(1.47)
Constant	1.2879**	1.3268***	1.4514**	1.4914**
	(2.52)	(2.59)	(2.46)	(2.52)
Clustered standard errors	Firm	Firm	Firm	Firm

Fixed effects	Year	Year	Year	Year
Observations	1,059,949	1,059,949	748,049	748,049
Pseudo R-squared	0.253	0.253	0.263	0.263

Panel B: Firm-level analysis

FV Discretion measure:	*Average*
High Reg. Int. measure:	*IRIS*
Variable	*(1)*
Average FV Discretion	0.7083***
	(4.03)
Average Lag FV to Cost	1.4388***
	(2.88)
Average Delta FV	5.6385***
	(5.63)
Average Number of Holders	-0.0235***
	(-6.34)
Average Traded	0.1993
	(0.41)
Average Lead Disposal	3.0452***
	(5.08)
Average Speculative	15.8038***
	(4.52)
Average Downgrade	1.0150
	(1.37)
Average Common Stock	-1.4461***
	(-3.45)
Average Preferred Stock	-3.8322***
	(-3.96)
Life	-0.1313
	(-0.37)
Governance	-0.3130
	(-1.07)
Average Holding Size	-0.0182***
	(-5.03)
Average US Govt Issuer	-0.8273*
	(-1.79)
Average State Issuer	-2.1698***
	(-3.74)
Average ABS	-3.1085***
	(-4.76)
Average Short-Term Maturity	-0.7185*
	(-1.87)
Average Long-Term Maturity	0.2390
	(0.29)
High Regulatory Intervention	-0.3875**
	(-2.07)
*Average FV Discretion*High Regulatory Intervention*	-0.1528
	(-1.42)
Constant	1.7011***
	(2.91)
Clustered standard errors	Firm
Fixed effects	Year
Observations	11,405
Pseudo R-squared	0.220

This table presents estimation results from regressions with *Impairment* as the dependent variable. Panel A presents the security level analysis where *Impairment* is an indicator variable equal to one if the security was impaired in year *t*, and zero otherwise. Column 1 presents the results when *FV Discretion* is a continuous variable, measured as the ratio of the standard deviation of FV per unit, divided by the mean value of FV per unit. The proxy for *High Regulatory Intervention* is based on the NAIC IRIS ratios. Column 2 presents the results when FV Discretion is an indicator variable equal to one for the top decile of the fair value coefficient of variation. The proxy for *High Regulatory Intervention* is based on the NAIC IRIS ratios. Column 3 presents the results when *FV Discretion* is a continuous variable and the proxy for *High Regulatory Intervention* is based on the NAIC RBC ratio. Column 4 presents the results when FV Discretion is an indicator variable equal to one for the top decile of the fair value coefficient of variation and the proxy for *High Regulatory Intervention* is based on the NAIC RBC ratio. Panel B presents the firm-level analysis with *Impairment* measured as the average impairment for the current year and *High Regulatory Intervention* based on the NAIC IRIS ratios. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.

Table 5
Fair value measurement discretion and incentives for earnings management (H2)

FV Discretion measure:	*Continuous*	*Continuous*	*Average*
High Reg. Int. measure:	*IRIS*	*RBC*	*IRIS*
Variable	*(1)*	*(2)*	*(3)*
High Regulatory Intervention	0.3047	0.2514	0.0013
	(1.07)	(0.62)	(1.24)
Delta FV	1.9732***	1.7108***	-0.0086***
	(4.74)	(3.51)	(-4.56)
Number of Holders	0.0335***	0.0323***	0.0002***
	(15.52)	(12.99)	(10.73)
Traded	-0.1405	-0.1478	-0.0042*
	(-1.64)	(-1.45)	(-1.94)
Lead Disposal	-0.3917***	-0.3806***	0.0037
	(-3.46)	(-2.89)	(0.57)
Speculative	-1.3871***	-1.4169***	0.0070***
	(-10.84)	(-9.93)	(3.39)
Downgrade	-0.5853***	-0.5564***	-0.0055
	(-4.15)	(-3.17)	(-1.55)
Common Stock	-0.2671	-0.5398*	-0.0037**
	(-0.94)	(-1.72)	(-2.18)
Preferred Stock	-0.3403	-0.9722	-0.0054*
	(-0.41)	(-1.15)	(-1.85)
Life	0.4979***	0.4176*	-0.0006
	(2.73)	(1.88)	(-0.93)
Governance	-0.3952**	-0.4531*	-0.0015**
	(-2.04)	(-1.79)	(-2.35)
Holding Size	0.6008***	0.7236***	-0.0001***
	(3.17)	(2.78)	(-4.40)
US Govt Issuer	0.7525**	0.8957**	0.0003
	(2.39)	(2.19)	(0.14)
State Issuer	-1.0179***	-1.3978***	-0.0003
	(-3.12)	(-3.50)	(-0.17)
ABS	-0.7923***	-0.8143***	0.0004
	(-7.38)	(-6.87)	(0.27)
Short-Term Maturity	0.5286***	0.6162***	0.0044**
	(3.57)	(3.34)	(2.18)
Long-Term Maturity	0.1154	0.1806	-0.0002
	(0.94)	(1.17)	(-0.11)
FV Discretion	-0.0040	-0.0117	0.0047***
	(-0.23)	(-0.58)	(3.30)
Constant	0.8666**	0.8314*	-0.0041**
	(2.04)	(1.81)	(-2.44)
Clustered standard errors	Firm	Firm	Firm
Fixed effects	Year	Year	Year
Observations	22,959	15,730	11,405
Pseudo R-squared	0.339	0.336	0.108

This table presents estimation results from logit regressions with *FV Failure* as the dependent variable. Column 1 (2) presents security level analysis when the proxy for *High Regulatory Intervention* is based on the NAIC IRIS (RBC) ratios. For all observations for which the cost of the security is in the reasonable range, and some holder recognized an impairment loss in year t, *FV Failure* is an indicator variable equal to one if: 1) the holder did not recognize an impairment loss in year *t*; 2) the reported fair value of the security is greater than cost. Column 3 reports the firm-level analysis. *FV Failure* is measured as the percentage of the portfolio designated as *FV Failure* at the security level. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.

Table 6
Non-fair value measurement discretion and incentives for earnings management (H3)

FV Discretion measure:	*Continuous*	*Continuous*	*Average*
High Reg. Int. measure:	*IRIS*	*RBC*	*IRIS*
Variable	*(1)*	*(2)*	*(3)*
High Regulatory Intervention	0.6965***	1.5617***	0.0126**
	(3.78)	(3.93)	(2.28)
Lag FV to Cost	3.4126***	3.5820***	-0.1119***
	(10.31)	(10.15)	(-10.04)
Delta FV	1.8398***	1.8088***	0.0507***
	(14.69)	(12.90)	(5.17)
Number of Holders	0.0088***	0.0078***	0.0005***
	(6.49)	(5.40)	(4.74)
Traded	0.1126***	0.1056***	0.0650***
	(3.48)	(2.97)	(3.36)
Lead Disposal	-0.4602***	-0.4751***	0.2109***
	(-6.23)	(-5.74)	(4.65)
Speculative	-1.0058***	-1.0004***	-0.0438***
	(-10.59)	(-8.77)	(-3.75)
Downgrade	-0.8465***	-0.8096***	-0.0160
	(-9.58)	(-8.75)	(-0.62)
Common Stock	-1.2558***	-1.4374***	0.0959***
	(-6.05)	(-5.78)	(8.25)
Preferred Stock	-0.8200***	-0.9273***	-0.0056
	(-4.42)	(-4.11)	(-0.34)
Life	0.2305	0.2222	0.0045
	(1.23)	(0.99)	(0.71)
Governance	-0.2871	-0.3026	-0.0002
	(-1.42)	(-1.30)	(-0.03)
Holding Size	1.0144***	1.1199***	-0.0000
	(4.99)	(4.13)	(-0.04)
US Govt Issuer	0.3523*	0.4488**	0.0245***
	(1.88)	(2.11)	(2.68)
State Issuer	-0.7504***	-0.7881***	0.0063
	(-4.69)	(-4.39)	(0.58)
ABS	-0.8346***	-0.8076***	0.0131
	(-8.50)	(-7.14)	(1.18)
Short-Term Maturity	0.1045	0.1425	0.0102
	(1.31)	(1.50)	(1.24)
Long-Term Maturity	-0.1702**	-0.1429	0.0219**
	(-2.25)	(-1.58)	(2.06)
FV Discretion (continuous)	-0.0313***	-0.0284**	-0.0029
	(-3.15)	(-2.45)	(-0.79)
Constant	-1.3195**	-1.4547**	0.1193***
	(-2.52)	(-2.48)	(10.37)
Clustered standard errors	Firm	Firm	Firm
Fixed effects	Year	Year	Year
Observations	205,699	144,733	11,405
Pseudo R-squared	0.166	0.167	0.312

This table presents estimation results from logit regressions with *Non-FV Failure* as the dependent variable. Column 1 (2) presents security level analysis when the proxy for *High Regulatory Intervention* is based on the NAIC IRIS (RBC) ratios. *Non-FV Failure* is an indicator variable equal to one if 1) the holder did not recognize an impairment loss in year *t*; 2) another holder of the security recognized an impairment loss in year *t*; and 3) the reported fair value of the security is less than cost, and zero otherwise. Column 3 reports the firm-level analysis. *Non-FV Failure* is measured as the percentage of the portfolio designated as *Non-FV Failure* at the security level. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.

Table 7
Optimistic fair value reporting and loss recognition, within CUSIP (H4)

FV Discretion measure:	*Continuous*	*Continuous*	*Continuous*	*Continuous*
High Reg. Int. measure:	*IRIS*	*RBC*	*IRIS*	*RBC*
Variable	*(1)*	*(2)*	*(3)*	*(4)*
Impairment	-0.0001**	-0.0001***	-0.0001***	-0.0001***
	(-2.41)	(-3.29)	(-2.92)	(-3.36)
Lag FV to Cost	-0.0000	-0.0000	0.0001***	0.0001***
	(-1.55)	(-0.72)	(6.15)	(5.22)
Delta FV	-0.0002***	-0.0003***	-0.0006***	-0.0007***
	(-6.88)	(-6.20)	(-10.69)	(-8.87)
Lead Disposal	-0.0000***	-0.0000***	-0.0001***	-0.0001***
	(-3.74)	(-3.35)	(-6.52)	(-5.92)
Life	-0.0001***	-0.0001*	-0.0001**	-0.0001*
	(-3.09)	(-1.80)	(-2.20)	(-1.86)
Governance	0.0001**	0.0001	0.0000	0.0000
	(2.18)	(1.24)	(0.78)	(0.74)
Holding Size	-0.0000	-0.0000	-0.0000	0.0000
	(-0.50)	(-0.19)	(-0.41)	(1.06)
Short-Term Maturity	-0.0001***	-0.0001***	-0.0000	-0.0000
	(-3.58)	(-2.94)	(-0.40)	(-0.90)
Long-Term Maturity	0.0002	0.0001	0.0001	0.0001
	(1.25)	(0.67)	(1.19)	(1.19)
High Regulatory Intervention	0.0000	0.0000	-0.0001	0.0002
	(0.01)	(0.55)	(-0.93)	(1.31)
*Impairment*High Regulatory Intervention*	-0.0004	-0.0009**	-0.0003	-0.0010**
	(-1.25)	(-2.32)	(-1.04)	(-2.54)
Constant	0.0003***	0.0002***	-0.0001	-0.0001**
	(5.54)	(4.05)	(-1.51)	(-2.46)
Clustered standard errors	Firm	Firm	Firm	Firm
Fixed effects	CUSIP and Year	CUSIP and Year	CUSIP and Year	CUSIP and Year
Observations	597,691	391,288	3,018,457	2,018,459
Adj. R-squared	0.118	0.148	0.059	0.080

This table presents estimation results from OLS regressions with *Optimism* as the dependent variable. *Optimism* is measured as the difference between the reported fair value of the security less the implied fair value of the security measured at median values, scaled by the implied fair value of the security. *Impairment* is an indicator variable equal to one if the security was impaired in year *t*, and zero otherwise. Column 1 (2) presents security level analysis when the proxy for *High Regulatory Intervention* is based on the NAIC IRIS (RBC) ratios and when a holder of the security impaired the security in the current year. Column 3 (4) presents security level analysis when the proxy for *High Regulatory Intervention* is based on the NAIC IRIS (RBC) ratios for the entire sample of securities. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.

Table 8
Optimistic fair value reporting and loss recognition, cross-CUSIP (H4)

FV Discretion measure:	*Continuous*	*Continuous*
High Reg. Int. measure:	*IRIS*	*RBC*
Variable	*(1)*	*(2)*
Impairment	-0.0001***	-0.0001***
	(-3.11)	(-3.72)
Lag FV to Cost	0.0001***	0.0001***
	(4.35)	(4.52)
Delta FV	-0.0006***	-0.0007***
	(-10.74)	(-8.81)
Number of Holders	0.0000***	0.0000***
	(4.47)	(2.80)
Traded	0.0001***	0.0001***
	(5.75)	(4.73)
Lead Disposal	-0.0001***	-0.0001***
	(-5.88)	(-5.02)
Speculative	0.0003***	0.0002***
	(4.15)	(2.71)
Downgrade	-0.0000	-0.0000
	(-0.44)	(-1.12)
Common Stock	-0.0001***	-0.0001**
	(-3.60)	(-2.21)
Preferred Stock	-0.0002***	-0.0002***
	(-3.96)	(-3.58)
Life	-0.0001**	-0.0001*
	(-2.18)	(-1.74)
Governance	0.0000	0.0000
	(0.78)	(0.68)
Holding Size	-0.0000	0.0000
	(-0.16)	(1.04)
US Govt Issuer	-0.0003***	-0.0002***
	(-6.59)	(-4.97)
State Issuer	-0.0000	-0.0001*
	(-1.33)	(-1.66)
ABS	-0.0002***	-0.0002***
	(-6.10)	(-5.49)
Short-Term Maturity	-0.0000	-0.0000*
	(-0.83)	(-1.94)
Long-Term Maturity	0.0000	-0.0000
	(0.78)	(-0.12)
High Regulatory Intervention	-0.0001	0.0002
	(-0.80)	(1.23)
*Impairment*High Regulatory Intervention*	-0.0004	-0.0010**
	(-1.29)	(-2.47)
Constant	-0.0000	-0.0001
	(-0.56)	(-1.16)
Clustered standard errors	Firm	Firm
Fixed effects	Year	Year

Observations	3,018,457	2,018,459
Adj. R-squared	0.002	0.002

This table presents estimation results from OLS regressions with *Optimism* as the dependent variable. *Optimism* is measured as the difference between the reported fair value of the security less the implied fair value of the security measured at median values, scaled by the implied fair value of the security. *Impairment* is an indicator variable equal to one if the security was impaired in year *t*, and zero otherwise. Column 1 (2) presents security level analysis when the proxy for *High Regulatory Intervention* is based on the NAIC IRIS (RBC) ratios. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.

Table 9
Additional analysis on fair value levels

Panel A: Descriptive statistics for the fair value levels sample

Fair Value Level	*N*
Level One	537,489
Level Two	1,861,947
Level Three	45,515
Total Observations	2,444,951

Panel B: Regression results for the fair value levels sample

Hypothesis:	*H1*	*H2*	*H3*
High Reg. Int. measure:	*IRIS*	*IRIS*	*IRIS*
Variable	*(1)*	*(2)*	*(3)*
Level Three	0.3941**	-0.0842	-0.6765***
	(1.97)	(-0.47)	(-3.01)
High Regulatory Intervention	-0.6786***	0.3034	0.7065***
	(-4.05)	(1.07)	(3.85)
*Level Three*High Regulatory Intervention*	0.1684		
	(0.27)		
Controls	Yes	Yes	Yes
Clustered standard errors	Firm	Firm	Firm
Fixed effects	Year	Year	Year
Observations	1,059,949	22,959	205,699
Pseudo R-squared	0.252	0.339	0.167

This table presents estimation results using the sample of observations reporting fair value levels. Panel A provides descriptive statistics on the observations across the Level One, Level Two and Level Three designations. Panel B reports the regression results. *Level Three* is an indicator variable equal to one when the security uses Level Three inputs. The proxy for *High Regulatory Intervention* is based on the NAIC IRIS ratios. Column 1 presents results when *Impairment* is an indicator variable equal to one if the security was impaired in year *t*, and zero otherwise. Column 2 reports results using *FV Failure* as the dependent variable. For all observations for which the cost of the security is in the reasonable range, and some holder recognized an impairment loss in year t, *FV Failure* is an indicator variable equal to one if: 1) the holder did not recognize an impairment loss in year *t*; 2) the reported fair value of the security is greater than cost. Column 3 presents results with *Non-FV Failure* as the dependent variable. *Non-FV Failure* is an indicator variable equal to one if 1) the holder did not recognize an impairment loss in year *t*; 2) another holder of the security recognized an impairment loss in year *t*; and 3) the reported fair value of the security is less than cost, and zero otherwise. The full set of control variables is used for each regression. Year fixed effects are included in the model and standard errors are clustered by firm. All other variables are defined in Appendix 1. Continuous variables are winsorized at the 1st and 99th percentiles. ***, **, and * denote two-tailed statistical significance of coefficient estimates at the 1, 5, and 10 percent levels, respectively.